



Instituto Interuniversitario de Desarrollo Social y Paz

**MÁSTER UNIVERSITARIO INTERNACIONAL
EN ESTUDIOS DE PAZ, CONFLICTOS Y DESARROLLO**



Master's degree final dissertation

Structural violence, Diabetes and Agrocolonialism

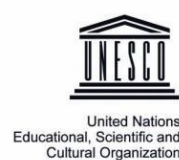
A case study of the United States, Mexico, India and the Pacific Islands

Presented by Bart Jurriaan ter Huurne

Supervised by José Ángel Ruiz Jiménez

Tutor: Sonia París Albert

Castelló Junio/Julio (2015)



UNESCO Chair of Philosophy for Peace



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Keywords: Peace, Agricultural policies, Agro-colonialism, Diabetes, Structural, Cultural, Violence, Galtung

Abstract: *This dissertation will focus on how agricultural policies can be a form of structural violence and how part of this violence manifests itself in the form of Diabetes Mellitus, which is the name for a group of non-communicable diseases. Furthermore, this dissertation will also shortly discuss the interrelatedness of structural and cultural violence and draw from the theories of Johan Galtung. The set-up of the dissertation will be the following; after a short introduction, diabetes will be defined, then part of the theory of Galtung will be explained. After that, what is arguably the origin of the structural violence will be discussed. Once that is clear, I will analyse through case studies how this violence is being spread to other countries.*



ACKNOWLEDGEMENTS

I want to thank all my friends and family for their support during the writing process of this dissertation. Also I want to thank my girlfriend Inna in believing in me even though I myself doubted a lot and I am still doubting whether my efforts have been enough.

Furthermore, I want to especially dedicate this dissertation to my Grandparents Huib Straatman and Gerrie Ammerlaan-Straatman whom I both lost during the writing process of this thesis. It has not made things easier, but it made this time a special period full with stress, sadness but also joy. I hope that both of you can watch over me as I take the next step in my life.

Rust zacht lieve opa en oma, ik mis jullie heel erg en ik zal jullie nog heel erg veel meer missen!

Also, I want to thank my supervisor and also friend Jose Ángel who with his course Armed Conflicts, has opened my eyes. His teaching made me aware of how many conflicts were not what they seemed, but there were many motives behind the wars. Furthermore, this course made me very aware of how the media of my country the Netherlands, which as a kid and teenager I always thought to be quite objective, was actually deceptive and had shaped a false worldview in me and probably many others. It is this awareness that has started to make me curious and to look further into matters and this is what has inspired me for this thesis, since I suspect that agricultural policies as well as food aid serve for economic and political motives that are often hidden in the shadows. But also I want to thank Sidi Omar and Alberto Gomes for giving some help and advice which has been very helpful.

Also, I want to thank this master for opening my eyes and to all my classmates and teachers who have helped in that process. As well as the UNESCO chair of peace and everyone that

was involved with this master program. It has been a very special program that has changed fundamentally how I perceive the world.

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Introduction

This dissertation will focus on the global diabetes epidemic, however it will not focus merely on the disease, but more so on the violent structures that are causing this dreadful epidemic. I believe that this epidemic also needs to be addressed from a different perspective than only a public health perspective. These harmful structures also are a violation of a significant amount of human rights and I believe that public health alone would not be suitable to deal with these structures and its manifestations. I believe that there is a need for a perspective that stems from many different disciplines, a so called transdisciplinary perspective. The disciplines that are involved in this dissertation are Peace, Development, Health, Nutrition, Economics, Business, Politics, Sociology and arguably more. I combine these perspectives with my personally situated perspectives and opinions in order to hopefully create a very direct piece of academic literature.

This master program has changed my writing style completely; it went from an “objective” writing style with which I wrote my bachelor thesis on: “How stress affects the consumer decisions”, to a more direct and more personal style of writing. I believe now that hiding yourself behind an so called objective facet, which despite being utterly impossible is also a very limited style of writing. Everybody has their own situated knowledge according to Donna Haraway (1988). Furthermore, according to Vincent Martínez Guzmán (2001) objectivity is not only impossible, but it can also be dangerous, Martínez Guzmán (2001) recommends an inter-subjective approach. Inter-subjectivity is hard to explain in words, however Owen Kelly (2012:1) attempted to do so and states the following: “An intersubjective truth asserts a “fact” that a group of people agree implicitly to treat as axiomatic, and as though it were an objective truth”. This basically implies that what we see as objective is constituted by our own relations with others and is formed through our

agreements. If facts origin from implicit mutual agreement through the interactions between people, could we still argue that objectivity is possible? Personally, I believe that it is thus impossible to be objective, I will on many occasions use the word “fact” but I do not see this as an absolute truth but more as something that is or would be agreed on. What I consider to be facts might not be facts to others.

That however does not imply, that I do not believe in being scientific while writing this thesis, but it means that I might have a different perspective on science than what is constituted as the current hegemonic definition of science. Also I am in favour of a trans-modern approach which basically favours the generation of knowledge through debates and these debates should not only happen between the so called scientists, but it should also include many different groups of people such as policymakers, politicians, but also for example regular people that are involved in one way or another. It would be foolish to just dismiss the knowledge of everybody that has not scientifically studied in certain matter, perhaps some people have lived with the very problem that the scientist is trying to solve for all their life and they possess valuable experience and knowledge that this scientist will never be able to obtain through his scientific research. However, trans-modernity in my opinion should be a cultural trans-modernity which is explained by Enrique Dussel (2006) and I have added a diagram of Dussel (2006) in the appendix in Part A.1. Furthermore, as I have mentioned earlier I will use transdisciplinary approach, because I believe that generally the best approach to generate knowledge to solve matters and problems is to generate knowledge by combining the knowledge of scientists from different fields, people with life experience related to those matters as well as to draw from the different cultures that exist throughout the world. In the West we tend to think that our culture with its objectivity and knowledge is superior, but throughout this dissertation I believe that I will make clear that some of the very foundations of the “western” society such as agricultural policies are harmful to the western

Societies themselves, but also to others through the rapid spread of Western ideals throughout the world.

To apply this transdisciplinary approach in my dissertation I draw from the work of John Synott (2004) who stresses the importance of a transdisciplinary perspective in global and international studies. Synott (2004) argues that his approach to globalisation attempts to move beyond the restrictions of trying to make sense of the world from a particular perspective of discipline. This is why I first analyse the origin of structures in my thesis, by applying knowledge from peace, development politics, nutrition, health and economics. In the latter part of this dissertation I will mainly use a peace, development and health perspective to discuss the effects of spreading this model to other countries and the harmful effects that occur in these countries as a consequence.

My dissertation focuses on the structures that cause non-communicable diseases and for this dissertation I have decided to focus especially on Diabetes Mellitus. Many hidden interests and violence is related to diabetes. I believe that diabetes can be seen as a manifestation of the violence that is caused not only several actors, but this violence and manifestations may actually be a result of a violent structure where the general public is unaware of. In this dissertation I will apply the theory of Galtung (1969) and Galtung (1996) to address a part of the violence that is manifested as diabetes. Also, I want to emphasise the importance of a more structural transdisciplinary approach to health.

Mark Hyman MD (2010) gives a clear example in his article that some medical diseases for a large part can be treated by changing the structures and thus the system rather trying to treat the symptoms. Because of the fact that there is a clear influence from the system that compasses much more than the mere domain of public health, but it also encompasses politics, economics and many other disciplines. The peace perspective makes the dissertation more powerful, it does not just see diabetes as a health problem, but also as a

manifestation of structural, cultural violence and also a violation of human rights, that should be solved by mainly transforming the structures that are causing this violence.

My dissertation will only briefly focus on diabetes in the introductory chapter and after that it will mainly focus on the structures that cause the disease. I have taken this approach not only because of the fact that I am not capable of solving the symptoms of diabetes, I think that preventing the disease by deconstructing and reconstructing the structures that are largely responsible for the rapid spread of the disease will be significantly more effective. So I do not have the expertise of a doctor that has concentrated his research on diabetes, however my education in Peace, Conflict and Development has equipped me with the tools to deconstruct discourses and analyse systems that are in place, which I will thoroughly do in this thesis.

Also, this dissertation is very relevant to this master, because I will clearly illustrate in the later stages of this thesis, how the desire to develop the other can have very negative consequences. Globalisation has many consequences, and not all of these consequences are necessarily bad, but in this dissertation I will demonstrate how in my opinion flawed structures that are already a breach of human rights in the United States, are being spread to other countries for political, economic and arguably humanitarian purposes, but the implementation of these structures causes a great deal of grievance in many parts of the world. Surely this structure also has its benefits, but I would like to focus on the harm that it causes in order to create awareness that will hopefully lead to a positive transformation of these structures. I will now shortly discuss the structure of my thesis.

The structure of this dissertation will be the following; I will first discuss what diabetes is, which types of diabetes there are. Also I want to clearly distinguish the effects of diabetes on men and women. The overall risk of type II diabetes may be statistically similar for men and women, but in practice I would say that women are more likely to develop a

form of diabetes. Women also have the risk of obtaining gestational diabetes during pregnancy, men do not have this form of diabetes and also despite the fact that gestational diabetes is temporary it does increase the risk of developing type II diabetes later in life. In addition to there are also social-economic differences that may play an important role in the development of type II diabetes. After describing diabetes, the growth of the disease will be discussed and the implications of the epidemic will be discussed both in the short term and especially the long term, since the disease is expected to grow significantly.

After this overview of diabetes, I would like to address the situation in the United states of America and how agricultural policies, the consumption of refined foods and the to some degree how current hegemonic discourses that are in place have led to a massive increase in individuals with diabetes and how the situation is expected to worsen. This chapter of my dissertation will largely focus on the origin of the harmful structures that lead to the manifestation of diabetes. Also I want to relate the structural violence to the cultural violence in the United States to gives an example of how these two forms of violence can interact.

With the origin of the structure that is spread through globalisation, I would like to demonstrate the effects of the implementation of similar policies, consumption of processed foods sold worldwide by multinationals and the spread of modernistic health-related discourses are drastically more harmful when all these factors occur in the so called the “developing countries”. Western countries like the United States are actively trying to reform these countries. Perhaps this interference with these countries politics stems from benevolence and the willingness to help but perhaps this interference is also powered by Economic and Political interests of Western Countries. I believe that it is a combination of both. However what is very important to discuss is that these interferences can also cause a great deal of suffering.

Populations in these countries suffer from structural violence as the population of the United States does, but the degree of suffering does not compare. These people due to different genetics/childhood are much more susceptible to the effects of consuming the same type of foods and beverages as most Americans or Europeans. This should be taken into account with the fact that the transformation of these structures occurs so much more rapidly than it has done so in the United States and in Europe. The consumption of these products has been leading to a negative spiral of which mothers with diabetes are very likely to give birth to children with a very high probability of even around 70% of developing type II diabetes around their 20's to 30's. This is expected to lead to extremely sick populations in these countries because of the implementations of agricultural policies of what is called the "Green Revolution" and the mass consumption of processed foods sold by multinationals who are dominating more and more of the global food and beverages market. Many of these countries are expected to transform from countries where undernourishment was a frequent problem to countries where the majority of the population suffers from diabetes and obesity. However, in some cases the poor suffer from a double burden, where in the same household obesity and diabetes can occur as well as undernourishment. This is an interesting paradox which I will explain later in this thesis.

Also this dissertation will use several case studies that describe the past development in the countries Mexico, India and several of the Pacific Island nations, the current situation as well as the estimations of what will happen in these countries if the current structures of that shape the agricultural policies of the world and the overconsumption of processed foods sold by capitalistic transnationals and multinationals does not stop or change. The idea behind these case studies is that I cannot properly address all countries that are affected by the spread of these harmful structures, but I have chosen some of the most clearly affected as well as some of the most representative countries.

To investigate all of the earlier mentioned issues I will use the following main research question: “How do the economic and political structural factors behind agricultural policies and the related growth of the food industry cause violence that manifests itself in the form of diabetes in the United States and how the implementations of similar structures in other countries cause similar forms of violence.” I divided this research question in two sub questions which are respectively: “How do modern agricultural policies and the consumption of refined/processed foods lead to diabetes in the United States?” , and the other question is; “How do the rapid implementation of American-like agricultural policies and the increasing global consumption of food and beverages from multi-national companies as well as local food companies combined affect low and middle income countries in terms of diabetes?”

After having given this introduction, I will now start with chapter 1 in which I will explain what diabetes is. This part does include a lot of health definitions as well as some statistics, but I believe that health is an essential discipline that should be incorporated in my approach to discuss the structures that I want to tackle, because if I do not understand what diabetes is and what causes is, I will not be able to properly analyse how it is related to structural and cultural violence.

Chapter 1: What is Diabetes and how is the amount of people with the disease expected to grow?

Description of Diabetes

For this section of this dissertation I will mainly make use of Medical news today (2015) and the “Diabetes Atlas” of the International Diabetes Federation (2013), Also I will use some of my own knowledge which I have obtained by following the course from Coursera (2014); “Diabetes: a global challenge” at www.coursera.org. It should be noted that I have followed

the 2014 course and not the course of this year. However, I expect that there will be little differences between these courses. The 2015 course came out while I had already started with writing my thesis. Now I will start with explaining what diabetes is.

According to Medical news today (2015), diabetes which is often referred to by doctors as Diabetes Mellitus, is the name of a group of metabolic diseases in which the patient has high levels of blood glucose which is often called high blood sugar. The cause of this high blood sugar is usually because the body does not produce enough insulin or because the cells of the body do not respond properly to insulin, however it can also be a combination of these two factors.

So insulin is clearly a very important factor for all types of diabetes, so what is insulin? Insulin is a hormone produced in the body, which triggers a reaction of the cells of our body to absorb glucose from our bloodstream. The glucose gets stored in the liver and/or muscles as glycogen and inhibits the body to use fat as a fuel source. Low values of insulin but also insulin resistance of the cells will result in little glucose uptake to the body's cell. As a result fat has to be used to as a source of energy by the body. However, the role of insulin is bigger than that, insulin is also a signal for other physiological processes in the body such as the uptake of amino acids by the cells of the body. Amino acids are basically the building blocks for many of the processes in the body. So, not being able to effectively use the building blocks of your body is detrimental for the proper development or restoration of your body. In the next part of this chapter, I will shortly describe the different types of diabetes, but before that I will shortly explain why this classification of types of diabetes is arguably problematic.

Currently, individuals are diagnosed as either non-diabetic, pre-diabetic, diabetic type II or diabetic type I. Personally I prefer the approach of Brooks-Worrel and Palmer (2011) who argue that Diabetes can better be seen as a continuous spectrum and that distinction

between the diseases should be focus on the involvement of the immune-system in the destruction of the beta-cells in the Pancreas. I believe that this is more accurate, because current research according to Brooks-Worrel and Palmer (2011) suggests that it can be seen better as a spectrum. The end stages of diabetes type II are very similar to type I diabetes whereas the pancreas is damaged and the body will be dependent on an exogenous source of insulin. I will not go any further into this, but I found it striking that the professors of the Coursera (2014) course did not extensively mention this approach. Currently, the hegemonic discourse of diabetes still makes the clear distinction between type I and type II diabetes and does not take into account that it might be more of a spectrum.

I believe that a spectrum approach, will improve the attitude towards the problem as well as provide more insights of how the disease progresses. A static definition of a disease that progresses is arguably not the most efficient way to deal with a disease such as diabetes. However, because the current knowledge paradigm uses the definitions of type I and type II diabetes; I will keep using the mainstream definitions, but I believe that it is important that more people know of the approach of Brooks-Worrel and Palmer (2011). I will now start with explaining type I diabetes.

The first type of diabetes that I will explain is type I diabetes. Type I diabetes has been discovered for a very long time and was considered to be a rare disease, but it is occurring more and more frequently and this frequency is increasing in a rapid pace. Type I diabetes is a condition that originates from an auto-immune disease. A strong auto-immune response in the body has resulted in the destruction of the beta-cells in the pancreas. The beta-cells which are the cells that produce insulin are permanently destroyed by this auto-immune response and cannot be restored by the human body. As a result of this auto-immune response the body is no longer able to produce insulin.

What are the symptoms that people who have developed the condition of type I diabetes experience? According to WebMD (2014) which bases its knowledge on the “natural medicines comprehensive database written by Jellin and Gregory (2009); people with type I diabetes experience a large variety of symptoms. Some of these symptoms are due to high blood sugar which include: frequent urination which happens because the kidneys are trying to get rid of the excessive amount of blood sugar, being thirsty due to being dehydrated due to frequent urination, weight loss because of dehydration, increased hunger because the body is not capable of efficiently using all the calories, blurry vision because of a sugar build up in the lens of your eye and feeling hungry because your body cannot use all the calories that you are consuming.

Besides the symptoms that are caused because of the high levels of blood glucose there are other symptoms that are caused by diabetic ketoacidosis, which according to WebMD (2014) happens because the cells cannot receive sugar for energy and as a result muscle and fat tissue are being broken down in order to get energy. This leads to ketones and fatty acid production and these substances will then enter into the bloodstream and this in turn causes a chemical imbalance that caused the condition of diabetic ketoacidosis.

Symptoms caused by diabetic ketoacidosis include a flushed, hot or dry skin, loss of appetite, belly ache, vomiting, strong breath odour, rapid and hard breathing, but also restlessness, drowsiness, difficulties waking up, confusion and even comas. Also low blood sugar generally occurs with individuals that have developed the condition of type I diabetes. Symptoms of low blood sugar include sweating, shakiness, weakness, hunger and confusion. However, there are more problems when it comes to type I diabetes, usually people with the condition of type I diabetes attempt to manage their blood sugar levels tightly to prevent certain earlier mentioned complications such as problems with the eyes, but also in order to prevent kidney and heart problems; with the latter two being some of the more dangerous and

lethal consequences of having abnormal blood glucose levels. However, it should be noted that it can be very difficult to manage blood sugar levels. For example, adolescents experience rapid growth spurts and have to deal with changing hormone levels. For example high levels of human growth hormone will result into a rise of blood sugar, since blood sugar acts as a regulator for human growth hormone production. Similarly with anxiety, depression or panic; hormone changes are also common. WebMD (2014) does not clearly mention the exact relationship between these emotions and the rise of blood sugar, but from my own knowledge I would say that this is due to the production of the hormone cortisol. Cortisol often known as the stress hormone will increase the blood glucose levels as the production of this hormone continues. From this fact and the previously mentioned fact you can even see risks in sleeping, because during the beginning phases sleep; growth hormone production starts which will elevate blood glucose levels until the blood sugar rises to a certain level and then growth hormone production will stop. After this, starts the production of the hormone cortisol, which also increases the blood glucose levels. This is a normal process for all humans but, you could imagine that if blood sugar is already high before sleeping that the hormone production cycle gets disrupted. This cycle is fundamental for every human being to have a healthy body that functions properly. Also, if your blood sugar goes up because of cortisol production which naturally goes up during your sleep and your body has difficulties with regulating blood sugar levels due to not being able to produce insulin, then it is clear that it can be very complicated to manage your blood sugar levels effectively. Other issues with blood sugar levels are usually due to Thyroid or Kidney problems, Gastroparesis which is nerve damage which causes the stomach to contract differently.

But also eating disorders could affect blood sugar levels. This especially holds for women that have developed the condition of type I diabetes, because the way society is formed puts more pressure on them to be skinny. This is explained by Jane Kilbourne (1996)

who in the book “feminist perspective on eating disorders” of Fallon and others (1996) explains how harmful modern society pressures women to be skinny. And how is this related to type I diabetes? Well, insulin causes the cells to rapidly absorb nutrients, thus insulin could lead to significant weight gains, which if you want to be skinnier can be undesirable. So this can be a dilemma of a person that has type I diabetes and wants to lose weight, in some cases this will lead to not taking insulin injections as it should, which is very harmful to the person that has developed the condition of type I diabetes.

Now after having stated some of the symptoms and problems that people with type I diabetes, I will continue with explaining type I diabetes. Most people develop the type I Diabetes condition before the age of 40, but in general it develops before the age of 18. However, it should be noted that the specific auto-immune reaction can occur at any age. Lately, it also seems to occur more often at later stages in a person’s life, this could be due to the increased exposure to certain structures that are harmful. Around 15 percent of the people that have diabetes have type I diabetes. However as you will see later in this thesis, other types of diabetes are more common. People with type I diabetes need an exogenous source of insulin or the disease will be fatal for them. Insulin injections are one of the most common examples of insulin from an exogenous source.

Type I diabetes is not preventable according to some doctors with the current knowledge about the immune-system, but I believe that we should just focus more in identifying the structures that cause type I diabetes. The effects of type I diabetes cannot be reduced through diet or exercise. However, diet and physical exercise can be very useful to regulate the blood sugar levels in a natural way. Combining these measurements and insulin from an exogenous source, the effects of diabetes type I can be controlled, but unfortunately the effects cannot be reversed because the beta-cells in the pancreas are simply destroyed. This would mean that type I is a permanent condition that cannot be cured, but only managed.

In some cases, success has been achieved with transplanting a pancreas and because of this the body was able to produce insulin again. So for some cases this can be a solution, however organ transplantation are expensive and not always without any complications. Auto-immune responses can occur as well as a result of organ transplantations. Current research thus focuses on Stem cell research, in theory all cells can be produced from a stem cell, as well as all cells can be reverted back to a stem cell as is argued by the Japanese 2012 Nobel Prize winner Shinya Yamanaka who discovered that mature cells can be reprogrammed to become pluripotent. This basically means that you can convert a stem cell into a beta-cell and then convert it back to a stem cell. Despite all these recent advances in knowledge regarding stem cells and beta cells, it seems that we are still relatively far from curing type I diabetes.

Because in practice the production of endocrine cells such as the beta cells in the Pancreas from stem cells has been a difficult process and little success has been achieved. Knowledge in this field is increasing, but the knowledge of today is not sufficient. Successful creations of beta-cells in mice have occurred but the majority of the cells were destroyed later as a result of an auto-immune reaction as can be seen in the experiment of Nir, Melton and Dor (2007). Stem cells would be a sustainable solution from a western-scientific point of view because from a single embryo, unlimited amounts of stem cells can be obtained through multiplication. But I would argue that unless the immune-responses are properly understood this approach would not be very fruitful. Additionally, you could argue that if the immune-response that leads to diabetes is understood that the disease can be prevented anyways so a transplantation of a pancreas or beta-cells would in many cases not even be necessary. You could transform the structures or prevent individual exposure to prevent the immune-reaction from occurring. Stem cell research is beneficial to eventually cure type I diabetes, but in my opinion prevention will be better than treating the disease. Also there is a large focus on the use of pharmaceutical drugs to manage the immune-reaction, but this is currently not

successful. As well as pharmaceutical drugs to manage the blood sugar levels. I believe that a more sustainable solution lies in solving the riddle of which structures cause diabetes. This is probably less complex and would require significant less research funds than to understand the complex nature of the human body and the effects of drugs.

Unfortunately, western science focuses more on the development of beta-cells and artificial drugs to keep the inflammation in check rather than trying to understand the very process that causes the auto-immune reaction in the first place. I do not say that pharmaceutical research and beta cell research is completely useless, but addressing the structures would be a better solution, but of course there is little economic profit that can be made by focusing on preventing a disease. Now after having shortly described diabetes type I, its treatment and the research that is involved with curing/preventing the disease, I will move on to the explanation of diabetes type II.

Type II diabetes

Diabetes Mellitus type II; is another variant of diabetes and is nowadays the most common variant of diabetes. In contrast to type I diabetes, diabetes type II usually develops later in life. In many cases people that have developed diabetes type II also have overweight. According to Medical news today (2015) around 55% of the people with type II diabetes were obese during the onset of diabetes. So overweight and obesity are clearly related to diabetes, but also people that are not overweight can have diabetes and even people with a lot of lean body mass such as athletes could develop insulin resistance and even diabetes.

In the case of diabetes type II a person usually does not produce sufficient amounts of insulin and/or the cells of the body are insulin resistant. Insulin resistance means that the cells of the body do not respond strongly to insulin and as a result not enough sugar will be

absorbed by the cells of the body and as a result there are high levels of glucose in the blood and the cells will not be getting sufficient glucose to get energy.

In the early stages of type II diabetes, Insulin sensitivity or moreover the lack of insulin sensitivity is the main abnormality. Insulin sensitivity is basically the opposite of the before mentioned insulin resistance. This causes high levels of Insulin in the blood in the initial stages of the disease, because the body will need more and more insulin to respond properly to the glucose in the bloodstream. There have been some medications that could improve insulin sensitivity or reduce the amount of glucose production of the liver. However, there are also natural spices such as cinnamon that can improve insulin sensitivity.

As the disease progresses the insulin production will be affected and will reduce dramatically over time as the pancreas is getting damaged. As a result the pancreas becomes permanently damaged and insulin production can by normal means not reach the levels of production that occurred before the damaging of the pancreas. Because of this, exogenous insulin is usually necessary and the individual in these stages of the disease will perhaps need to inject insulin just like somebody with type I diabetes.

Symptoms of type II diabetes are relatively similar to type I diabetes; which are increased hunger and thirst, frequent urination, unexplained weight loss, fatigue, blurred vision, headaches, loss of consciousness. Also type II diabetes can lead to impotence, skin rashes, yeast infections numbness and tingling of the hands and feet.

Also it should be important to note, that for type I diabetes, type II diabetes and even pre-diabetics all have an increased risk of getting heart and kidney complications that can result into a premature death. Many of the symptoms may not seem so severe at first as the disease progresses the symptoms get generally worse. The tingling of the hand and feet can eventually develop to the loss of feeling in hands and feet and this can become permanent. So

after having discussed some of the symptoms, I will shortly discuss whether the disease can be treated or not.

So can diabetes type II be treated? Not completely, because part of the problem is similar to type I diabetes, once a beta cell in the pancreas is destroyed it cannot be brought back. But in its early stages there is definitely the possibility to reverse the effects of insulin resistance and if the beta-cells are still largely or completely intact the condition should be reversible with a proper lifestyle. Also, the disease can be managed relatively well through diet, exercise and insulin injections. Moreover the disease can be prevented, and the disease was relatively rare a century ago, so this would most likely mean that changes in our environment and our lifestyle are the cause of this increasing number of people with diabetes. Before moving on to explaining the rise of diabetes and its “Epidemic” I would also like to address gestational diabetes which is the last type of diabetes that I will describe.

Gestational diabetes is a type of diabetes that only occurs in women during pregnancy. The cause of this type of diabetes is that during pregnancy the placenta is producing an additional amount of hormones which can lead to a build-up in blood sugar. In most cases the pancreas can produce sufficient insulin to deal with this, however in some cases the pancreas cannot produce a sufficient amount of insulin and as a result blood glucose levels will rise and this may lead to gestational diabetes.

With proper regulation of blood sugar levels, a healthy baby can still be born of a woman with gestational diabetes. However, if blood sugar levels do not get managed well, for example if the woman does not have proper access to healthcare, both the health of the mother and the child may be severely affected. Additionally, even if gestational diabetes goes away, after birth the women will be more likely to get type II diabetes later in life and the same holds for the child of the mother. So you could argue that women suffer a larger risk to contract any form of diabetes than men.

I will shortly describe the symptoms of gestational diabetes and then conclude this part of the dissertation and then move on to the rise of diabetes. The symptoms of gestational diabetes are tricky, because there are no clear symptoms. Some may be increased thirst, hunger, frequent urination and blurred vision. But the majority of these are normal during pregnancy. Usually the disease sets on between the 24th and 28th week of pregnancy. So all women should be tested for this, however not all women have proper access to healthcare, are not aware of the existence of gestational diabetes or perhaps are not worried until the final weeks of pregnancy. As you can see gestational diabetes is a very tricky condition that is hard to assess without proper testing. Lack of effective access to healthcare can be very harmful in these cases.

Also I would like to note that there are some other rare variations of diabetes, but these are very rare and I have decided not to focus on these variations. Now after having explained the three main types of diabetes, I will make a short summary and conclusion of the above and then I will move on to describe the rise of diabetes and its current epidemical state.

So some of the symptoms of the symptoms of diabetes do not seem that horrible, and the disease gets perhaps often underestimated by many people. But in this short summary I will clearly mention the seriousness because much of the violence that will be addressed in this dissertation will lead to all this suffering. So according to the IDF (2013) every 7 second a person dies from diabetes, which would mean that roughly 4.9 million people have died in 2014 because of diabetes according to the IDF (2013). Furthermore, it should be noted that people with diabetes or people that are in a pre-diabetic state which generally suffer from impaired glucose tolerance have an increases risk of getting coronary artery disease. Organisations such as the WHO (2014) contribute many deaths to coronary artery disease and strokes. However, many of these deaths are related to a form of diabetes. This explains why

there is such a large difference between the numbers of the IDF (2013) and the WHO (2014). However, even according to the WHO (2014) diabetes has been one of the top 10 causes of deaths in the last decade and it is growing. Also people in lower and middle income countries suffer more from non-communicable diseases such as diabetes.

Other effects and symptoms of diabetes as I have mentioned before are blurred vision due to dehydration of the eye, Frequent urination (Measurement of the body to get rid of glucose), Increased hunger and thirst, tiredness, slow healing from cuts and wounds and basically other processes as well, insulin is very important for the absorption of amino acids, so from this you can deduce that joints, bones and muscle recover slower as well.

Diabetes can be considered as a disease that leads to other diseases. It can lead to all kinds of problems such as the earlier mentioned coronary artery disease or strokes. But also to all kinds of other diseases and the condition generally causes inflammation in many parts of the body. Diabetes is named by some people as the mother of diseases because of the fact that the condition of diabetes generally leads to other diseases. The effects of diabetes are generally underestimated and also the symptoms of the disease are often not that visible. Which is also why about half of the people with diabetes; is unaware of the fact that they have developed the condition of diabetes. However, it is one of the main causes of deaths and if the numbers of the IDF (2013) are accurate diabetes is one of the top three causes of death in the list of the WHO (2014). Diabetes has not always caused this many deaths; which is why I will shortly discuss how the disease has risen.

The rise of Diabetes

I will now shortly discuss how the number of people with diabetes has increased significantly over the past century. After that I will discuss the current situation and the future estimations of the disease, after having done all of this I will move on to the Implications of diabetes.

The rise of type I Diabetes

So first I will describe the rise of diabetes in each of the main types of diabetes. Type I diabetes was a rare but well known disease and the disease has showed little changes in incidence from the period of 1925 to 1955 according to Edwin Gale (2002). However, Gale (2002) mentions that in the middle of the mid-century the amount of incidences of people with type I diabetes have been increasing linearly. The cause of type I diabetes is unknown, which means that it is unknown what exactly causes the auto-immune response of the body that destroys the beta-cells in the pancreas. But something that has happened, in let us say roughly the last hundred years that has been increasingly triggering auto-immune responses that lead to the condition of type I diabetes.

My thoughts are in line with those of Gale (2002) who states that: “A rapid change in incidence within a genetically stable population implies that non-genetic factors are active and that the influence of genes is relative to population, time and place. Additionally, Gale (2002) suggests that something has changed in the environment of our children. As I have mentioned before; type I diabetes usually occurs in the childhood before the age of 18. Finally, Gale (2002) argues that identifying and reversing this historical trend should be the central task to prevent type I diabetes. Even though some medics say that type I diabetes cannot be prevented, there seems to be an exogenous factor that has caused the increase of people with the condition of type I diabetes. So logically speaking unless the general gene expression of the population has suddenly changed incredibly rapidly which is very unlikely the argument of these doctors that it cannot be prevented is illogical. So you could argue that diabetes can be prevented by addressing the factors that cause the condition rather than finding a medical solution to cure the disease. Prevention is better than curing for both; the possible patient as well as the whole of society.

Only the people that would make a living out of treating diabetes would be worse off, for example insulin suppliers as well as pharmaceutical companies that try to manage the effects of type I diabetes with pharmaceutical drugs. Insulin injections are no solution to the problem, but are a way of managing the problem whereas pharmaceutical drugs can only manage the disease to a certain degree. Furthermore, preventive pharmaceutical drugs have failed so far to prevent the immune-reaction in mice when the beta-cells were transplanted into a sick mouse. Furthermore, pharmaceutical drugs could come with all kinds of adverse side-effects so a natural prevention would be desirable from a non-economic humanistic point of view. So structurally speaking, it should be possible to prevent type I diabetes to a very large degree and reduce the incidence of type I diabetes as it has been in the past or perhaps in a perfect scenario it would be possible to prevent the disease completely if the origins of the condition are completely known and if the underlying processes would be completely understood.

How far we should go back in the past to get identify which changes in structures are related to the increased incidence of type I diabetes is not clear, in the 1920's for example, there were a lot less cases then nowadays, but in the article of Gale (2002) one can conclude that even from 1900-1920 the incidence of diabetes type I has increased, so perhaps we should go back even further in time.

So after speculating about the origins of the condition let us look at how the incidence of type I diabetes has developed over the years. Green and others (1992) showed that in Denmark, the incidence of type I diabetes has almost doubled between the timeframe of the 1950's to the late 1980's. Furthermore, Gale (2002) states that the rise in incidence from the 1950's started around the same time both in Northern America as in Europe. You could argue that it is because of some change in the "Western" societies that Diabetes has started to grow. After the 1960's the incidence of type I diabetes has kept on increasing; Gale (2002) states

that from the period of the 1960's to 1996 the incidence of type I diabetes has grown with approximately 3% per year. Furthermore, from the period of 1998-2010 the incidence of type I diabetes was expected to grow with around 40% according to Onkamo and others (1999). These numbers are quite shocking, the mere fact that auto-immune diseases become more and more frequent and the incidence can increase with 40% in a little bit more than a decade in a genetically stable population means that something drastically has happened in the environment. This clearly implies that there is an increasing amount of negative influences from the structures that surround us.

So what is the number of people with type I diabetes nowadays? In the U.S. the problem is the most serious and according to the Juvenile Diabetes Research foundation (2013) also called the JDRF, every day there are around 80 people are diagnosed with type I diabetes. Over the period of a year that would mean that around 15000 children and around 15000 adults would develop the condition of type I diabetes. The global amount of people with type I diabetes is difficult to estimate, but according to the JDRF (2013) in the United States alone out of the 26 million people with Diabetes, 3 million people are estimated to have type I diabetes. The current amount of people with type I diabetes is difficult to find, but it is clear that it is increasing rapidly. After having described the increase of type I diabetes, I will now describe the growth of type II diabetes.

The rise of type II diabetes

Despite the rapid growth rate of type I diabetes, it does not compare to the growth rate of type II diabetes. Ginter and Simko (2012) state that in the second half of the 20th century that there was an obvious relentless increase in type II diabetes. This is in line with the rapid increase of type I diabetes which according to Gale (2002) was also in that specific period. So once again, this could imply that something drastically changed in our lifestyle or

environment during this period, since type II diabetes is not a hereditary disease. It would also be logical if a continuous spectrum approach of diabetes would have been implemented as argued by Brooks-Worrel and Palmer (2011), because this would imply that if more individuals are in the spectrum range of type I diabetes which is one end of the spectrum, it would generally be logical if more and more people would have at least developed type II diabetes, which is between type I diabetes and impaired glucose tolerance due to aging in the spectrum of Brooks-Worrel and Palmer (2011). Incidences of type I and type II diabetes would be related from a spectrum approach.

The growth rate of type II diabetes has been absolutely stunning, Beebe (1999) states that the prevalence and incidence of diabetes has grown with 500% since 1950. So that is an average of 100% per decade! So what is the current status of people with diabetes type II? Around 90% of the people with diabetes have diabetes type II. According to the IDF (2013) there are currently 387 million people living in the world with diabetes, so around 90% of that will have diabetes type II. So that implies that around 1 out of 12 of all the people in the world has diabetes and that the majority of these people have type II diabetes. Furthermore, the IDF (2013) states that one out of two people with diabetes does not know that they actually have diabetes, this makes the condition even more harmful because many people are unaware of the fact that they have developed diabetes.

The amount of people with diabetes in the world is not the same, for example there are around 39 million people with diabetes in North America and the Caribbean, around 25 million in central and South-America; 52 million people in Europe, 37 million people in North Africa and the Middle-East, 22 million in the rest of Africa, 75 million in South-East Asia and 138 million in the Western Pacific. So roughly 90% of all these people all over the world have type II diabetes. Looking at these figures, one can clearly conclude that diabetes is a global problem and the problem is getting bigger every year!

The size of this problem keeps increasing rapidly; the IDF (2013) estimates the amount of people with diabetes in 2035 to rise with around 205 million people. That would mean 592 million people in the world with diabetes in 2035 and the majority would thus have developed the condition of type II diabetes. So after having given a short picture about the rise of diabetes type II and after having discussed the estimations regarding diabetes in the future, I will now discuss the rise of gestational diabetes

Gestational Diabetes

You would normally deduce that if around 9% has type I diabetes of the people and around 90% Type II diabetes, then the other main variant of diabetes, namely gestational diabetes has around 1% of the incidences with diabetes. Unfortunately, that is not the case, gestational diabetes, is much more common than that. According to the IDF (2014) around 15% of the pregnant woman in the world has gestational diabetes. Gestational diabetes is often temporary of nature, so getting proper estimations of the past, present and future is difficult. But if you take into account that 15% of the women have gestational diabetes during pregnancy, you could say that the prevalence is very high.

It is important to realize that just because gestational diabetes is temporary, that does not imply that it is a condition that should be taken less seriously. Gestational diabetes; increases the risk of contracting type II diabetes for both the mother and the child, gestational diabetes may very well be one of the main causes for the rapid growth of the global diabetes epidemic. I believe that gestational is one of the driving factors of the negative structural spiral that leads to diabetes in the world.

Now after the fact that I have given a global overview on diabetes and how it is spreading, I would like to focus more specifically on the structures that cause diabetes. However, before discussing some of the main issues that cause diabetes, I would like to

define the term of violence. This dissertation will largely focus on the violence that is caused by policies, international politics and capitalistic endeavours of multinationals. Diabetes will serve as a case study to demonstrate all the violence that is happening in the world.

Chapter 2: Violence and the USA

Galtung

In order to clearly define violence, I will use the work of Johan Galtung (1969), Galtung (1990) and Galtung (1996). I will start mainly explain Galtung (1969), but I will refer in this dissertation also to Galtung (1990) and Galtung (1996). Galtung (1969, p. 3 or p.168) clearly states that:” peace is the absence of violence”, so if we would want to strive for a global peace we should identify what is violence and resolve or transform that violence so that peace can occur. So what is violence? Galtung (1969, p.3 or p.168) states that” violence is present when human beings are being influenced so that their actual somatic and mental realizations are below their potential realizations.”

This definition of violence is very broad, but as Galtung (1969) argues that the concept of violence should not be an easy narrowly defined concept. Galtung (1969) makes use of several distinctions in order to properly define or identify the form of violence that we want to discuss. I will shortly mention these distinctions and will later in this dissertation apply them to the case of diabetes. Also it should be noted that Galtung (1969) considers something to be violence when it is unavoidable.

The first distinction made by Galtung (1969) is that one should make a distinction between physical and psychological violence. So with physical violence it is violence that hurts human beings somatically which is usually quite easy to identify. On the other hand psychological violence can be seen as violence that works on the soul according to Galtung

(1969) this includes threats, brainwashing, lies, several types of indoctrination and basically everything that serves to decrease the mental potentialities of human beings.

The second distinction made by Galtung (1969) is a distinction between negative and positive influence. According to Galtung (1969) this can be seen as violence because the net result of these actions can effectively prevent that human beings will realize their actual potential. This distinction of Galtung (1969) will be very useful to address the violence caused by the influence of institutions, states and organisations, but it can also be helpful to see the actual violence people suffer from by consumerism, people might not experience this as violence, but it can be seen as system that limits the individuals of reaching their actual potential.

The third distinction by Galtung (1969) is a distinction that is to be made on the object's side; this distinction is whether or not there is an object that is hurt. Galtung (1969) poses the question whether we can talk about violence when no physical or biological object is hurt. However, according to Galtung (1969) it can also be the destruction of things that are very dear to persons that are referred to as consumers or owners

The fourth distinction of Galtung (1969) that is to be made is one that focuses on whether there is a person who acts. Sometimes it is very easy to identify whether someone acts, this is usually in the case of direct violence. However if the form of violence is indirect, structural or truncated it is less clear. Galtung (1969) argues that sometimes the violence can be traced back to a specific actor and that sometimes it is not possible to trace the violence back to a specific actor, in these cases you could argue that the violence is built into the structure. This could for example include, medical services that are only offered to a certain group in society, but it could also imply a heavily skewed income distribution, or when a certain group has all the power to decide over certain resources.

The fifth distinction of Galtung (1969) of violence should be made between whether the violence was intended or unintended. According to Galtung (1969) it is important to focus on guilt in this case, because according to Galtung (1969) this concept has been more tied to intention rather than consequence. It is very important to note for this case study that if we would only focus on intended violence then we would not properly address structural violence that is possibly not intended, but the structure has formed in such a way that violence occurs and because of this peace cannot happen, because an absence of violence would be necessary.

The sixth and final distinction of Galtung (1969) is a traditional distinction of violence, which is whether violence has manifested itself already or is latent in nature which implies that it will appear in the future. In our case this distinction of violence will also be very important, since much of the violence has already manifested itself, but arguably there will be an even larger latent proportion of violence that I expect to happen in the coming decades.

I will use this theory of Galtung (1969) and Galtung (1996) to address the diabetic crisis in the United States which is actually a manifestation of structural of violence and cultural of violence, but also later in this study when we focus on the effects of agricultural reforms in other countries such as Mexico, India and the Pacific Islands and the mass consumption of products produced by multinationals and transnationals in these countries. Also cultural violence I will address in several parts of this dissertation with the theory of Galtung (1990), but I will shortly explain that in the paragraphs that concern cultural violence So the first region that I will address is the United States of America because the fundamentals of what I identified as a harmful structure origin largely from the United States. The structure will be slightly different in every country, but in essence all structures are formed either by an internal agricultural policy or dependent on a country that has such an

agricultural policy as well as the consumption processed food. However, there are also differences in the structures as well as the populations and environments in which the structures are put in place. Thus, I will analyse the origin of the structure and discuss some of its fundamentals and later use different case studies where I demonstrate the harmful effects of a similar structure as that of the United States on a different population and in a different environment. But before that I also want to discuss the universal human rights which will also be used in this dissertation to prove that also a violation of human rights occurs because of this structure.

Human rights

The Universal declaration of human rights is a document which is often referred to in politics. It is used to justify wars, to address norms and values of other cultures, influence the policies of foreign nations and much more. Many countries have ratified the original universal human right treaty, but some countries have not ratified some of the latest human rights. For example the U.S.A. has not ratified the C.E.D.A.W. However, my dissertation will not focus on this, but the universal declaration of human rights will be used to demonstrate in many ways the harmful structures that I describe are a violation of the universal human rights.

Article 25 of the universal declaration of human rights is very obviously linked to this thesis, but as you will see later; there are also other human rights that are very relevant.

Article 25.1 of the United Nations (2009) states the following: “(1) Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.”

So everyone has the right to a standard of living adequate for his own health and that of his family and this includes food. The link between food, health and diabetes will be made

clear and through this I will demonstrate that human rights are being breached. I will do this in the next paragraphs where I discuss the United States, but throughout this dissertation I will refer to several human rights that are in my opinion breached and I will attempt to demonstrate this. Now without further ado let us start with describing the situation in the United States.

The United States

I believe that the fundamentals of the harmful structure originate from the United States. Also many people suffer from diabetes, in the United States so it is likely that this structural violence also occurs in the country itself. The United States or organisations and institutions related to this country have been spreading aspects of this original structure to other countries for a various number of motives. Thus the structure in the United States should be analysed before moving on to other regions in the world. So without any further ado I will explain the structure in the United States.

I first got a hint of the violence that was happening when reading an article written Mark Hyman (2012), according to Hyman (2012) “diabesity” which is basically the manifestation of metabolic syndromes such as diabetes and obesity, stem largely from what he defines as the toxic triad. Hyman (2012) is a doctor, but uses little references, but his words make sense so I will investigate whether I can come to similar conclusions, but I will extensively draw from academic sources about politics, peace and nutrition. So what does this this “Toxic Triad” consists of?

According to Hyman (2012) this consists of Big Food, Big Farming and Big Pharma. Hyman (2012) makes a comparison with this triad and the Military Industrial Complex in the United States. He paraphrases the toxic Triad as the medical, agricultural, food industrial

complex. Hyman (2012) actually uses the term structural violence to describe the actions of the toxic triad. He states that there are social, political, economic and environmental conditions that foster and promote the development of diabetes and obesity. I would like to note that I will mainly focus on two parts of the toxic triad, which are Big Farming which refers largely to the agricultural system and Big Food which focuses on the actions and influence of the food industry. The third one Big Pharma which refers to the pharmaceutical industry which also plays a major role in the diabetes epidemic, but unfortunately I cannot focus on everything in this thesis.

Firstly, I will explain big farming. According to Hyman (2012) farmers are not intentionally bad people, but it is the fault of the system that promotes raising certain crops. So first let us quickly mention how the economic and political system promotes certain crops. I will try to explain this by using the theory of Harriet Friedman (1990) who explains how family farms have transformed into commercial farms. This transformation occurred around the late 19th century according to Friedmann (1990).

Friedmann (1990) mentions that eventually farming in the U.S.A. took place on a scale that has never been seen before, furthermore Friedmann (1990) argues that these farms took specialization even further than as has traditionally been the case in Europe. For example, farms would perhaps specialize and focus mainly only on wheat and not on Barley, Millet, Buckwheat and other crops. Friedmann (1990) explains how post-war accumulation was focused on mass production of standardized products as well as the consumption of standardised products. This standardization led to the so called monocultures.

These monocultures form the base of the American agricultural policies, but this approach has been spreading to other countries. Friedmann (1990, 1993) states that: “purchased diets and specialized regions of mono-cultural production are still the hub of agro food relations, but the scope of these relations now encompasses the globe, and they penetrate

even more deeply into daily life. This would mean that monocultures are nowadays even stronger situated into the daily life of consumers and also that this structure is globalising.

As you will see later in this thesis, this structure can be very harmful. For example Vandana Shiva (2014) states that: “Humans have traditionally eaten a large variety of foods, think of thousands of different types of food and this all has been narrowed down to just a few crops for economic purposes” By taking into account the arguments of both Shiva (2014) and Friedmann (1990) you could argue that there are strong economic factors that have transformed the agricultural structure in the United States and later in the rest of the world. But there is more to the structure than just the agricultural structure.

Friedmann (1990) argues how durable foods became an important factor to promote consumption of appliances such as freezers, coolers and other machines. The demand for durable or processed foods has increased significantly over the years, but according to Friedmann (1990) it has hardly increased the demand for agricultural products. Friedmann (1990) argues that this is because of the fact that agricultural products simply shifted from final use to raw materials for durable foods. Furthermore, Friedman (1990) argues how soybeans, corn, sugar and animal products were used as ingredients for processed foods. This gave rise to the food industry, which makes it clear that Big Farming and Big food are strongly interrelated. These transformations caused a significant increase in the production of manufactured foods, which apparently also had strong effects on the American foreign policy

Because of the increased increase in manufactured foods, there was a surplus supply of wheat. Wheat was also used for quite some processed foods, but not on the same scale as other “raw materials” it was mainly used for bread and pastries. According to Friedman (1990) to deal with this surplus wheat became a wage food in “underdeveloped” countries. This surplus will be important in a later part of this thesis, but for now I will continue with explaining the structure in the United States.

The Farmbill

The structure of the monocrops in the United States is perhaps driven by economic motives, but there is a strong political influence that helps with shaping the structure. According to Hyman (2012) certain crops are subsidized and therefore produced in bulk and sold at incredibly low prices to the food industry. Also it should be noted that the amount of farmers has significantly decreased due to changes in policies and that farming has become something that is mainly done by big corporate farms. The crops that Hyman mentions are the crops of the farm bill.

Johnson and Monke (2010) state that “since the 1930’s farm bills have traditionally focused on a handful of commodity products which include, corn, sugar, wheat, dairy, rice, soy and cotton.” I will not focus on cotton, surely the excessive amount of cotton production can be harmful, but the link to diabetes is faint, however all other crops can be related to the increase in people with diabetes. The following part of this dissertation will draw heavily from the discipline of nutrition as well as health, but I will later relate these paragraphs to the theory of Galtung (1969). I believe that it is important to explain how the emphasis of agricultural policies on a particular amount of crops can be harmful.

High fructose corn syrup

The first crop of the farm bill which I will explain is corn, which is largely used to manufacture high fructose corn syrup (HFCS). You could argue that corn or maize is a healthy substance, but there are very different opinions on that. Maize is a starchy food that is also relatively high in fructose that comes from a grain plant. It also has some useful micronutrients, but claims that it is very nutritious crop are in my opinion not based on solid

evidence. I believe that many of the researches that state that maize is healthy are not based on solid evidence, because basically none of these researches mention the anti-nutrients in maize.

Also many of the studies such as the study of Muzhingi and others (2011) only focus on very specific issues, for example whether maize is effective for increasing vitamin A in humans. Maize in general is very low in vitamin A and most maize variants do not even have significant amounts of vitamin A. 100g of yellow maize has around 4% of the daily recommended of vitamin A. Other variants have approximately 0%. In comparison 100g of carrots has 334% of the recommended intake of vitamin A. That would mean that around 1.2 g of carrots would be as effective as 100g of maize if the bio-availability of maize and carrots would be the same. Muzhingi and others (2011) did use beta-carotene enriched maize and beta-carotene is a precursor of vitamin A, but it would not compare to carrots and most likely not to any local food that is high in vitamin A. The introduction of foreign plants could also harm the eco-system especially considering that maize is being planted on a large scale and that it GMO such as this enriched maize, most likely needs a lot of pesticides and chemical fertilizers in the long run.

Furthermore, it is important to note that corn today is not the same as it has been in the past, it is heavily modified (often genetically) to be much sweeter than it naturally is. I will not focus extensively on corn as a nutrient per se, since it often serves as a raw material for the production of HFCS.

HFCS which is used often as a sweetener in soft drinks, but also in other manufactured products. Basically, all big cola brands such as Coca cola and Pepsi have adopted HFCS in their production processes, and many businesses are very fond of HFCS because it can be produced in bulk and the process is rather smooth. The result of the manufacturing process is a cheap, sweet and refined liquid sugar that is a combination of

fructose and glucose. At first sight it is similar to sucrose, which is generally referred to as table sugar a sugar and consists of equal amounts of both glucose and fructose.

It should be noted that HFCS is not always specified as HFCS on the etiquette, sometimes it is just referred to as sugar. As explained earlier in theory it is a liquid composite of sugars, but there are some small differences with sucrose which is normally referred to as table sugar. However, these differences will be explained later in this thesis, I first want to describe how the consumption of HFCS has increased over the last decades.

According to Buck (2001) the growth of HFCS consumption has been absolutely stunning. Also, it is important to note that the product has received some modifications throughout the years. The 42% fructose syrup was deemed not sweet enough, so companies have decided to increase the fructose levels through an intensive refinement process which resulted in HFCS with a ratio of 55% fructose. There is also a variant with 90% fructose, but fortunately this type is not processed in as many foods but is mainly used to create HFCS 55.

Buck (2001) says that the transition from sucrose in soft drinks to HFCS occurred in only around 5 years, this was in the period of 1980-1985. The amount of shipment of HFCS has increased at an incredible pace; in the appendix in part A.2. I have added a diagram from the book of Buck (2001), which clearly demonstrates the rapid rise of HFCS consumption. This diagram is in line with the work of Bray, Nielsen and Popkin (2004), who stated that the consumption of HFCS has increased with a 1000% between 1970 and 1990. HFCS is also exported to other countries, but it should be noted that in the United States alone more 42% and 55% HFCS are being consumed than in the rest of the world combined.

This rapid rise in consumption of HFCS is not only because of the consumption of sweetened beverages such as coca cola and Pepsi has increased, but also because HFCS is processed into a large amount of foods and it does not always gets mentioned under its own

name. Sometimes HFCS is mentioned as sugar and although both substances consist of sugar molecules, the term sugar usually refers to table sugar which is sucrose.

So in which other products can we find HFCS? According to the Huffington Post (2012) it is also present in Yogurts, whole wheat bread, Cereals and cereal bars even those marketed as healthy for weight loss such as Special K, but also in Frozen Pizza, Macaroni and cheese where it is the second most prominent ingredient, furthermore it is present in Cocktail peanuts, Salad dressing, Canned fruits, many sauces, Heinz ketchup, Strawberry marmalade and many other processed foods. This article from the Huffington Post (2012) is in line with the statement of Bray, Nielsen and Popkin (2004) who state that HFCS is available in soft drinks and fruit drinks, candied fruits and canned fruits, dairy desserts and flavoured yogurts, most baked goods, many cereals, and jellies. So why is HFCS processed into so many foods? Well, mainly because it is sweeter than sugar, cheaper and easier to process into foods, but there may be some other reasons which I will address later.

So HFCS is processed in many foods and beverages and the consumption has increased tremendously over the last decades, but why is this problem? I will partly explain why this is bad by deconstructing the arguments of the Corn Refiners Association (2015) which clearly has an economic interest in the production and usage of HFCS. The Corn Refiners Association (2015) for example argues that it is nearly identical to normal sugar. Furthermore the association also states that it contains no artificial or synthetic ingredients. It is made from corn thus it is a natural product according to them. Additionally, the association states that metabolism of HFCS is exactly the same as with any other sweetener and it states that it contains the same amount of calories such as any other sweetener. Also, the Corn Refiners Association (2015) quoted the American medical association that according to them stated that “high fructose corn syrup does not appear to contribute to obesity more than other caloric sweeteners.”

I will now clearly demonstrate that these numerous statements of the corn refiners as well as the statements of the American medical organisation are ambiguous and are arguably lies. The exact effects of glucose and fructose and their effect on diabetes will be clearly explained when I will elaborate on table sugar and I will then also shortly relate that knowledge to HFCS, but for now I will focus mainly on deconstructing the arguments of the Corn Refiners Association (2015)

Research from Princeton University, clearly shows that many of the claims made by the corn refiners association are simply not true. Let me start with the chemical basis and why these two products are not the same. According to the article by Hilary Parker (2010) published online at the website of Princeton University, there are at least two clear differences between HFCS and sugar. The first difference is that sucrose is composed of equal amounts of two simple sugars it is 50% glucose and 50% fructose. But the typical HFCS has a slightly imbalanced ratio, HFCS contains 55% fructose and 42% glucose, the remaining 3% comes from larger sugar molecules called higher saccharides. So with sucrose the ratio is generally equal, but with HFCS there is around 13% more fructose than glucose.

The second main difference mentioned by Parker (2010) from Princeton University is that due to the manufacturing process the fructose molecules in HFCS in the sweetener are free and unbound, which implies that they are absorbed far more rapidly. With sugar from canes of beets this is not the case, because the fructose molecule is heavily bound to a glucose molecule and the fructose molecule must go through an extra metabolic step before it can be utilized.

This clearly implies that the two substances are not the same, but what are the consequences of these differences between these two substances? I analysed the article which Parker (2010) referred to, which was written by Bocarsley, Avena, Powell and Hoebel (2010). These scientists did two experiments were one was a short term (2 months) access to

HFCS with male rats and the second experiment was a long term (6-7 months) experiment with both male and female rats.

The results of these experiments were the following; for the first short term experiment, the results were the following, the male rats exposed to HFCS gained more weight than animals that had equal access to sucrose and Bocarsley and others (2010) and others noted that there was no difference in caloric intake between the HFCS rat and rats exposed to sucrose.

The results of the long-term experiment are very important to note, Bocarsley and others (2010) concluded that rats on water that contained 8% of HFCS gained more than rats who were on water that consisted of 10% sucrose. This means that even though the HFCS-rats consumed 20% less calories they gained significantly more weight than the rats that were consuming more calories but from sucrose.

The results of these two studies do not only imply that HFCS, would lead a little bit to obesity compared to sucrose, but that it would lead to obesity at a significantly faster rate than sucrose would do. This clearly leads to the understanding that the claim of the Corn Refiners Association (2015) and the American medical association to which the Corn Refiners Association (2015) refers to are completely false. They stated that HFCS does not contribute more to obesity than other caloric sweeteners, but according to the research of Bocarsley and others (2010) HFCS not only contributes more to weight gain than sugar for equal amounts of calories, but even around 20% less HFCS would most likely lead to more weight gain than normal sugar.

Furthermore, in the article by Bocarseley and others (2010) they mentioned additional differences between sucrose and HFCS which were not all mentioned by Parker (2010). Bocarsley and others (2010, page 7) state the following which I will cite directly from their

research, because they did a truly marvellous job on using literature to clearly state the differences between HFCS and sucrose.

“First, HFCS-55 has proportionately slightly more fructose than sucrose (White, 2008). Second, fructose is absorbed further down the intestine than glucose, with much of the metabolism occurring in the liver, where it is converted to fructose-1-phosphate, a precursor to the backbone of the triglyceride molecule (Havel, 2005). Third, fructose is metabolically broken down before it reaches the rate-limiting enzyme (phosphofructokinase), thereby supplying the body with an unregulated source of three-carbon molecules. These molecules are transformed into glycerol and fatty acids, which are eventually taken up by adipose tissue, leading to additional adiposity (Hallfrisch, 1990). And fourth, HFCS causes aberrant insulin functioning, in that it bypasses the insulin-driven satiety system (Curry, 1989). Whereas circulating glucose increases insulin release from the pancreas (Vilsboll et al., 2003), fructose does this less efficiently, because cells in the pancreas lack the fructose transporter (Curry, 1989; Sato et al., 1996). Typically, insulin released by dietary sucrose inhibits eating and increases leptin release (Saad et al., 1998), which in turn further inhibits food intake. As previously discussed, meals of HFCS have been shown to reduce circulating insulin and leptin levels (Teff et al., 2004). Thus, fructose intake might not result in the degree of satiety that would normally ensue with a meal of glucose or sucrose, and this could contribute to increased body weight”.

So as you can see both with experiments and by using scientific literature you can easily conclude that the corn refiners association (2015) is completely wrong and that their statements are simply not true. Furthermore, Bocarsley and others (2010) concluded that rats who maintained a diet rich in HFCS showed increased weight gain, a larger amount of circulating triglycerides, and an augmented fat deposition. In humans these factors would translate to obesity according to Bocarseley and others (2010). Bocarsley and others (2010)

finalize their conclusion with the statement that: “thus, overconsumption of HFCS could very well be a major factor in the “obesity epidemic,” which correlates with the upsurge in the use of HFCS”. I believe that with these paragraphs I have already explained quite well that HFCS and sugar are not the same and that HFCS contributes significantly more to obesity than sugar does. This would also significantly increase the risk of diabetes, because obesity significantly increases the risk of developing diabetes.

So to conclude these paragraphs on HFCS, I would like to state that some of the discourses brought up by organisations such as the Corn Refiners Association (2015) are completely false. These discourses seem logical and are easy to believe, but if you would critically analyse their statements and enrich your knowledge with scientific articles and read about experiments you would quickly come to the conclusion that these statements of the Corn Refiners Association (2015) are wrong.

If we would apply the methodology of Galtung (1969) here then this would not only mean that HFCS consumption physically harms the consumers. But that there are also false discourses and false statements surrounding what HFCS actually is. According to Galtung (1969) this would be another form of violence where the mental potentialities of the consumers are negatively affected. HFCS is very attractive for many companies in the food industry and thus I suspect that part of the food industry has great interests of keeping these false discourses intact through statements as those of the Corn Refiners Association (2015). However, it is difficult to point out all the specific actors, because most likely the Corn Refiners Association (2015) is financed by a company or multiple companies of the food industry, but there is clearly violence going on.

According to Galtung (1969) that violence would probably be structural in nature unless we would be able to trace it back to specific actors. Also the violence seems to be both physical as well as mental, since mental violence occurs when there are false or incomplete

discourses in place, while there is clearly also physical violence going on which has manifested itself in the form of obesity and diabetes.

Also, I would like to shortly mention that I have not yet addressed all factors concerning the consumption of HFCS, but I will do so in the following paragraphs along with sugar. I just clearly wanted to distinguish the two substances because they are not the same, but some things are similar for both substances and I will address these issues together, but when necessary I will always make the distinction between sugar and HFCS.

Sugar

After having elaborated on HFCS and some specific issues surrounding that substance, I would like to continue these sweet paragraphs with sugar. Sugar is naturally present in many foods, but nowadays sugar is being harvested and refined and then added to products, which has significantly increased the sugar consumption. Surprisingly sugar is also one of the heavy subsidized commodities in the United States, which is strange right? In some countries such as for example France, the Value added tax for sodas that are high in sugar or harmful artificial sweeteners is elevated. So it is likely that economic forces are behind the politics surrounding the farm bill. Also, as I have mentioned earlier, I will make some statements that will yield for both Sugar and HFCS. So please note that HFCS will still be mentioned frequently, since I have not yet explained everything that there is to say about the substance. So now will explain why sugar is another harmful monoculture crop and how it is related to diabetes.

Sugar generally refers to table sugar which is basically sucrose. Sucrose as mentioned earlier consists of 50% glucose and 50% fructose. I will now discuss how sugar consumption could lead to diabetes and after that I want to discuss the possible addictiveness of sucrose as

well as HFCS. In this part I will refer to sugar as sucrose for clarity and correctness, sucrose consists of both glucose and fructose.

Glucose can clearly lead to diabetes, despite the fact that glucose is an important source of fuel for the cells of the body. According to WebMD (2014) high glucose levels slowly erode the ability of the cells in the pancreas to make insulin. In the beginning phases of type II diabetes; the pancreas over compensates insulin production and the insulin levels remain too high. Over time the pancreas becomes permanently damaged and this would lead insulin resistance and eventually type II diabetes.

So glucose consumption by itself is not necessarily bad, but chronic overconsumption of sucrose and other forms of carbohydrates that are converted partly or completely into glucose can lead to type II diabetes in the long run. One should not just take into account the quantity of sugar that is being consumed, but also the context in which carbohydrates that transform into glucose are consumed. Some carbohydrates get absorbed faster than others. In order to look at how fast carbohydrates will be converted into sugar in the body you can look at the Glycaemic Index. According to Shiva (2014) the so called monocrops are too high in carbohydrates. Because we eat with so few diversity and basically most things consist of carbohydrates according to Shiva (2014) this leads to non-communicable diseases such as diabetes.

The American Diabetes Association (ADA) (2014) clearly explains the glycaemic index (GI), which is an index that usually refers to glucose or white bread being 100. High GI values tend to raise blood sugar levels faster and higher than foods with a low GI. But it should be noted that large quantities of low GI foods can also raise blood sugar levels. Factors that reduce the GI are for example fibre and fat, for example if you put olive oil on your bread it would slightly reduce the GI-index of your food. Also fibres affect the speed of which your blood glucose levels will rise. For example you eat bread with olive oil, lettuce on

it. This bread would significantly lower the GI value of the food. On the other hand if one would put low-fat chocolate sprinkles on your bread, the GI as well as the quantity of carbohydrates would significantly rise.

However, it should be noted that there are other factors that can increase the GI of food; according to ADA (2014) cooked and processed foods generally have a higher GI index. The ADA (2014) does not really explain why that is the case, but that could mean that the GI of HFCS is possibly higher than expected due to its heavily processed nature. This seems to be the case because HFCS despite being higher in fructose has a higher GI ranking with 87 than table sugar which has a GI of 80. However, consumption of HFCS would possibly lead to more weight gain than pure glucose which would have a GI of 100. Because HFCS it will significantly raise blood sugar levels due to the unbound molecules due to its heavily processed nature, this is because HFCS basically skips a part of the metabolic process and the glucose in it gets absorbed directly while the fructose can lead to an increase in adipose tissue levels. So arguably the GI-Index generally holds, but it should not be seen as an exact way of measuring the effect on blood glucose levels or weight gain, there are more factors that should be taken into account and especially so with heavily processed foods such as HFCS that has unbound molecules.

So how is it that these days the amount of people with diabetes has increased so significantly? This is partly due to an increase in the amount of carbohydrate intake and a reduction in the amount of fibres that are being consumed. This would imply that more foods with a higher GI-Index are consumed, since fibre significantly reduces the GI values of food. Gross and others (2004) wrote about how increased consumption of refined carbs has led to the type II diabetes epidemic. Their experiment was an ecologic correlation study in which they looked at the per capita nutrient consumption data from 1909 to 1997 given by the U.S. Department of agriculture and compared this data with the prevalence of type II diabetes and

this data was provided by the Centres for disease control and prevention. Gross and others (2004) provided some interesting statistics which I would like you to read in the appendix.

Gross and others (2004) argue that an increased intake of refined carbohydrates such as sugar and HFCS together with a decrease in the consumption of fibre parallel the upward trend of type II diabetes prevalence. I would like you to check figure 1.0 by Gross and others (2004) in the appendix in part A.3. And then take into account that HFCS was introduced around the 1980's. You can clearly see that there was already a tendency of lower fibre and for some time a lower carbohydrate consumption, according to Gross and others (2004) this was because of a lower whole grain consumption. However, around the 1980's when HFCS was introduced carbohydrate consumption increased very steeply as you can see in the figure. Gross and others (2004) mention that in 1980 carbohydrate consumption increased with more than 500 kcal per day on average. This is not a little increase, but a tremendous increase, furthermore the total amount of fibre consumption stayed low, so that would mean that those carbohydrates were not from whole grains, seeds, fruits or vegetables. Also this increase is very big, because sugar was being added to sweetened beverages before the implementation of HFCS, so this could mean that sugar consumption was already going up while whole grain consumption was going down. So you could argue that HFCS did contribute significantly, but the prevalence of diabetes and obesity was already growing due to an increase in sugar consumption.

On a side note, I want to relate this to a previous part of this dissertation that concerned the grain surplus. The reduction of the consumption of whole grains in the USA explains the origin of the big grain surplus that is mentioned by Friedmann (1990). The agricultural structure has been built in such a way that wheat was produced in a bulk and as wheat consumption reduced gradually over the last century as can be seen in the model of Gross and others (2004), the United States needed to find a way to get rid of its surplus and it

did so by subsidizing the export of wheat to third world countries. This did not just serve as a relief method for the farmers or aid but also as a political tool. Furthermore, it can arguably have created a dependency on wheat products. Let me now quickly resume the paragraphs about the increase in sugar consumption, but it was important to mention this because it will come back later in this dissertation.

In figure 2, Gross and others (2004) clearly show that whole grain consumption reduced significantly, while HFCS has increased significantly. In figure 3 to figure 5 of Gross and others (2004) you can see that an increased refined carbohydrate intake seems to go hand in hand with the increasing prevalence of both diabetes type II and obesity.

Also it seems that HFCS is the main culprit when it comes to diabetes when you look at the article of Gross and others (2004). If you take into account the experiment of Bocarsely and others (2010) that showed that even with less calories from HFCS, rats would gain more weight than with diets of chow or sucrose. So the previously mentioned 500 kcal is already a significant amount, but if you consider that 100 grams of sucrose only contains 387 kcal, and then if you would take into account that 20% less HFCS leads to more weight gain than sucrose in rats. You could argue that this increase would be similar to $500 \times 1.2 = 600$ kcal from sugar. $387 / 600 = 0.645$, so this HFCS consumption would equal roughly 155 grams of sucrose if this carbohydrate consisted purely of HFCS. Fortunately as you will see later this is not completely the case as sucrose consumption did decrease slightly, but these calculations clearly show that if there are similar metabolic processes in humans, rats and mice.

According to Demetrius (2005, p. s39) who states the following this is the case: "Mice and humans are good examples of this metabolic homogeneity—they have the same organs and systemic physiology, and they also show great similarities in disease pathogenesis." Most experiments in my dissertation featured rats, but rats are generally even more similar to

humans than mice as argued by Nature Methods (2010). So this would imply that rats, mice and men would react quite similar to HFCS consumption.

Refined carb consumption has thus increased significantly, but not all refined carbs are HFCS and sucrose. Refined grains such as wheat, cereals and rice play an important role in the diabetes epidemic as well. Basically refined carbohydrate sources in general seem to have led to the diabetes and obesity epidemic from a nutritional perspective. But sucrose and HFCS have contributed perhaps more than these other carbohydrates this is not only because of that these two substances get consumed relative more, but also because both HFCS and sucrose contain fructose and can arguably be related to food addictions. Firstly, I will discuss the effects of fructose and after that I will explain how these two monocrops can be related to food addiction.

Fructose is another simple sugar like glucose that is naturally present in sucrose and which is also present in HFCS. Being one of the main sugars in fruits fructose has been indoctrinated as a healthy sugar and the sugar that is present in fruits. However, you could argue that this is silly, because glucose and also the composite sucrose as well as some other sugars are naturally present in fruits. So what can be so harmful about fructose?

As mentioned earlier Bocarseley and others (2010) who experimented on rats with sucrose, chow and HFCS, suspected that the higher fructose levels in HFCS in combination with the fructose molecules being unbound in comparison with the bound fructose molecules of glucose, have led to considerable weight gains in rats. So this could already hint at several complications when looking at the fructose consumption since a substance with more fructose, HFCS led to more weight gain than sucrose. So how can fructose be related to diabetes?

Tappy and others (2010) have investigated the effects of fructose consumption on diabetes. They have designed a model which clearly shows that fructose consumption can

lead to both obesity and diabetes. This model can be seen in the Appendix in part A.9. But I will explain the model in greater detail here.

Tappy and others (2010) argue that excess calories from fructose will lead to an increase in hepatic de novo lipogenesis which would basically mean an increase in fat production and this happens in the liver, because this is where fructose is being processed. So excess calories from fructose will be converted into fat and this has several consequences and this will lead to insulin resistance in three manners. Concerning the first two manners, according to Tappy and others (2010) this lipogenesis leads to an increase of triacylglycerol secretion as well as a triacylglycerol clearance. This as a consequence would lead hypertriacylglycerolemia, because of the clearance the triglycerides get into the bloodstream. This hypertriacylglycerolemia has two significant consequences which are an increase in visceral fats which are fats that are stored in the abdomen cavity This increase in visceral fat will lead to insulin resistance, impaired glucose tolerance and the metabolic syndrome in other words obesity and diabetes. This is similar what happened to the rats who consumed HFCS in the experiment of Bocarseley and others (2010).

On the other hand increased hypertriacylglycerolemia will also lead to ectopic lipids in the skeletal muscles which basically means; that fat gets stored in an awkward place which is the skeletal muscles. This in turn also causes insulin resistance, impaired glucose tolerance and the metabolic syndrome according to Tappy (2010) and others. The third and final way that hepatic lipo de novogenesis leads to diabetes, obesity and insulin resistance is because it increases Hepatic Steatosis. Hepatic Steatosis is simply a fatty liver due to excessive amounts of triglycerides and other fats inside the liver cells. This condition is usually called non-alcoholic fatty liver disease. The name is specified to distinguish between the fatty liver disease that is caused by alcohol use.

The effects of fatty liver disease are usually underestimated and many patients as well as practitioners according to WebMD (2011) view it simply as fat in the liver. Around 1/3 of the people in the United States have a fatty liver according to WebMD (2011) but according to WebMD (2011) it is an independent variable that significantly increases the risk of developing type II diabetes. This is in line with the work of Sung and Kim (2011) who researched the correlation between fatty liver disease and type II diabetes and they concluded that a fatty liver independently increases the risk of developing type II diabetes. In a way this is logical, because the liver plays a vital role in both processing fructose as well as storing glucose as glycogen in the liver for when the body would need it. If the liver does not function well it will surely affect the capabilities of your body to deal with sugars and carbohydrates.

So, as I have mentioned before excessive calories from fructose could lead to the development of diabetes, so what is an excessive amount of calories from fructose and how much do Americans consume fructose on a daily basis? Livesey and Taylor (2008) concluded from their meta-analysis that an intake of more than 50g per day of fructose, altered triglycerides plasma concentrations could be detected, so hypertriglycerlomeia could already occur with daily intakes of 50g or more fructose per day and could arguably in the long run lead to diabetes, obesity, glucose impairment and from here on it could lead to coronary heart diseases and strokes.

So how much fructose do Americans consume on a daily basis? Gaby (2005) states that from 1970 to 1997 the American annual sucrose consumption dropped from 102 pounds to 67 pounds, so in grams this is from around 46kg per year to around 30kg. However during that same period HFCS increased from 0.5 pounds per year to 62.4 pounds per year. So around 28 kg per year, this would make the combined total of sucrose and HFCS be around 58kg per year, that would mean that more than a kg of sugar is consumed on average by an

American per week. Also it should be noted that the majority of this consists of fructose since sucrose is 50% fructose and corn syrup generally holds around 55% fructose. Furthermore Gaby (2005) states that fructose consumption from both sucrose and HFCS was around increased from 1970-1997 from 64 grams per day, which was already too much if you take into account the effects of more than 50g of fructose per day, to a staggering 81g per day in 1997. These numbers are merely based on HFCS and sucrose consumption. Fruits and Fruit juices as well as some processed foods contain fructose. Thus arguably total fructose consumption is actually higher than is argued by Gaby (2005).

However there is some good news after that in the period of 2000-2008 according to Welsh, Sharma, Grellinger and Vos (2008) total sugar consumption decreased from the period of 2000-2008, but still exceeds clearly the guidelines of the FDA. Sugar consumption decreased from 100g per day which is way too much too 76 grams per day which is still very large.

Some gurus in the health and fitness industry such as Charles Poliquin (2012) who has trained multiple Olympic medallists and gives seminars all over the world, states that for normal people with a normal lifestyle 25 grams of sugar per day is the maximal healthy recommended intake. Please note that this is sugar intake and not carbohydrate intake. So arguably the average sugar consumption went from 4 times too high to only 3 times to high. You could argue that Poliquin (2012) is no scientist, but he is an expert in that field which means that he has practical experience but I believe that he would generally have more academic knowledge than the average scientist as he reads a lot of articles and has published numerous articles and is renowned worldwide for his expertise in nutrition.

I believe that it is also important to bring the views of people like Poliquin (2012) to the debate. Because these are the people that read scientific research and combine that with their personal experience to create their own set of knowledge. From a trans-modern

perspective everybody should join the debate; the people that consume sugar, the policy makers, the scientists and the practical experts such as Poliquin (2012).

So the amount of sugar consumption and the metabolism of fructose would already largely explain the diabetes type II and related obesity epidemic, but why is it that American consumers consume such insane amounts of fructose on a daily basis? I believe that there are at least two reasons for that beside the fact that HFCS and sugar get processed into many foods which clearly increases the daily fructose consumption. The first reason is that foods high in fructose such as sucrose and HFCS do not make you feel full; this is not the case with fruits, because fruits generally hold both fibre and glucose. Glucose gives a satiety signal to the brain and also promotes directly the production of insulin, combined with the fibres in fruits these factors will prevent overeating to a certain degree as most fruits contain both glucose and fibre. However refined sugar and HFCS do not have fibres, are added to processed products or beverages that are generally low in fibres or do not even contain fibres. This contributes to the overconsumption of processed foods and sweetened beverages. I also want to specifically discuss how sugar and HFCS processed into a beverage can result into type II diabetes. There are some differences between beverages with sugar or HFCS and solid foods, which I will clearly explain in the following paragraphs.

Sugar sweetened beverages might play a major role in the diabetes epidemic because of the following factors. According to Malik and Hu (2012) sugar sweetened beverages on average contain around 35-37.5g of sugar per 12 ounces which is roughly 0.35 litres. So perhaps if you look on the label of a beverage perhaps it would indicate that it only contains 10g of sugar per 100ml as most food labels would indicate. But what if you take into account that the average glass is at least 200ml and that cup sizes in restaurants and bars in the United States are generally much larger than this. If somebody would drink a litre of a sugar sweetened beverage per day then this would be around 100g of sugar already. If the sugar

consists of sucrose then this would be 50g of fructose from just that litre. If that sugar would be HFCS then it would be 55g of fructose.

These amounts of fructose are not easy to obtain by eating for example fruits. Surely some fruits are significantly higher in fructose than others, but let me use strawberries as an example. The total amount of metabolic fructose of a strawberry would be roughly around 3g per 100g this is the total of both the amount of fructose from sucrose and fructose by itself. So in order to have 55g of fructose from strawberries one would have to eat over 1.8 kg of strawberries, or just 1 litre of a sugar sweetened beverage. Drinking a litre of a sugar sweetened beverage per day is not that difficult if you would divide it over the day, right? What about that 1.8 kg of strawberries, pretty difficult right? So why is it that sugar sweetened beverages, are so much easier to consume in larger quantities?

Malik and Hu (2012, p. 198) state the following: “The prevailing mechanisms linking sugar sweetened beverages to weight gain are decreased satiety and incomplete reduction in energy intake at subsequent meals after consumption of liquid calories. Pan and others (2011) state in their summary that: “Accumulating evidence suggests that liquid carbohydrates generally produce less satiety than solid forms.” This is in line with my strawberry example, but we should also take into account that the strawberry contains fibres as well which increase the satiety response. So this explains; why relatively large amounts of beverages can be consumed so easily compared to solid foods.

The second factor mentioned by Malik and Hu (2012) which is incomplete reduction in energy intake at subsequent meals, is basically explained by the first factor, if you do not have the same satiety response with beverages you will clearly feel less full before starting your next meal.

Also it is important to take into account that the calories from sugar sweetened beverages contribute relatively more to the energy balance than is the case with calories from

solid foods. DiMeglio and Mattes (2000) conclude from their experiment that: “liquid carbohydrate promotes positive energy balance, whereas a comparable solid carbohydrate elicits precise dietary compensation.” Thus we can argue that; liquid carbohydrates seem to be converted to relatively more energy than solid counterparts.

To sum up how these factors surrounding sugar sweetened beverages can lead to diabetes, I would like to apply and mention the Bradford Hill model. Malik and Hu (2012) explain that most short-term studies surrounding sugar sweetened beverages serve as sufficient amount of evidence to clinically link sugar sweetened beverages to type II diabetes.

Bradford hill criteria are widely accepted in modern science to establish a causal relationship between an incidence which in this case is the consumption of sweetened beverages and a possible consequence which is type II diabetes. The Bradford hill model consists of 9 criteria which are the following: Strength of association, Consistency, Specificity, Temporality, Biologic gradient, Plausibility, Coherence, Experiment and Analogy. Malik and Hu (2012) argue that the relationship between sugar sweetened beverages and diabetes type II; meets 7 out of 9 criteria of the Bradford hill model. So there is fairly strong evidence to establish a causal relationship between the two. Unfortunately I will not discuss all these criteria, but in the appendix I have added a table of Malik and Hu (2012) in part A.7 of the appendix, for the reader to check it. I now want to discuss food addiction in relation to HFCS and sugar consumption.

Food addiction is a hot debate; some scientists argue that palatable foods can have similar effects to the brain as cocaine and other drugs. Palatable foods would generally be sweet foods, oily foods, salty foods, etc. everything that is produced in such a way that it is tasty. In this dissertation I will largely focus on sweet foods that have been enriched with sucrose or HFCS or palatable foods in general.

Avena, Rada and Hoebel (2008) investigated the behavioural and neurochemical effects of intermittent, excessive sugar intake. Avena and others (2008) argue that addiction implies psychological dependency and thus according to them it is also a cognitive or mental problem and not just a physical ailment. Furthermore, they state that “drug dependence is characterized by compulsive, sometimes uncontrollable, behaviours that occur at the expense of other activities and intensify with repeated access.” It should be noted that sadly their experiment was done with lab animals, so they had some complications with properly demonstrating dependence, but they have used methods that have been used for studying drug dependence on rats and simply applied these models to test for sugar dependence. Also, would it be ethical to use animals to discover drugs dependency? I have mixed feelings here, because the article provides very useful information, but is it worth the cost of this information?

To continue with the experiment, Avena and others (2008) studied bingeing, withdrawal, craving and sensitization. They state that drugs and foods can stimulate some of the same neural systems; this is the case for Dopamine, Opioids and Acetylchlonine.

Dopamine is a hormone that makes you feel good and is released by eating chocolate, sugar and several other foods. This could explain the tendency of certain people to eat chocolate or ice cream when they are depressed. Furthermore, Avena and others (2008) found that cravings were enhanced, which would also explain the cravings for chocolate and sweet foods at times; I personally experienced these in the past.

Avena and others (2008) argue that in the case of sugar that bingeing occurred where there was an escalation of daily sugar intake and large meals. This is very similar to the situation of the United States where the daily sugar intake has escalated over the last decade. Also if you would look in most restaurants in the United States of America they serve absurdly large meals.

Avena and others (2008) also discovered other factors such as that withdrawal from sugar could lead to anxiety and even depression among the rats. If this holds for humans that would mean that it would be psychologically undesirable for those who consume sugar to stop consuming large amounts of sugar, because people would serve anxiety or stress. Finally, Avena and others (2008) found that sugar enhances the dopamine pathways and through this leads to behavioural effects of sensitization. In the discussion of their research, Avena and others (2008, p. 30) suggest that: “sugar, as common as it is, nonetheless meets many of the criteria for a substance of abuse and may be addictive for some individuals when consumed in a “binge-like” manner. This conclusion is reinforced by the changes in limbic system neurochemistry that are similar for drugs and for sugar. The effects we observe are smaller in magnitude than those produced by drugs of abuse such as cocaine or morphine; however, the fact that these behaviours and neurochemical changes can be elicited with a natural reinforcer is interesting.”

So sugar is not as strong as cocaine or morphine, but it can possibly lead to addiction in humans. It seems that the American population is over-indulging themselves on average as I have showed earlier in this dissertation when I discussed the total sugar consumption. For anyone that believes that the problem is not real look at the article of the Mirror (2013) that features overeaters anonymous. Also it would be plausible that certain individuals would indulge amounts that are a lot higher than average and addiction could play a role in these cases and this could definitely lead to diabetes type II and obesity. Also, I would like to note that this research was done with sucrose; it is interesting to think what the outcome would be with HFCS. According to Bray (2004) the sweetness of HFCS 44% was 1.16 times sweeter than that of sucrose and HFCS 55% which is the common HFCS added in beverages would be 1.28 times as sweet as sucrose. So if HFCS would be 28% sweeter than sucrose which can already be addictive for some individuals under some circumstances then how addictive

would the artificial sweetener HFCS be? I believe that this would be an interesting topic to research.

But I believe that the food industry is most likely fully aware of the effects of sweetness, even if food addiction does not exist, Dotson and others (2012) argue that the taste of food is a major factor in determining food selection. From infancy, we derive pleasure from sweet foods and have an innate dislike for bitter-tasting foods.” So whether people can get addicted to sweets which can be possible in my opinion if you consider that certain foods access similar pathways in the brain as certain drugs, but it is also likely that people have an innate tendency to have a taste preference for sweet food. However, whether it is addiction, preference or both, companies are clearly producing sweeter and sweeter products. Not in terms of amounts of sugar, but the sweetness of the substances that they manufacture with, which I will now try to shortly demonstrate.

Jim Laidler (2010) provides some general information about the sweeteners that have been used by the food industry and in his article you can clearly identify the tendency of companies to keep using sweeter substances. Initially sucrose was used, but because glucose has a sweetness of 60-70% and fructose has a sweetness of 140-170% companies tried to increase the fructose content. Sucrose was around 100%, but companies increased this through the concept of invert sugar, which allowed them to break sucrose apart into glucose and fructose. In 1957 according to Laidler (2010) a process was developed to transform some of the glucose in corn to fructose, creating a sweet end product which was HFCS 42. This product had a sweetness of 110% being slightly sweeter than sucrose and moreover it is cheaper and easier to process. Later, according to Laidler (2010) manufacturers started with making HFCS 90 from HFCS 42. This HFCS 90 was used to make a HFCS with 55% fructose which is the commonly used HFCS 55. HFCS 55 is 25% sweeter than sucrose. However nowadays agave syrup which is 85-90% fructose is also used frequently nowadays

and is marketed as a healthy product. Furthermore, as you will see later even pure fructose is by an association named the Calorie Council. However to the point, I deduce from the article of Laidler (2010) that manufacturers of processed foods are clearly trying to both save money and make their products cheaper and sweeter.

This was the final part of Sugar and HFCS that I wanted to discuss and now just like before with only HFCS I would like to apply the theory of Galtung (1969) and also at the same time I would like to deconstruct the arguments of yet another association which promotes the consumption of fructose. There are clearly a lot of misconceptions about fructose it has been known to be a harmful substance among scientists when considered in relatively large quantities, but I believe that under the general population its harmful effects are not known. Also here in Spain, I see several products marketed for diabetics in the supermarkets, and I did some field research to show that fructose gets marketed as a healthy substance, the limitation is that I did it in Spain, but I believe that in the West general discourses are pretty similar. You can see my field research in the Appendix Part C.

But in this dissertation I will focus on deconstructing the arguments of www.fructose.org which is one of the first sites that appears if you google fructose and diabetes. This website serves as an information centre for fructose and in the question and answer sheets there is some shocking information. This website stems from the United States so it might be more representative than my dissertation. The calorie control council (2014) which is in charge of the website makes the following statements.

1. Sucrose and Fructose are generally considered as safe.
2. The FDA concludes that HFCS is as safe for use as sucrose, corn syrup and invert sugar.
3. The International life science institute argues that fructose is a valuable traditional source of food and energy, there is no basis for recommending increases or decreases in its use.
4. The only proven health risk is tooth decay.
5. Claims that fructose has led to the obesity epidemic is based on unproven

hypotheses. 6. People with diabetes can consume fructose since it does not lead to the same spikes in blood glucose and insulin. 7. They promote crystalline fructose which is an artificial pure version of fructose for low caloric diets to lose weight.

So regarding claims 1 and 2; excessive consumption of sucrose/ HFCS has been proved to be harmful according to Bocarsley and others (2010). Recommending it as a safe product is harmful and would not motivate consumers to consume these products with moderation and is thus dangerous. Furthermore, these substances can be addictive when taking into account the research of Avena and others (2008).

Concerning claim 3; Livesey and Taylor (2008) have conducted a meta-analysis that indicated that a consumption of more than 50g of fructose per day could already have harmful effects on health. Gaby (2005) showed that the consumption of fructose was already too high before the introduction of HFCS and after that the consumption at some point was around 87g per day on average which is 37g higher than what should be recommendable. I do think that recommendations should be made regarding fructose, since fructose malabsorption seems to occur quite frequently and is one of those consequences is obesity and diabetes. It should be noted that not each individual has the same fructose processing capacity, so I would put them as extremely as Poliquin (2012) who really focuses on optimal health, but I believe that the 50g would be a recommendable maximal intake, but recommending that products high in fructose are healthy is in my opinion violence, as individuals buying these products are likely to strive for optimal health or a level close to that.

The fourth claim is perhaps the most dangerous claim of all and is an absolute lie, it states that the only proven health risk because of fructose consumption is tooth decay. As I have illustrated earlier with the research of Tapy and others (2010) excessive fructose calories can lead to a fatty liver, obesity, diabetes, high circulating tryglycerides and besides all of that it leads to inflammation as well but on this I did not focus extensively, because

although inflammation is certainly related to diabetes because it is inflammation that destroys the beta-cells in the pancreas, but the effects of inflammation due to excessive fructose consumption can be very general, but these effects are well known.

Also, Mary Choi (2009) discusses several negative effects of fructose in her article. She poses the question in her work what has caused the new epidemic in the United States. She states that there are many contributing factors such as the shift to excessive calorie intake from junk food which is coupled with a propensity towards a sedentary lifestyle. However she clearly notes that an increase in fructose intake is also one of the likely factors that drive the epidemic. She mentions Neilson (2007) who remarks that the United States have transformed into a fructose nation. Most importantly Choi (2009, p. 457) states that: “epidemiologic and experimental studies link high fructose consumption with the development of metabolic syndrome, insulin-resistant diabetes and more recently kidney disease. “ This would also answer question 5 because it proves that it can be related to the obesity epidemic.

Regarding claim number 6, people with diabetes can consume fructose since it does not lead to the same spikes in blood sugar and insulin. Fructose will eventually raise blood sugar levels after being processed and thus insulin, but because it first needs to be processed before being absorbed in the bloodstream, so it does not produce the same spikes in blood sugar and insulin as for example glucose.

However, there is compelling evidence that excessive fructose consumption can lead to insulin resistance as is shown earlier in the research of Tapy and others (2010). It is harmful in my opinion to state that people with diabetes can consume fructose, they can also consume pure glucose or basically anything, but that does unfortunately not imply that diabetics can consume fructose without any worries or consequences, it could significantly worsen their condition of insulin resistance and causing more inflammation in an individual

that is already suffering from heavy levels of inflammation due to his diabetic condition. This is also in line with the research of Malik and Hu (2010) who demonstrated that when applying the Bradford Hill model to sugar sweetened beverages and diabetes type II, most of the criteria of the model were met. Sugar sweetened beverages are generally high in fructose as most likely 50% or more of the sugars in those beverages consist of fructose.

Finally, regarding their promotion of crystalline fructose, which is basically pure fructose, I would respond that it is dangerous to do so. Fructose at these levels is simply toxic and even sucrose consists of not more than 50%, and surely it would not be consumed in large quantities and added to other products, so the total percentage of fructose would not be a 100%, but considering that the population already gets overexposed to fructose, pure fructose added to products would possibly even worsen the current crisis. After having analysed these claims and responded to them, I would now like to apply the theory of Galtung (1969) not only on the consumption of sucrose and HFCS, but also on the claims made by the Calorie control council (2014).

Overconsumption of Sucrose and HFCS from a physiological perspective is clearly inflicting violence on oneself. On average people in the United States overconsume sugar as I mentioned earlier. Partly this overconsumption can be due to the fact that sugars are generally processed into a large variety of processed foods. Sugar consumption is generally thought of as one of the main causes that lead to diabetes. The glucose in sugar composites is often regarded as the culprit, it should be noted that fructose is also very harmful as has been seen earlier in this dissertation. But basically an overconsumption of carbohydrates in general seems to lead to diabetes, but sugar composites generally contribute to diabetes. For example, fructose which is often regarded as a sugar naturally present in fruits, can clearly lead to diabetes. Sugar sweetened beverages also play a major role as they do not make you feel full and also the energy compensation is not the same compared to solid foods; all those factors

surrounding sugar sweetened beverages make it easier to consume large amounts of sugar. Finally, sugar can be addictive as has been argued by Avena and others (2008). For an easy explanation, you can watch the video created by Avena for TEDX:

<http://ed.ted.com/lessons/how-sugar-affects-the-brain-nicole-avena> .

So sugar is everywhere in the supermarket, it can be physically harmful, it is often processed in foods or beverages that do not make you full as most processed foods are low in fibre and finally it can also be addictive. These harmful effects combined with the abundance of products that contain sugar and its addictive nature can definitely cause diabetes type II and according to Galtung (1969) subsidizing these foods would be structural violence and the overconsumption of these foods would also be physical violence to oneself. Furthermore, the statements by the calorie control council (2014) are also violence according to Galtung (1969) since they reduce the mental potentialities of the people that read it. Also in supermarkets there is violence occurring, here in Spain supermarkets are describing products high in fructose as suitable for diabetes, but the research of Tapy and others (2010) clearly demonstrate that excessive fructose consumption clearly leads to diabetes, also taking into account the research of Bocarseley and others (2010) fructose might in fact be even more harmful than glucose for diabetics, because a 55% fructose HFCS 55 led to more weight gain and insulin resistance than sucrose which is 50%. Now I would like to shortly sum up these paragraphs and move on to the next crops.

Sugar and HFCS are most likely some of the biggest contributors to the diabetes and obesity epidemic, scientific research has clearly shown that there are some dramatic health effects that occur when these products are being consumed excessively and this could inflict violence on oneself. The general consumer might be to some extent aware of the risks of consuming these products, but there seem to be certain organisations that resist against some of the scientific claims made about these substances and these organisations such as the

calorie control centre (2014), but also the Food and Drugs Administration of the government seems to be supportive to the consumption of fructose, sugar and HFCS, since statements from the FDA have been quoted by the calorie control centre (2014). So there is a lot of different information out there, but most likely the information of the FDA and organisations such as the Calorie Control Centre (2014) would be considered more dominant sources of information, because these organisations are actively marketing their findings and the FDA would arguably as a state institution have a reliable image, while scientists may only publish their research and move on to their next investigation which would make them relatively unknown. Also the media power of those organisations is likely to be higher than those of the scientists. I believe that it would be interesting to have public debates in a trans-modern fashion where policymakers, scientists that support the policymakers, scientists that oppose the policy makers and practical experts would together have these trans-modern debates. As well as people of everyday life that would share their opinions and experiences. Science in my opinion should not be distanced from society itself, later in this dissertation I will mention some other related discussions about this facet. All with all there should be more discourses regarding these discourses and all of these should be known to the population and then from experience consumers could make their own decisions and create their own belief system.

Now, I would like to move on to the next set of commodities that are wheat and rice. Although perhaps less clear, these substances are also related to the diabetes epidemic.

Grains and Cereals: Wheat and Rice

It should be noted that there are many different types of grains and cereals, but some of the most common are wheat, rice and arguably corn, but I will not focus extensively on corn

here. Both these types of food are supported by the farm bill. So how are these substances related to the diabetes epidemic? I will start with explaining some details about rice.

Rice is very high in carbohydrates; raw white rice contains 82g per 100g of carbohydrates. Cooked this is significantly lower but it is still quite high with 21g and the GI of cooked foods as you will see later are generally higher. A strawberry has for example only 8g of carbohydrates per 100g. Also rice has a relatively high glycaemic index; Miller, Pang and Bramall (1992) researched the Glycaemic Index of several types of rice and products that consist mainly of rice, and they found that all the GI's ranged 64 to 93 without taking the standard variations into account. It should be noted that 100 is the maximum and represents pure glucose or another product with a very high glycaemic value that would serve as a reference. So the Glycaemic Index for rice and products containing rice is relatively high to very high and if overconsumed it would thus lead to insulin resistance just as sugar and HFCS, which can in turn lead to diabetes type II. Also one should look at the amount of carbohydrates that are in rice, raw rice has 82g per 100g of carbohydrates. Cooked this is significantly lower but it is still quite high with 21g and the GI of cooked foods as you will later are generally higher. Yet many organisations such as American Diabetes Association (2012) recommend products containing rice to diabetics. Furthermore, the American Diabetes Association generally gives harmful information, the approach utilized by Harvard University that not only considers the GI of a food, but also the carbohydrate content and serving size which is called the glycaemic load is already more accurate and is an easy to apply heuristic Harvard University refers to the article of Atkinson and others (2008) for a further explanation of this method. This method is much better as it takes into account the glycaemic index which is affected by carbohydrate content, types of carbohydrates, fat content, fibre content and more factors and combines it with the total carbohydrate content. It is not perfect, but it is a more appropriate heuristic that can help people manage their diet.

So the American Diabetes Association (2014) recommends rice and some people can eat all the rice that they want and they are unlikely to develop diabetes. However for people that are already diabetics or pre-diabetics such foods are anything but recommendable. Sun, Hu, Pan and Malik (2012, p.1 & p.4) conducted a meta-analysis and systematic review; to investigate the relationship between white rice and type II diabetes. They concluded that: “a higher consumption of white rice is associated with a significantly increased risk of type II diabetes, and that this is especially the case for Asian populations. Also they stated that: “Although rice has been a staple food in Asian populations for thousands of years, this transition may render Asian populations more susceptible to the adverse effects of high intakes of white rice, as well as other sources of refined carbohydrates such as pastries, white bread, and sugar sweetened beverages. In addition, the dose-response relations indicate that even for Western populations with typically low intake levels, relatively high white rice consumption may still modestly increase risk of diabetes.” According, to Sun, Hu, Pan and Malik (2012), Asian populations also tend to consume a lot more rice than other populations; this would put these populations at a much greater risk to develop type II diabetes; so this is yet another subsidized crop that can lead to diabetes. Also rice is everywhere; industrial bred rice is also cheap, high in carbohydrates and thus slightly sweet, produced in bulk and it can be harvested many times per year, which also makes it less and less nutritious in terms of micronutrients because the soil is getting overexploited. It is ideal for businesses and therefore it is incorporated in a lot of products, but for the health of the consumer this type of rice would generally not be a good thing and I did not even mention the arsenic values of GMO rice.

Another problem with rice as there is with wheat, it can cause gluten sensitivity, this does not necessarily manifest itself as celiac disease, but it can also simply cause fatigue in individuals which would lead to reduced activity levels, so rice could possible spike up

insulin and decrease physical activity. This caused gluten sensitivity according to Vandana Shiva (2014) generally appears with industrial bred wheat and rice. She mentions wheat that is produced by Monsanto, and if you would take into account that Monsanto is an American company it would be very likely that Monsanto seeds are used for a large part of the rice and wheat production in the United States, which brings us to a lot of problems. But I would like to go beyond Shiva (2014) because the problem does not just lies with industrial bred rice and wheat, possibly people respond stronger to industrial bred rice, but gluten sensitivity and other forms of intolerance to rice and wheat are much more common than has been thought in the past.

According to the National Foundation for Celiac Awareness (2012) around 1 in 133 people have celiac disease which is very few, but the foundation also states that around 18 million Americans have non-celiac gluten sensitivity which is around 6% of the population and is thus quite common. However, it should be noted that the research surrounding non-celiac gluten sensitivity is only in its infancy state, since it has been a recent concept.

Furthermore, one should not only look at the gluten, but also at FODMAP's which are low in rice, but very high in wheat. FODMAP is an acronym for "Fermentable Oligo-, Di-, Mono-saccharides And Polyols". FODMAP's are most likely even more common than non-celiac gluten sensitivity, but it is also a relatively new concept. However, according to Nanda and others (2012) the diet is not a craze and there is compelling evidence for that FODMAP's can indeed be harmful and result into gastrointestinal symptoms.

But how are those issues related to diabetes? Both FODMAP and gluten can cause inflammation, but they can also lead to fatigue, which will most likely reduce the physical activity of that person and in this way promote a sedentary lifestyle that can be linked to diabetes.

However, there are more problems related to rice and wheat and especially with rice planted from the industrial bred seeds that were mentioned by Shiva (2014). These seeds combined with the exhaustive exploitation of the farm lands, generally leads to depleted soils which are eventually low in nutrients. Grains and legumes are already known to be caused some vitamin and mineral deficiencies because there are generally high in substances such as phytic acid. If the food is very dense in vitamins and minerals from a nutrient soil, the effects of these phytic acids would not reduce the bio-availability of minerals in the body that dramatically. I will extensively explain phytic acids in the next part of my dissertation that focuses on soy. But with many GMO-products that is not the case and although that producers argue that their crops are pretty rich in vitamins and minerals it would probably be useless if the soil is depleted and nitrogen and other chemicals are used to artificially make up for the nutrient depletion of the soil.

So arguably people in the United States may be lower in minerals than is currently thought; due to a reduction of bio-availability of vitamins and minerals which is something on which Food authorities generally do not focus, because they only mention the daily recommended intake of vitamins and minerals. However, I would like to note that reality is more complex than that, you can consume all the vitamins and minerals you want, but if there are substances that seriously affect the bio-availability of these minerals, your efforts can be quite fruitless. These mineral depletions will also lead to diabetes and several other diseases, which I will explain later. I would like to conclude the paragraph that focuses on rice and continue mainly with wheat.

Rice is thus also a serious contributor to type II diabetes and especially in Asian populations, but most likely also in many other people as well as Native Americans which I will explain later in this dissertation. It has a glycaemic Index as well as a high carb content which directly links it to diabetes type II, but rice can also be responsible for a variety of

inflammations as well as lead to fatigue which could indirectly lead to diabetes. Occasionally consuming rice will not be harmful, but there are people that consume rice multiple times per day. Variety with food consumption is necessary and especially so if the diet has been standardised and the staple foods consist of high carbohydrate monocrops.

Yet, little variation exists when it comes to bread and other products that are made from wheat. Bread is consumed by many individuals on a daily basis and often this is even several times per day. Bread is generally produced from wheat, which is another heavily subsidized crop that is produced in bulk in the United States. It is consumed a lot in the United States and Europe, but in the last decades it has also been exported on a large scale since there is a grain surplus in the United States. As mentioned by Friedman (1990) bread has become the cheap global commodity for workers.

Just like rice whole wheat products such as bread have a very high carbohydrate content, for example a white bread has approximately a carbohydrate content of 49 grams per 100g while multi-grain bread has a total carbohydrate content of 43 grams per 100 grams. Whole wheat products would be slightly better for patients with type II diabetes compared to refined wheat products; both in terms of carbohydrate content but also because of the glycaemic index.

Since whole wheat bread for example has a glycaemic index of 46-69 according to Venn (2014), while white bread ranged from 61 to 85 on the glycaemic index. Both are still high in my opinion and even though whole wheat products are generally not considered as a product with a high GI. So from this you could argue that products of wheat and especially refined products with a higher GI will have some relationship to Diabetes. Also if you would take into the account the amounts of carbohydrates that are consumed with a high GI such as sucrose, rice and HFCS adding more relatively high carbohydrate sources could increase the risk of diabetes even further. Whole wheat breads consist of already 40g of carbohydrates per

100g, which is quite a lot, for refined carbs this would be higher and if sugar or HFCS is added to sweeten the bread, consequently the GI index would also be higher. White bread for example already consists of 49g of carbohydrates per 100g; imagine that HFCS being processed into that white bread, then the carbohydrate content would be even higher.

Also one should consider that HFCS is more and more often processed into bread as has been argued before with the article of the Huffingtonpost (2014). Now, I would like to bring in more statements of Shiva (2014), she addresses similar problems regarding carbohydrate consumption she states the following:

“The problem of hunger and malnutrition are rooted in an obsolete and destructive food and agriculture system that is blind to the need for diversity, quality and nutrition of food for a balanced diet. The reductionist mechanistic paradigm that I have called the Monoculture of the Mind promotes Monocultures, and only focuses on the yield of a few commodities. As a result of this Monoculture model, the human diet has been reduced from the diversity of nearly 8500 species providing a diversity of nutrients that the human body needs, to just 8 crops, largely producing carbohydrates. Not only are these monocultures of carbohydrate rich crops deficient in most essential micronutrients, through industrial breeding they are introducing new deficiencies that are leading to killer diseases.”

This is largely what is happening in the United States, the emphasis of the farm bill lies in the production of many carbohydrate rich crops, and in addition to that these crops are generally industrially bred so they are anything but nutritious. Also as argued by Friedmann (1990) more and more standardised products are being consumed which would increase this even more, since many standardised products are made largely with the crops from the farm bill.

However, there are more problems with the consumption of grains, auto-immune problems to be exact. In the next paragraphs I will focus on auto-immune responses that result from grain consumption.

The consumption of wheat can also be related to the rise of Type I diabetes and other diseases that are the result of an auto-immune response. Chmiel and others (2015) investigated the introduction of solid foods to infants. They came to the conclusion that the introduction of cereals before the age of 3 months could be related to an increased risk of obtaining type I diabetes.

In my opinion this studies kind of misses the point, because cereal consumption can simply lead to immune-responses, surely the probability of this can be reduced by introducing foods later, but why is it so necessary that infants consume cereals? The best thing that children at these ages can consume is breast milk. The World Health Organisation (2015) recommends that infants should be fed by breastfeeding exclusively until the age of 6 months. Breastfeeding also has been related with the decreased risk of type I diabetes, whereas products with gluten, infant formulas or cow milk could actually trigger an auto-immune response that causes type I diabetes. Patelarou and others (2012) confirm this. Also it should be noted that even if an immune-response does not occur, the consumption of these foods is linked with an increased possibility of developing type I diabetes later in life. To supplement breast milk, at a certain age you can have mashed puree of healthy foods, but these should be introduced slowly and not until the designated age.

Furthermore, I would like to mention the research of Knip and others (2005) who argue that type I diabetes can be prevented and even argue that Environmental modification is the most powerful strategy to successfully prevent type I diabetes. These modifications would be helpful to prevent both familial and sporadic cases of type I diabetes. Knip and others (2005, S133) mention the research of Akerblom and others (2005) and argue that: “ It is

possible to manipulate the spontaneous appearance of β -cell autoimmunity by dietary modification early in life in high-risk individuals, represent the first indication that environmental modification may affect the natural history of preclinical type I diabetes”. So even for people with a very high probability to develop type I diabetes, this can simply be prevented by modifying the environment. I would like to note that in the course I followed on diabetes at Coursera (2014) such a prevention method was not even mentioned, I believe that this is because of the fact that preventing type I diabetes by modifying the environment is simply not economically profitable.

So what are these likely environmental triggers that cause diabetes type I in children? Knip and others (2005) argue that: “Early exposure to complex foreign proteins in infancy may be a factor that affects the programming of the immune system in such a way that autoimmune responses are favoured later in childhood. “ Which implies that feeding foreign proteins to a child at a young age; could increase the risk of the occurrence of an auto-immune response later in life and this could cause diabetes or other auto-immune responses. I personally experienced an auto-immune response in my nervous system and it was not pleasant and affected me for several years. This could have been partially influenced by the fact that I was born through a caesarean section and spend the first weeks of my life in an incubator and as a result I consumed foreign proteins. In these cases it may be the only choice, but I believe that parents that have a choice should always opt for breastfeeding as other options can be harmful and seen as inflicting violence on the baby.

So according to Knip and others (2005): “Early nutrition has indeed been implicated as a potential risk factor for later type I diabetes.” Furthermore Knip and others (2005) state that: “Cow milk proteins are the first foreign proteins an infant is exposed to in more than two-thirds of all infants in developed countries.” So cow milk is one of the foreign proteins and the other foreign proteins generally come from cereals, which you can see in my field

research where the baby food consisted mainly of milk or cereals. Furthermore Knip and others (2005) mention in their research that both non-gluten cereals as well as cereals containing gluten which is a protein, can increase the probability of developing diabetes. Thus all forms of grains/cereals such as rice and wheat could significantly contribute to type I diabetes, as can be seen in the experiment of Ziegler and others (2003) who found that exposure to gluten foods before the age of 3 months would significantly increase the likelihood of developing type I diabetes.

As argued by both Knip and others (2005) and Ziegler and others (2003) I would like to stress the importance of guidelines regarding infant nutrition, removing foreign proteins from a child's diet and especially proteins of cereals and dairy would generally be recommendable to successfully prevent type I diabetes and other auto-immune diseases. Also the promotion of breastfeeding would be very important to prevent type I diabetes, because children will not be exposed to foreign proteins and children will have sufficient proteins in order to develop themselves to be healthy babies, but surely at some point in time babies need to ingest or food as well, as can be seen in most guidelines, but breastfeeding in my opinion is recommendable until the age of 2-3 years old and this is in line with the recommendations of the World health organisation (2015) who strongly recommend breastfeeding until the age of 2 years old and beyond. Unfortunately, very few people receive breastfeeding until such an age and eat processed junk made by corporations such as Nestlé and Hero. Breast feeding and suitable mashed foods should in my opinion be the diet of a child until the age of three,

Also for kids, teenagers and adults, I believe that a limited consumption of cereals in general would be a recommendable and especially for people with diabetes. Venn and Mann (2004) concluded that whole grains are inversely related with the risk of diabetes. They compared mainly whole grains and legumes to refined grains. Surely if you would compare whole grains with refined grains, sugar, HFCS; then these substances would definitely be less

likely to cause diabetes, but then you could take foods such as nuts, vegetables, meat and seeds which would have an even lower Glycaemic Index. Even in the past when whole wheat products were consumed a lot, the number of people with type II diabetes was already rising before that there occurred a large reduction of whole wheat consumption and people started consuming more refined carbs.

Whole grains are better for diabetics than the refined grains, sucrose and HFCS which are being consumed generally consumed nowadays, but as mentioned earlier, diabetes incidences were already rising before the introduction of HFCS and before people were starting to consume less whole wheat and more sugar. Whole grains are by no means healthy, I would say that the fire of diabetes was already burning slightly due to the consumption of whole grains and other crops that are rich in carbohydrates, but we added some petroleum to that fire with an increase in sugar and HFCS consumption. Whole wheat has generally been associated with being healthy, but recently grains are being critiqued more and more, some of these critiques are also related to the gluten sensitivity mentioned earlier and the type I diabetes in infants. But there is also a more general critique which basically argues that whole grains are inflammatory in general.

Karin de Punder and Leo Pruimboom (2013) investigated the auto-immune responses and inflammation that is caused by the consumption of cereals and especially wheat. De Punder and Pruimboom (2013, p. 1 or 771)) state that: " Inflammation is the response of the innate immune system triggered by noxious stimuli, microbial pathogens and injury. When a trigger remains, or when immune cells are continuously activated, an inflammatory response may become self-sustainable and chronic. Chronic inflammation has been associated with many medical and psychiatric disorders, including cardiovascular disease, metabolic syndrome, cancer, autoimmune diseases, schizophrenia and depression."

Furthermore, de Punder and Pruijboom (2013) argue that an inflammatory response is often caused by high amounts of consumption of simple sugars, think of table sugar, But de Punder and Pruijboom (2013, p.772) also state that "other substances in our daily food, like those found in wheat and other cereal grains, are also capable of activating pro-inflammatory pathways." This would perhaps explain the increased incidence of type I diabetes in older people as well. Cereals over the last centuries have become a staple of the human diet. Infants generally develop the disease because of a strong auto-immune reaction, but chronic inflammation over the long run could have the same effects as an auto-immune response.

Cereals such as wheat and rice are generally inflammatory, but they have been staple foods in the human diet for several centuries so they have a very healthy image, however if you critically compare grains and cereals to other foods it is clear that these foods are not that healthy. Many people cannot handle gluten that well, this does not only manifest itself as gluten allergies, but also many people get simply sleepy from gluten consumption. I would now like to conclude these paragraphs about rice, wheat and cereals in general.

Cereals are generally inflammatory and they are staple foods in the human diet. It may thus not be recommendable to have an inflammatory food serving as a staple food in the diet of almost everybody of this planet. Infants could develop type I diabetes by consuming cereals. Also gluten can be harmful for the population to a much larger degree than was initially thought, blood tests before the consumption of these foods are necessary in my opinion. Cereals including rice, oatmeal, whole wheat, etc. are simply harmful for many people and can trigger an inflammatory responses and auto-immune reactions. So inflammation can cause a metabolic syndrome as well as autoimmune diseases and many other factors.

May I remind you that diabetes type II is a metabolic syndrome and that inflammation is that which destroys the beta-cells in the pancreas? Furthermore, because of the fact that

people with a metabolic syndrome do not produce sufficient amounts of insulin in the later stages of type II diabetes and for this reason are more likely to experience inflammation due to high blood sugar levels. The pro-inflammatory substances such as grains and cereals are perhaps not recommendable.

So whether a substance can lead to the development of a metabolic syndrome or diabetes does not solely depend on the height of glycaemic index of the substance. Only looking at the GI-index to associate certain foods with diabetes is inadequate and is a typical example of narrow-minded research which is why I stated that previously that certain researchers are missing the point. Also, may I remind you that type I diabetes, is the result of an auto-immune response in which can thus in theory be caused by the consumption of cereals, because there seems to be a relation with cereal consumption by infants and type I diabetes. Yet, why is it; that none of the diabetes organisations such as the American Diabetes Association (2014) do not mention a single thing about the inflammation caused by the consumption of cereals? They only talk about the glycaemic index. Surely, they are more useful to control your blood sugar compared to other carbohydrates such as sugar, but inflammation is not only related to the height of a person's blood sugar, there are so much more factors that should be taken into account. Recommending these products to people with diabetes that suffer from high degrees of inflammation is structural violence in my opinion. However, it is difficult to really point at a perpetrator in the case of cereals, but as Galtung (1969) would say that is built into the system, this is in line with the thoughts of Shiva (2014) who also states that monoculture of the mind is that which promotes these monocultures. Furthermore, Shiva (2014) states that diets based primarily on carbohydrates like industrial rice, do not only lead to micronutrient deficiencies, but also because of the high Glycaemic Index will lead to diabetes. I would like to add to that, that industrial bred wheat would have a similar effect as industrial bred rice and in addition to that I want to state that it does not all

depend on the GI, but if the staple of our diets consist mainly of high GI foods, then I do agree with Shiva (2014) and see these monocultures as a harmful structure that inflicts violence on the consumers of the United States. But I do want to point out that I disagree with Shiva (2014) recommendation of Millet. Millet is also a cereal, although one that does not contain gluten and would be slightly less harmful, I would not recommend it as a staple food as it contains other substances that can cause inflammation. But generally I agree with Shiva (2014)

To conclude I would like to state that; companies do not want people to stop consuming grains such as wheat and rice. They are cheap, easy to refine and form the staple of the current human diet. Furthermore flour can be used to produce very palatable foods that are arguably addictive. If people would stop eating cereals; that would mean that factories have to be shut down, new products would have to be invented, it would be a paradigm shift that is perhaps too large to phantom for most people in the world.

However wheat and rice as well as other cereals can be linked to both type I and type II diabetes. They are high carbohydrate foods as well as foods that can cause inflammation and trigger auto-immune responses. So, I still believe that it would be a necessary paradigm shift to change the staple of our diet and to bring in more diversity as well as form guidelines that warn people for the consequences of eating a certain food. Especially for babies this is a huge violence that is inflicted on them. Babies are more likely to develop type I diabetes because they have been fed with cow milk or cereals as an infant. If the current socio-economic structure promotes giving infant formulas to babies which are basically harmful processed foods, then I believe that this is also a form of structural violence according to the application of the theory of Galtung (1969). You could argue that breastfeeding until the age of 2-3 years old would impede the women's abilities to work, but this is because the current structures are not adapted to promote breastfeeding. Companies could create spaces for

babies where women can come and breastfeed their babies or women simply bring the baby to work. Yes this would perhaps impede productivity, but if you only look at productivity you are ignoring the important aspects of life and you are impeding the potentialities of the babies and this according to Galtung (1969) is violence.

Also the fact that inflammatory foods are the staple of our diet can perhaps be seen as structural violence as we are reducing our own potentialities and this would also be considered as violence according to the theory of Galtung (1969). We should transform the structures surrounding infants, diet and more to improve the peacefulness of our generation and future generations. Now, after this conclusion, I would like to address how dairy consumption can be related to the development of diabetes.

Dairy

As mentioned before, dairy consumption in infants can promote an auto-immune response in a similar way that cereals do, this can be read in the earlier mentioned work of Knip and others (2005). So, in these paragraphs I largely want to discuss the link of dairy with type II diabetes, since the relation to type I diabetes has been partly explained earlier.

In many studies dairy is promoted as a substance that reduces the risk of diabetes type II. For some reason these studies also state that low-fat milk reduces the risk to diabetes type II to a larger degree than full fat milk. This is strange; because fat would normally lower the insulin spikes.

Berkey and others (2005) on the other hand found evidence that high amounts of dairy consumption could actually lead to weight gain. This group of scientists contained Walter Millet, who is known for his honesty and for the fact that he kept fighting to get the danger of trans-fat to be known even though many businesses and associations were against him. I

personally, add more value to articles written and research conducted by scientists that possess integrity than those which do not or when it is not clear. Dona Haraway (1988) for example, states that you should situate yourself, but I believe that you should also try to situate some of the authors of the literature that you plan to use, especially when there are many different views on the matters that you want to discuss. Powell (2014) interviewed Walter Millet and he clearly states that scientists should take a dominant role in the debate of health related issues. Policymakers are usually left to deal with the debate but according to Millet in Powell (2014) policymakers usually do not understand the data as well as the scientists that came up with the data. Furthermore, Millet in Powell (2014) states that in his case the cardiovascular prevention community and the “economically influenced manufacturing industry” wanted to have the results of his data to be dismissed. Some institutions can have good intentions but they might have firm beliefs of how things are, however because these institutions consist of people and people can make mistakes or be unaware of certain matters, you should still try to convince them with your data. Miller experienced that with the Heart Association which firmly believed that saturated fats were related to heart disease while in fact that is not completely true, Millet argued that mainly trans-fatty acids were harmful. Also Millet in Powell (2014) mentions that; companies that have other interests than you can fiercely.

So back to dairy, I wanted to mention this aspect of research, to make my argument more convincing. Especially, since the dairy industry is funding the majority of the research on dairy. This might explain why so many articles completely contradict the findings of Berkey and others (2005). Dairy is a very controversial food and many people are in favour of dairy consumption, but there are also a lot of people that oppose dairy consumption.

Thus large amounts of dairy can lead to an increase in weight gain and this is especially the case for low-fat milk. Which is probably because that low-fat milk contains

more hormones and has a higher GI-Index. But there is another often overlooked relationship between dairy consumption and diabetes that does not directly concern humans.

Cows are generally fed grains and legumes such as soy and corn these crops are not natural foods for them, but because these foods are so cheap due to the farm bill and are effective at increasing the weight of the cow they are fed to the cows. This has two specific consequences, the cows will fart and burp significantly more and this will lead to significantly higher methane emissions. This is in line with the thoughts of Shiva in Reid (2010) who states that the soy beans fed to cows is the major source of methane. Also personally, I would like to note that if 40% of the land mass is grass and these landmasses naturally co-exist with cows, would the earths possibly to retain methane not be significantly higher? But there is also research that states that naturally grazing cows produce more methane, this is strange, but this could be due to hidden interests of the meat and dairy industry or perhaps its true but only in a specific context.

Furthermore, making the shift to grass-fed beef would in many regions mean that cow meat would become a seasonal product and this would thus reduce the need for the amount of cows. So the meat industry would definitely not want grass-fed cows to have a more sustainable image than grain-fed cows. So for me it remains unclear what is more sustainable, but I think that cows living in a natural setting would be more sustainable.

Furthermore, Shiva in Reid (2010) mentions that it can be seen like if cows are feed with beans and grains because it makes them sick, which brings me to my second factor. The second factor is that the cows develop diabetes or the metabolic syndrome due to the way that they are fed. Saleem and others (2012) discovered that cows that are fed diets high in grains during lactation have a high incidence of metabolic disorders. The diabetes and obesity epidemic does not only include humans, but basically all farm animals and even fish such as salmon that are fed grains, legumes and other foods that are unnatural for them.

I think that it is very important to mention the farm animals as well, these animals are fed with food that is not their natural food, they consume excessive amounts of foods that are toxic to them, spend their life without the possibility to move and as a result these animals get obese and develop diabetes and farmers are very happy because they can use cheap fodder to get big animals and are capable of selling them for more. These extra calories then result in more meat consumptions of humans, which can also contribute to the development of diabetes and obesity.

Saleem and others (2012) who I mentioned earlier; are researching why cows develop these conditions, but I believe that is simply because they are designed to eat grass. They have a stomach with 4 chambers for a reason, to digest foods that are generally harder to digest; thus with a little bit of logic you can prevent the metabolic syndrome from occurring. Give the cow the space to move and put them on a grass plain and I would say that diabetes would be rare or even non-existent as the cows use more energy to digest food and use energy to move.

Farm animals are very important natural fertilizers for farmers as is also argued by Shiva in Reid (2010), furthermore Shiva in Reid (2010) states that cows are important for a sustainable solution. I agree with her if you consider that 40% of the world land mass consists of grass plains, these grass plains have evolved by coexisting with herbivores. The methane emissions of livestock would possibly not be as harmful if the animals were fed their natural diet as argued by Shiva in Reid (2010), it is not the fault of the animals but because of the structure that inflicts physical and arguably mental violence on these farm animals, which causes them to burp and fart very frequently. Even though some research states that grass-fed cows produce more methane emissions, I have my doubts about that, when I stopped eating legumes and grains, my stomach felt more stable and I fart and burp almost never lately.

Furthermore, if you consider that there is so much grass in the world, there would be no need to have many cows in dry regions such as the desertified parts of California, which would reduce the need of water for agriculture and like this it will be better for a sustainable environment.

I would like to state that I am not against consuming meat per se since I believe that humans are omnivores, but I am in favour of consuming meat in a natural, sustainable and seasonal setting. For example, the research of David and others (2014) shows that gut population of bacteria in the human stomach can alter very rapidly between an animal-based diet and a plant-based diet. However, this rapid adjustment capability would mean that we would not eat meat all the time, a great example for me is the Hunza society, who traditionally ate raw fruits and vegetables in the spring and in the winter they consume some of their animals for survival. The Hunza society has surely changed because of modernity, but some of their practices remain as well as their indigenous knowledge to live sustainable and healthy.

So I am not against the fact that animals such as humans eat other animals, I see that as a normal part of nature, but imprisoning and overfeeding animals with junk is unnatural and unethical to me. It would be better for the planet, the animals and our health if we would thrive from grass-fed animals that have lived a relatively long and healthy life while eating their natural foods and have freedom of movement and eat them seasonally. Grass fed food is also healthier. Grass-fed meat according to Daley (2010) is lower in fat, but higher in omega 3 fats, higher in CLA which prevents heart disease, higher in both vitamin A and E and higher in cancer fighting oxidants such as Glutathione and superoxide dismutase.

So cows if fed harmfully are harmful for humans and arguably for the planet, but if fed properly and given freedom to move can be beneficial for both humans and the sustainability of the planet. To keep the cow population and the grasslands in check we could

hunt cows and be grateful for their meat, but this should not be done as frequently as is currently the case.

Also cows also have organs that can be eaten which in the West, does not happen that often, if we would completely use the cow from which we have taken its life, less cows would have to be consumed than is currently the case. You could take the Maasai in Kenya as an example who really use almost every part of the cow. The Maasai association (n.d.) clearly explains how Maasai use cattle and engage in a form of communal land management system that works with seasonal rotation. I believe that engaging in a trans-modern dialogue with these cultures would be very useful to critically assess our current use of cows for dairy and meat production.

Native cultures as can be seen in the article *Alternative development* written by Gomes (2012) can be very sustainable and take great care of the land, in the United states a dialogue could be formed with the native Americans that used to manage the land in a sustainable manner. So now after addressing shortly the diabetes epidemic of livestock and after discussing related sustainability issues, I will get back to the relationship between dairy and diabetes among humans.

Dairy in its pure form as milk, could also lead to diabetes which I will discuss later in this dissertation. However, dairy is used on many occasions to combine with sweet substances such as sugar and this should also be taken into account when consuming dairy.

For example, chocolate milk has added sugar usually in the form of sucrose or dextrose, milk already contains lactose which is milk sugar, both types of sugar have their own receptors and as a result the insulin response after consuming this product is a lot stronger. This might be great for athletes at some point in time to boost their recovery, but in the long run this over-stimulation of insulin will lead to insulin resistance and especially for people with a sedentary lifestyle. Also because there are two types of sugar in chocolate milk,

more sugar will be absorbed in the bloodstream, making it more dangerous for people with diabetes.

Another similar case is that of low-fat yogurt with added HFCS or sugar, as mentioned earlier by Bray and others (2004) HFCS is found in many yogurts as well as is regular sugar and as is fructose, just think about those low-fat yogurts containing bifidus and a fruity flavour, these products have diabetes written all over them, yet are consumed by so many people because they want to have a healthy gut. Guess what? Large amount of sugars feed the wrong bacteria in your gut, so if you really want to improve your gut try organic kefir or other natural fermented milk products that do not have added sugars.

Another product of dairy that has led to a lot of diabetes is ice cream; ice cream is generally full with sugar and comes often with HFCS. If it is low in sugar, it usually is filled with artificial sweeteners that are also not recommendable. Now I would like to move on to a facet of milk that is not discussed frequently and most research does not take this into account.

I want to state that milk can lead diabetes. Of course you can ask yourself whether this is not the case with all food, but there are more factors that one should take into account when consuming milk. For example, milk does contain some natural amounts of sugar, in the form of lactose. This amount of lactose is not that much, but there are others things that need to be taken into account.

Namely that milk is an insulinogenic/insulinotropic food, which is basically why milk can be harmful for people that have diabetes or are in a pre-diabetes state. This has been researched by Nilsson and others (2004) they concluded that milk protein has insulinotropic properties which implies that it stimulates insulin production, so if you consider the fact that milk proteins stimulate a larger than normal insulin release, contains lactase which is a sugar, and many people drink skimmed milk that is low in fat; then all of these factors combined

would lead to a significant insulin spike. You could argue that an insulin spike is great for diabetics. But if a person is overproducing insulin as happens in the prior stages of the development of the disease, the pancreas can overwork itself more rapidly, since it gets stimulated to produce even more insulin. Also if the pancreas is damaged as is the case with diabetics then this needed insulin cannot be produced and this could lead to complications. So in general it could be harmful to recommend dairy consumption, and foods that improve insulin sensitivity such as cinnamon would be favoured, because these foods do not deregulate the insulin production, but makes the cells of the body more sensitive to insulin.

One of the hegemonic discourses is that low-fat milk is inversely related with the risk of diabetes, which in my opinion is really strange, perhaps it is inversely related when compared to the consumption of a sweetened beverage that contains a lot of sugar or HFCS, but low-fat milk by itself in my opinion does not possess the qualities to be associated with an inversed risk of the development of diabetes mellitus type II. Also according to Berkey and others (2005) it is expected to lead to a larger weight gain than full milk despite the fact that skim milk contains less calories. Thus, I suspect that the dairy industry is promoting low-fat milk unjustly and that there are harmful hegemonic discourses in place. But I cannot be certain about this, but I would like to apply the model of Galtung (1969) on dairy consumption. Diabetic people will consider taking milk because it is known to be inversely related with the risk of developing diabetes, while in reality this may not be the case. If it is true that dairy worsens the conditions of those with diabetes or can even lead to diabetes due to its insulintropic properties then faulty discourses put in place by the dairy industry are inflicting serious harm to people that are already diagnosed with a sickness. This would be violence according to Galtung (1969) because it would be lies and indoctrination that will actually have a harmful physical effect on people with diabetes and of course it would decrease their mental potentialities. However, before jumping to any conclusions regarding

dairy I believe that there should be more independent research on dairy. Since there is not that much clarity concerning dairy as there is with other foods.

But it is safe to say that dairy consumption is also likely related to the development of type I diabetes. Infants that consume foreign proteins as those in dairy at a young age are significantly more likely to develop type I diabetes. Exposing infants to dairy consumption can be seen as violence according to the theory of Galtung (1969) since their mental potentialities would be significantly reduced if they develop type I diabetes or another auto-immune disease.

Dairy seems to be related to auto-immune responses, this is also implied in the research of Segurel and others (2013) who argue that possibly cereal and milk consumption have changed gene-expression in such a way that the prevalence of diabetes has increased considerably. This is feasible because the pre-agricultural or hunter/gatherer populations researched by Cordain and others (2002) in general did not consume cereals or milk and were free from non-communicable diseases such as diabetes as well as other auto-immune diseases.

Finally, I do not want to state that all dairy is bad for diabetics, I do believe that moderate amounts of high fat fermented dairy products; could be an alternative for diabetics that like having desserts compared to ice cream and such, but whether dairy consumption is beneficial for health is doubtful and more independent research is necessary. Also, there is a large amount of social injustice going on with farm animals such as cows that suffer from diabetes and obesity as well. A change in the meat and dairy industry would be most welcome. Now after discussing dairy, I would like to address the final controversial crop which is soy.

Soy

Soy is a very controversial food some say it is harmful and some say that it does wonders for your health. However, one should beware of the fact that most soy products in the supermarket are from GMO-made soy and are heavily refined into processed foods. Also, one should take into account that the soy industry is very powerful as is the dairy industry. Soy is one of the main subsidized crops after all and this might be so because the food industry benefits from this. For example, soy gets processed in many processed foods, soy serves as a meat replacement in refined products, its lectins are in the majority of processed foods and it serves many other purposes for the food industry.

It should be said that soy is high in vitamins and minerals, but one should not just look at the micronutrients, one should analyse the whole absorption and digestion of a food and not just its vitamin and mineral content. Furthermore as is explained by Kevin Cann (2014) who has an undergraduate in health and wellness with an emphasis in nutrition and has its own nutrition company, we should not compare the soy consumed in the United States with the soy consumed in Asia. In Asia people generally consume fermented soy; while in the U.S. unfermented soy from GMO crops are consumed, the fermentation process reduces many of the anti-nutrients in soy and the population of beneficial bacteria increases due to the fermentation. But also according to Patisaul and Jefferson (2011) who argue despite the fact that Asians historically had lower incidences of certain diseases and despite the fact that soy is one a cornerstone of many traditional Asian diets; they question whether there is actual evidence that soy consumption leads to this improved health condition and they pose the question which compounds of soy would then actually lead to those health benefits. With many of the compounds a negative link to health can be established. Soy as argued earlier has

many nutrients, but Soy has so many anti-nutrients and harmful compounds that it is almost difficult to decide where to start.

So I will start with lecithin and other toxics, lecithin which is commonly used as a food additive that binds substances together. Soy lecithin is arguably a toxic phytoestrogen. Behr and others (2011) state the following in their abstract: “we found soy lecithin to be strongly estrogenic. It might, therefore, be a major contributor to total estrogenicity. We conclude that dietary oestrogens are omnipresent and not limited to soy-based food.” So Soy is estrogenic, but you should not confuse dietary oestrogens with oestrogens produced by the body. Dietary oestrogens are toxic as can be seen in the article of European Food Safety Authority (EFSA) (2011). The EFSA (2011, p.8) researched zearalenone levels in food and stated the following: “The toxin is common in maize, but because the spores of *Fusarium* are ubiquitous, cereal crops such as barley, oats, wheat, rice, sorghum and soy beans are also susceptible to contamination with zearalenone.” But miraculously the EFSA (2011, p.2) also stated that: “There were indications that soy can be contaminated with zearalenone but there were insufficient data to draw conclusions.” I am not sure whether this is a coincidence or whether the food industry does not want certain data to be published, yes this is a superstition of mine, but as you will see later there are a lot of controversial issues with soy.

Furthermore, the EFSA (2011, p. 90) stated that: “The possible impact of combined exposure to zearalenone with other oestrogenic substances in food (such as phytoestrogens in soya) or the environment could be additive or antagonistic. So that would mean that infant formulas containing soy lecithin and cereals could be very toxic if the effect is additive, which it most likely the case! The EFSA (2011) and other authorities do not look at the additive effects of these toxics and base their recommendations on individual isolated substances in specific products, they only state that they should investigate it.

They really should investigate whether these phytoestrogens are additive, because the EFSA (2011, p. 3) also stated that: “The highest exposure estimates are for toddlers (aged \geq 12 months to $<$ 36 months), at 9.3 to 100 ng/kg b.w. per day for average consumers, and 23 to 277 ng/kg b.w. for high consumers.” This means that infants have the highest exposure to these toxics; which is not a coincidence in my opinion, because basically all infant formulas contain soy lecithin and/or cereals. This is very worrying, because still little is known about lecithin from soy and how it can interact with the immune system. To back this statement up; Behr and others (2011) examined 18 foodstuff samples and five infant formulas were assayed for in vitro estrogenicity. In total, 69.6% of these samples exhibited significant estrogenic activity. Also Behr and others (2011) as mentioned earlier, they found soy lecithin to be strongly estrogenic. So I would strongly recommend to not feed infants with cereals and soy until proper research with sufficient amounts of data has been done on soy, cereals and the toxics that can be found in these substances. These facts surrounding infant nutrition are extremely important, but slightly off-topic, so let us get back to diabetes.

So how do these toxic phytoestrogens relate to diabetes? As I will also argue later with the phytoestrogen genistein with the research of Zanella and others (2014) which is also found in soy, it can lead to an increase in adipose fat-tissue which would decrease insulin sensitivity and contribute to weight gain which will significantly increase the risk of developing diabetes. It should be noted that Soy in the past got hailed for helping with preventing diabetes and obesity, but according to Patisaul and Jefferson (2010) the potentially beneficial effects of phytoestrogen consumption have been eagerly pursued, and frequently overstated, the potentially adverse effects of these compounds are likely underappreciated. So the research that states that soy consumption could prevent diabetes and obesity is generally overstated and the negative effects should be studied better. I will not state with absolute

certainty that soy causes or prevents diabetes, but there is a good possibility that it causes diabetes and obesity. I will now move on to the next arguably harmful compound.

Soy also contains phytic acid, Lopez and others (2000) discovered that phytic acids reduce mineral absorption for zinc, iron and other minerals. How is this related to diabetes? For both men and women this would be harmful and could increase the risk of diabetes, in today's society men generally are low in zinc and an even further depletion of zinc levels would result in a significant decrease of testosterone levels. Which is problematic because testosterone levels are dropping very fast, Travison and others (2007) found that testosterone levels dropped in the United States with 17% from 1987 to 2004. Low testosterone levels are tightly linked with both diabetes and obesity. Low testosterone levels may be caused by these diseases, but also the other way around there seems to be a correlation between low testosterone and the likelihoods to develop these diseases. I would like to state that although this testosterone drop might affect men more than women; testosterone is arguably the most important sex hormone for women as well.

Also since inflammation plays an important role for the development of diabetes among men and women and zinc is an essential nutrient to boost your immune system as this would reduce the effects of inflammation with type II diabetes and it could help with preventing type I diabetes. Haase and Rink (2009) argue that the trace element zinc is essential for the immune system and furthermore Haase and Rink (2009) also argue that there is a high prevalence of zinc deficiencies in hospitalized patients. This is strange right? Because Haase and Rink (2009) are from Germany where just like in the U.S. as according to their food authorities these deficiencies would normally not take place since many foods have added vitamins and minerals.

However, I see this as a fallacy of modern science that over emphasises mineral intake and does not look sufficiently at the bio-availability of minerals in the body. Legumes

and cereals as mentioned earlier possess anti-nutrients that could deplete the body from certain minerals. Interactions of the body with certain foods should be analysed more closely. Also as I will explain later, zinc plays an important role for insulin sensitivity, a lack of zinc could thus lead to insulin resistance and this is one of the main reasons that low levels of zinc can be related to diabetes.

Grossman and others (2008) investigated the relationship between diabetes and insulin resistance, they came to the conclusion that low testosterone levels were more common in men with type II diabetes than when comparing to the average of the general population. Furthermore, Grossman and others (2008) linked insulin resistance to low testosterone levels. As you may well recall, all people with type II diabetes, but also the people in a pre-diabetic state suffer from insulin resistance. This would imply that all of the previously mentioned commodities are harmful for people with diabetes, since they all tend to cause insulin resistance.

However, also for women zinc is very important Qi Sun and others (2015) concluded that zinc intake is inversely related with diabetes type II. Qi sun and others (2015) also argue that zinc is very important for insulin action and thus very important for diabetes. Finally they state that having a higher zinc to heme iron ratio was significantly effective in improving insulin action. Heme iron is present in products such as meat, so this would mean that zinc from vegetal sources or from meat that is low in heme-iron would be the most beneficial to address diabetes, since plants only possess non-heme iron, this can be read in the encyclopedia of Coates and others (2014). But it should be noted that red meat is very high in zinc and has over three times more zinc than iron so the ratio would generally improve, but zinc levels should be increasable in a vegetarian diet as well. The best would arguably be a combination of vegetables and meat.

Zinc is thus an essential trace mineral for both men and women that have diabetes, or are at a risk of developing diabetes, but also for any person in general since it is an essential mineral and deficiencies cause many problems in the world. According to Hambridge (2000) In the United States the intake levels of zinc seem to be sufficient, but a large part of the population has a deficiency when it comes to the bioavailability of zinc. Hambridge (2000) is not sure why this is the case, but personally I would say that this is because of large consumptions of refined soy, flour and cereals in general which are known to deplete the bioavailability of a numerous amount of minerals in the human body. One should thus not only look at the nutrient content of a certain food, but also at the interaction of a certain food with the bio availability of essential vitamins and minerals. I have to conclude that the hegemonic paradigm concerning nutrition in the United States is both simpleminded and narrow minded.

Little attention is given to interactions of substances in the human body and there is an emphasis of looking at the intake levels as well as counting calories while not all foods are equal. This simpleminded paradigm of thought can be utterly harmful as I will demonstrate later with dietary iodine and the regulation of the thyroid hormone levels in the body. However, this may not be caused by the scientist, but by the policymakers that interpret most of the data, this could seriously decrease the quality of the guidelines as well as the general knowledge of the population. Also, it could be caused by hidden interests of institutions to only research certain matters because they are being financed by the food industry.

Another problem with soy is that it contains Oxalic Acid, Kelsay (1997) researched the effect of fibre, phytic acid and oxalic acid on mineral bioavailability in the body. Kelsay (1987) came to the conclusion that refined products containing these materials would have a negative effect of the bioavailability of these minerals in food. Non-refined products did not show a significant decrease in bio-availability. Cereals and soy both contain all 3 of these

substances and most processed foods such as pasta and soy milk in the supermarket generally stem from these refined cereals and soy. Another mineral that gets poorly absorbed because of oxalic acid is magnesium. Magnesium is another important mineral for testosterone production, the immune system, the central nervous system and more. For example, Cinar and others (2010) argue that magnesium is important to increase free testosterone levels for both athletes and sedentary subjects.

Most people are deficient in magnesium; in addition to that the current guidelines for vitamins and minerals are in a heavy need of being revised. Furthermore, Noonan and Savage (1999) argue that oxalic acids can be especially harmful for women because they reduce the bioavailability of calcium. Women need relatively more amounts of calcium and the health of the women thus suffers from this. Pittas and others (2007) argue that vitamin D and calcium insufficiency can negatively influence glycaemia, so according to them vitamin D and calcium supplementation can both be beneficial in optimizing glucose metabolism which is essential to prevent diabetes. I would like to make two statements regarding this, with the first one being that dairy could negatively affect the vitamin D3 and calcium balance since both substances use similar receptors and this could thus arguably increase the prevalence of diabetes, but this is my personal deduction and furthermore I would like to state that Pittas and others (2007) are not specific enough and should specify the type of vitamin D and not simply vitamin D. Because humans can only absorb vitamin D3 and other variants of vitamin D are not suitable for humans. So Oxalic Acid is likely linked to diabetes as it can reduce the bio-availability of important minerals that are linked with the prevention and treatment of diabetes. Now, I would like to continue with another substance that is present in soy.

Soy also contains other phytoestrogens such as the isoflavone genistein which according to Zanella and others (2014) leads to an adipogenesis in mice, which is the creation of fat tissue. This is not surprising since phytoestrogens have a similar function as oestrogen

and thus leads to a significant increase in fat mass. An increase in fat mass is generally associated with Diabetes, Obesity and heart problems. The scary thing is that, Hwang and others (2014) mention that hydrolysed tofu enriched with phytoestrogens has become a more functional food after refining the tofu. However, from research such as that of Kelsey (1987) you could conclude that refined soy products are harmful and as I mentioned earlier phytoestrogens are toxic and the European Food Safety Authority (2011) is actually researching whether people do not consume too much of it, products enriched with phytoestrogens is arguably the same as putting some extra mercury on your fish. Also if you look at the complications that are caused by refined foods in general and if you would consider that the soy industry has an important interest in maintaining the healthy image of soy, I would say that the investigation of Hwang and others (2014) is utterly suspicious. I will refer to this research of Hwang and others (2014) later as well since they described this product as a cost-effective protein source for developing countries that is also richer in phytoestrogens.

A fifth reason why soy can lead to diabetes is because it probably disrupts thyroid levels. Thyroid is an important hormone that is produced in humans through the thyroid gland. Soy can cause low thyroid hormone production because it blocks the absorption of iodine. According to Elizabeth Pearce (2004) this is especially dangerous for pregnant women and children who are in greater need of iodine. Iodine deficiencies can cause many problems of which hypothyroidism is one of them as argued by Pearce (2004). Symptoms of Hypothyroidism include fatigue, weight gain, depression and much more. To back this up I would like to use the quote of Pearce (2014) in an article on the site of Boston University. Pearce (2014) states that: “Thyroid disease affects millions of people worldwide and an underproductive thyroid can cause obesity. This is because the thyroid produces hormones

that help regulate metabolism, which in turn affects body weight.” I would like to clarify that an underproductive thyroid is the name as hypothyroidism.

These are symptoms from which people with diabetes generally suffer from. And also weight gain and fatigue can lead to insulin resistance which in turn can lead to the development of diabetes. According to Patricia Wu (2014) people with diabetes have an increased risk of developing a thyroid disorder. Additionally, Wu (2014, online) states that “Postpartum thyroiditis, a form of autoimmune thyroid disease that causes thyroid dysfunction within a few months after delivery of a child, is three times more common in women with diabetes.” So people with diabetes might be especially prone to a thyroid deficiency such as hypothyroidism. However, Wu (2014, online) states that hypothyroidism is largely caused by an iodine deficiency, but in the States that is not the case because Iodine gets added to table salt. You could ask yourself the question whether artificial iodine is as beneficial as the consumption of foods that are naturally higher in iodine. For example, if person X has a soy burger and uses table salt that is enriched with Iodine, would person X still be able to absorb sufficient amounts of iodine and is there any difference between this iodine and iodine that is naturally present in food? Wu (2014, online) states that most people in the United States with hypothyroidism suffer from Hashimoto thyroiditis which is an autoimmune disorder. The cause of this auto-immune disorder is unknown, but it seems to appear more frequent in the United States and other countries where the consumption of refined goods is very common.

I would not even be surprised if the cause of this auto-immune disorder in the thyroid gland is caused by the artificial iodine that gets added to salt and food in the first place. After investigating the relationship with Iodine I stumbled on the research of Yoon and others (2003) who argue that removing dietary iodine, which is thus the substance that is added to table salt to prevent hypothyroidism, can actually help restoring thyroid functioning for

people that suffer from Hashimoto Thyroiditis. From this you can deduce that perhaps more thyroid problems are caused than resolved by adding dietary iodine to products. This is another clear example, which illustrates that the quick fixes from the food industry in the west perhaps inflict more damage than that they have beneficial effects. So why is it so that soy is considered to be healthy? This might be because of hidden interest, which I will try to illustrate now by mentioning a specific case.

In 1999 the Food and Drug Administration of the United States has considered the food to be healthy despite the protest of two of its members that are considered to be experts in soy research. These experts were Daniel Doerge and Daniel Sheehan who were two of the key experts of the FDA who protested against the health claims related to soy made by FDA itself, Doerge and Sheehan (1999, letter is in the appendix in part D, stated on 18 february, 1999 in an official letter that: “there is abundant evidence that some of the isoflavones found in soy, including genistein and equol, a metabolize of daidzen, demonstrate toxicity in oestrogen sensitive tissues and in the thyroid. This is true for a number of species, including humans. Additionally, isoflavones are inhibitors of the thyroid peroxidase which makes T3 and T4. Inhibition can be expected to generate thyroid abnormalities, including goiter and autoimmune thyroiditis. There exists a significant body of animal data that demonstrates goitrogenic and even carcinogenic effects of soy products. Moreover, there are significant reports of goitrogenic effects from soy consumption in human infants and adults.”

So I would like to pose the question would scientists generally revolt against the organisation they work for? I do not believe that Doerge and Sheehan would have done this without a good reason.

Furthermore, if you look in the research of Doerge and Sheehan (2002, p. 352) mention some alarming facts on soy, for example they mention Duncan and others (1999) and state that soy products are heavily marketed to postmenopausal women for relief of

menopausal symptoms, despite the absence of consistent clinical data demonstrating any such benefit in human trials. However, Doerge and Sheehan (2002) mention more alarming facts such as that Iodine deficiency is an emerging concern in elderly Americans, as you may well recall women and children suffer more from iodine deficiencies, since it is more vital for them. Because of the properties of soy that can cause iodine deficiencies, Doerge and Sheehan (2002) argue that post-menopausal women can be at a significant higher risk of developing an iodine deficiency; this iodine deficiency could thus lead to hypothyroidism in these women making their post-menopausal period unbearable because of fatigue, depression and anxiety. This is another possible case of violence caused by the food industry on people with the good intentions to improve their health. Galtung (1969) would clearly see this as violence, not only because of the deception which thus reduces the mental potentialities, but also because of the physical harm that has been caused with this. This violence has clearly manifested itself in the United States if you consider all the people that suffer from thyroid problems and nutrient deficiencies. Also as thyroid dysfunctions seem to be heavily interrelated with obesity and diabetes, I would say that this is another argument that soy could be related to violence that has manifested itself in the form of diabetes.

However, there are other alarming factors that are related to soy consumption. Doerge and Sheehan (2002, p.353) state that: “children put on soy formula are thought to be more likely to have autoimmune disorders.”

Also, Doerge and Sheehan (2002) argue that there are possibly other substances in soy that are causing problems and thus argue that soy should be researched further before promoting it as a health product. In addition to Doerge and Sheehan (1999) there were was a letter of protest to the FDA in 2004 by the Weston A. Price foundation. In this letter Sally Fallon and others (2004) wrote an extensive letter which I will add in the appendix in part D.

that discusses more extensively than I did the possible risks of soy consumption. Fallon and others (2004) also have the original letter from Doerge and Sheehan (1999) in their letter.

As I said before soy is a difficult case, several important industries have an interest in soy research, this being the soy industry, the meat industry since soy replaces meat on many occasions but also the dairy industry since soy milk is often used as an alternative to milk. Non-GMO fermented soy might be more beneficial for health, but that should be researched more extensively, it would be perhaps better to avoid soy until this research has been done, as is argued by both Doerge and Sheehan (1999) and (2002). You could ask yourself the question if soy, cereals and corn do not lead to a serious amount of weight gain, then why are animals being fed almost exclusively with these types of foods. It does not necessarily have to translate to human beings, but farm animal are increasing weight so fast these days and also more and more sickness occurs in animals and as a result more and more antibiotics are necessary. As I said before this can be due to several factors such as lack of movement, poor hygiene and other factors, but soy is definitely a controversial case and most research that is positive about soy includes organic soy, fermented soy products such as miso soup or high quality products made in a lab setting, this may perhaps not compare to the refined soy products that are purchased in most supermarkets by people with a low-income. Some high-quality organic soy products are thus not so clearly related to risks, but these are not accessible to everybody and this can be seen as a sort of social class violence, in which the lower classes suffer from their financial inability to purchase high quality organic products.

Summary food commodities and consumption levels and conclusion of these paragraphs

Thank you for bearing with me, but I thought it was necessary to illustrate that the crops that have been produced on a mass scale to serve as ingredients of mass produced standardised products are generally harmful. Also with this analysis many forms of violence have been exposed as well as cases that need to be investigated further such as soy.

Given that for all of these commodities; sugar, corn, wheat, rice, dairy and soy a link with diabetes can be established as well as to other diseases and that these monocrops are heavily embedded into the daily life of consumers are responsible for, then I would argue according to the theory of Galtung (1969) that there are structures that inflict violence upon the consumers. Furthermore there are many positive discourses surrounding these crops which are generally spread by associations that are most likely linked to the Food industry. These discourses regarding these crops would generally be considered as violence according to Galtung (1969) since they reduce the mental potentialities of people through indoctrination and lies. The documentary: *Dirt! the Movie* (2009) gives some interesting insights about monocrops and soil degradation which I could not extensively discuss.

When taking into account the theories of Hyman (2012) and Friedmann (1990) it seems clear that there are big economic factors that are influencing the content of the farm bill. Agriculture serves mainly as a type of industry that produces raw materials for processed foods. This can be great for the profit of the food industry and the short-term economy of the country, but this structure comes at a price, which is the health of the consumers of these commodities. So given that this structure is arguably harmful and favours the consumption of processed foods, to what extent do processed foods get consumed in the United States?

An exact number is difficult to estimate, but with several pieces of literature estimations of the trends of the last decades can be made. St-Onge and others (2003) analysed

the fast food consumption over the last 20-30 years and discuss several changes in the consumption patterns regarding these foods. Some of the changes that were discussed by St-Onge and others (2003) included: increased reliance of foods consumed away from home, food advertising, food marketing and promotion and food prices. Furthermore, St-Onge and others (2003) mention that there are currently more families where both parents are working and as a result time limitations have become an important factor in determining the type of foods that will be consumed. Also according to St-Onge and others (2003) the food industry has increase the offer of the amount of convenience foods. In addition to that, there are more changes mentioned by St-Onge and others (2003) that are related to the diabetes and obesity crisis; which are respectively the increase in portion sizes as well as an increase in added sugar and added fat per capita. So that could mean that more sugar as well as fat is increased to products besides the amounts of sugar and fat that are already naturally present in foods or/and that people are consuming more processed foods with added sugars and added fats.

In order to see the degree of changes in food consumption St-Onge and others (2003) have drawn from the research of Nielson and Popkin (2002) who conducted surveys which had the following results; the amount of food consumption at home decreased whereas the food consumption at restaurants and fast foods has increased over time. This would imply that the consumption of fast food over time has increased.

St-Onge and others (2003) mention quite some surveys and experiments that have interesting statistics concerning the consumption of fast food. For example, in one of the experiments which was conducted by French and others (2001) where men and women who reported that they consumed food at a fast food outlet had a 40% higher energy intake, which is quite significant. Furthermore, people that tend to visit restaurants or fast food outlets have been associated with a higher degree of soft drink consumption. However these people not only consumed more soft drinks, but these people consumed also less fruits and vegetables.

So fast food consumption seems to be associated with a certain behaviour in which people consume more soft drinks and less fruit and vegetables. This would indicate that these people would consume more calories, probably more sugar and probably also less fibre which would thus significantly increase the risk of developing diabetes. This data also came from the research of French and others (2001). Jahns and others (2001) investigated the snacking behaviour of children during the period of 1977 to 1996 and came to the conclusion that. The amount of consumption through snacking increased in all age groups between 24 and 32%. This increase of snacking resulted in a 30% increase in daily caloric energy intake through snacks.

Furthermore, St-Onge and others (2003, p. 1070) discuss the changes at schools, they mention the work of Wildey and others (2000) who researched 24 middle schools in San Diego and St-Onge and others (2003, p. 1070) the following:” These researchers reported that 47.2% of students attending schools where there is a student store shop at the store \geq 1 time/wk, and the most popular food item was candy; cakes and cookies were the next most popular items.”

These are disturbing facts and while there are schools that have actually banned soft-drinks it seems that many schools do not offer many healthy alternatives. St-Onge and others (2003) do mention that healthy commodities get consumed more often if the price goes up, but this to me only demonstrates the harm of the farm bill where raw materials for fast food are heavily subsidized while fruits and vegetables usually do not have these subsidies.

St. Onge and others (2003) thus mainly focused on adolescents, but I believe that the consumption of these foods during childhood would to a large degree be representative for the consumption patterns of these children when they mature. For example, fast food and other palatable foods can be addictive of nature as was argued with the research of Avena and others (2008). So if children are exposed to fast-food and processed foods at home because

the parents perceive that they have less time available and prefer to buy fast food, the fact that children eat more often in fast food outlets or restaurants and also the fact that schools sell large amounts of fast food and tend to sell less healthier options which if available are likely to be more expensive than many of the unhealthy commodities. Researching adolescents is also very useful because if they develop insulin resistance or overweight during this period, it would most likely have consequences on their health as an adult since they will be more likely to develop type II diabetes. Research on adolescents and children is very useful to estimate the future levels of diabetes.

St-Onge and others (2003) discussed similar issues at the end of their article. For example they mention the research of Fried and others (2002) who stated that changes in children's food supply have been dictated largely by political and economic forces. Furthermore, Fried and others (2002) state that the current consumption patterns of children would increase the risk of obesity and other future health problems.

The results of these changes in structures can be clearly demonstrated with facts and figures of Pinhas-Hamiel and others (1996) who argue that before 1992 only around 2-4% of the children would develop type II diabetes and before the age of 19. But in 1994 this was already around 16% of the children according to Pinhas-Hamiel and others (1996).

In relation to this Drake and others (2002) mention that type II diabetes is even starting to occur in white children at the age of 14. This would generally mean that even people that have not genetically been predisposed to develop type II diabetes can still due to these drastic changes in consumption develop type II diabetes in their childhood, which a century ago was a rare disease among adults. This would mean that native-Americans and other people with thrifty genes which I will explain later in the paragraphs about Mexico will suffer significantly from these harmful structures.

I would like to conclude this part about fast-food and processed food consumption in the U.S., I only scratched the surface of all that there is to say about the consumption of fast-food and processed foods, but it is very clear that there are harmful structures in place that would even lead to development of diabetes type II in children, which a century ago was described as a disease that would only affect the elderly. Also the structures in the U.S. are so harmful that people that genetically unlikely to develop diabetes type II can develop it even during their childhood.

Finally, before drawing a conclusion, I would like to discuss shortly the role of hegemonic discourses and how these can lead to diabetes. I have discussed some specific discourses regarding certain foods types, but I also would like to discuss a discourse that is related to development of diabetes which is that of the macronutrient fat.

The hegemonic discourse surrounding fat and especially saturated fat has changed significantly over the last century. In the beginning of the 1900's a diet emerged to treat epilepsy which was the Ketogenic diet designed by Russel Wilder in 1924. The diet was initially designed to solve epilepsy and the diet consisted of 90% fat consumption, but the ketogenic diet and the Atkins diet which is also high in fat and low in carbohydrates seem, to be incredibly effective at treating type II diabetes, neurological disorders and even cancers. This is in line with the current research of Paoli and others (2013) who conclude that: Ketogenic diets are commonly considered to be a useful tool for weight control and many studies suggest that they could be more efficient than low-fat diets." Furthermore, Paoli and others (2013) conclude that: "There are new and exciting scenarios about the use of ketogenic diets, as discussed in this review, in cancer, T2D, PCOS, cardiovascular and neurological diseases." So diets high in fat could possibly be used to; treat type II diabetes, cardiovascular diseases and more. However, the views regarding fats have changed significantly after the 1920's and nowadays there are still many negative views on fat consumption. I believe that

this is mainly because of economic interests related to Big Farming, Big Food and big Pharmacy and some powerful hegemonic discourses that are or have been in place. For example, the agricultural sector has transformed into an industry that is producing mainly high carbohydrate mono-crops.

Furthermore, if high fat diets which are arguably just as effective as modern pharmaceutical drugs but without the side effects to treat many disorders such as epilepsy and more, then for pharmaceutical companies high fat diets would dramatically decrease their profits. So how have the discourses surrounding fat changed?

This started mainly with the endeavours of Ancel Keys, who has posted numerous studies since the 1950's before eventually posting in 1970 and did so every 5 years after that period. Keys (1970),

However, this study was very controversial, because data from 22 countries was gathered, but for his conclusion Keys only used the data of 7 countries. Furthermore, there is a lot of debate whether dietary intake of cholesterol would actually lead to higher levels of blood serum cholesterol. This was already argued by Gofman (1958). Another counter argument against the popular study of Ancel Keys was from Campbell and Cleave (1969) who actually stated that coronary heart disease, diabetes and obesity were mainly caused by the "Refined" carb disease. Also Edward Ahrens (1957), a notable lipid researcher mentioned that it is dangerous to oversimplify the link between diet and coronary heart disease.

Nowadays modern research by Cordain and others (2002) clearly showed that the view of Ancel Keys (1970) was too simplistic. Cordain and others (2002) argue that a high reliance on animal fats would not necessarily cause unfavourable lipid levels in the blood stream as has been argued by Keys (1970). In addition to that Cordain and others (2002) mention that qualitative factors regarding fat-consumption need to be taken into account as well. A lower omega 6 to omega 3 ratio would serve according to Cordain and others (2002) to inhibit the

development of cardiovascular disease, but Cordain and others (2002) would also deter the risk of developing cardiovascular disease; they mention factors such as anti-oxidants, fibres, vitamins, phytochemicals, low salt intake and all of this with lifestyle characteristics of more exercise, less stress and no smoking.

Also, it should be noted that there are many types of saturated fats, and not all saturated fats are animal fats. And arguably not all animal fats are bad, but it is just that we have been given junk to animals so the consumption of animal meat is therefore not very recommendable. Furthermore, omega 6 fats which are polyunsaturated fats which were previously considered to be healthy are actually related to coronary heart disease. However it should be noted that what is important is the ratio of omega 6 to omega 3, so omega 6 would not necessarily be unhealthy, but in today's food the ratio of omega 6 to omega 3 is dangerously distorted. Ideally this ratio is around 1:1, but nowadays this seems to be impossible. The research of Simopoulos (2002) clearly shows the importance of this ratio, as he states the following in his abstract as unfortunately I did not have access to this particular article: "Excessive amounts of omega-6 polyunsaturated fatty acids (PUFA) and a very high omega-6/omega-3 ratio, as is found in today's Western diets, promote the pathogenesis of many diseases, including cardiovascular disease, cancer, and inflammatory and autoimmune diseases, whereas increased levels of omega-3 PUFA (a low omega-6/omega-3 ratio) exert suppressive effects."

So what is the ratio of Western diets? According to Simopoulos (2002) it was 16.7 to 1, which is ridiculously high? Why is this? This is a result of many factors such as the oils that are used in processed foods contain largely omega 6 fatty acids, the animals that we consume are fed garbage so their omega 6 to omega 3 ratios are distorted as well and also many types of fat have been demonized. An example of the effectiveness of changing this ratio is that of a 70% decrease in total mortality by cardiovascular disease which is currently

the number one cause of death in the world can be achieved by a 4:1 ratio of omega 6 to omega 3 according to Simoupolus (2002).

Adequate nutrition is often disregarded in my opinion, but it can be used to save more people and should be more accessible than expensive pharmaceutical drugs, but I believe that economic and political factors are blocking its path. Diet transformations could prevent so many deaths and it seems so easy, yet nobody is using it and this is very frustrating, the current paradigm of thought thinks that pharmaceutical drugs and doctor visits are necessary to treat and prevent diseases, in some cases this may be so, but diets have so much more potential both in effectiveness, health and sustainability. I believe that corporations are some of the main culprits of this in the documentary/movie dirt! (2009) that I mentioned earlier in which Vandana Shiva collaborated, clearly demonstrates how the soil is being degraded, destroyed and exploited for short term economic profits. Also with the ingredients itself corporations mainly choose the cheapest and easiest to produce crops despite the fact that these crops can be very harmful. I have been studying International Business for my bachelor degree, and in my studies they explained that the consumer is the king or queen, but I believe that this is only from a theoretical perspective because we also got stressed how important profit maximisation is and how you can achieve it through micro- and macro-economics.

To me both approaches are a part of the truth, as reality seems very complex, but companies try to maximize profit at the lowest cost, but they also try to make the consumer believe that they are the king and queen by installing false discourses and forcefully resist against people that do not agree with the hegemonic discourse that serves in the company. But part of the responsibility also lays with us the consumers. We should be more critical and think more deeply about matters. Foucault (1980) argues that you should always ask yourself to whom does this discourse serve and in many cases it is not the consumer but the corporation. I will try to explain this with the example of the saturated fat discourse.

The study of Keys (1970) allowed companies to focus on Poly-unsaturated fats and carbohydrates without worries of public protests as a strong discourse has been put in place. Which perhaps was what companies wanted all along, also it should be noted that the study of Keys (1970) was done on an unprecedented scale, Keys (1970) had an annual budget of 200,000 dollars in 1956 which according to www.dollartimes.com would be over 1.7 million dollar in 2015. Please note that this was a longitudinal study that went on for decades. Very few studies have such annual budgets, so it is likely that a lot of economic interest was related to that study. An interesting critique of the study of Keys (1970) is depicted in great detail in the book of Zoe Harcombe (2011), but I will not discuss this book, but I strongly recommend reading it.

So back to the topic, what happened after this discourse has been put in place and how are these oils dangerous besides the skewed ratio of omega 3 and omega 6?

Poly unsaturated fatty acids (PUFA) have been used in bulk since they are very cheap forms of fat, so this did increase the total amount of calories consumed in combination with the increase in carbohydrate consumption.

Also these oils due to their oxidation cause inflammation on many levels and could arguably lead to diabetes, but that will have to be investigated in further research. Heating, omega 6 content and oxidation should thus also be taken into account when analysing fatty acids, this is extremely important because the food industry generally heats foods at high temperatures and prefers to use cheap oils which also happen to be unstable.

Well, I believe that I shortly mentioned the effects of discourses. I did not focus that extensively on discourses, because I believe that many hegemonic discourses are a result of structural factors that are beneficial to some and are often put in place by these actors. With nutrition it seems that discourses generally work in the favour of the food industry. Now I would like discuss cultural violence and after that I will conclude this chapter on the United

States that included a lot of nutritional and medical information, but this was necessary to demonstrate how harmful this structure is. The rest of this dissertation will focus considerably less on this.

Cultural violence

The complexity of the violence that I depicted previously is much more complex. I will try to also shortly look into cultural violence that is interacting with the structural violence and which causes a lot of internal conflicts in the citizens of the United States.

Galtung (1990, p. 2 or p. 291) defines structural violence in the following manner: “By ‘cultural violence’ we mean those aspects of culture, the symbolic sphere of our existence – exemplified by religion and ideology, language and art, empirical science and formal science (Logic, mathematics) – that can be used to justify or legitimise direct or structural violence.”

So I would not go as far as Galtung (1990) and argue that this cultural violence will justify or legitimise the structural violence, because I believe that nothing justifies violence, but the cultural violence that I am about to discuss is definitely related to the structural violence. In the United States and in the western culture in general there are several stereotypes of how a person should be. I would like to note that in the case of the United States there may necessarily be several stereotypes of how a body should be that are favoured by the dominant culture, but also there are sub-cultures that might actually have a different opinion. This idea of an ideal body type is by itself cultural violence, but I will try to relate this type of violence with the structural violence that is occurring.

I will use the work of Jennifer Webb and others (2013) who compare the ideal body size of collegial women. Webb and others (2013) also take into account that there may be inter-ethnic differences and this makes her work a lot more interesting. Furthermore Webb

and others (2013, p. 2) quoted the work of Grabe and Hyde (2006) and stated that: “The largest discrepancy of between-group differences in weight or size dissatisfaction occurs during emerging adulthood, which according to Arnett (2000) was around the age of college.

These points are very important because it would mean that cultural violence is not experienced the same by every age group. Also it should be noted that this violence is very dynamic over time. Franko and Roerhig (2011) argue that there are currently rising levels of body dissatisfaction experienced by African American women and they also argue that historically African American women had a higher positive self-image compared to European American women. According to Roberts and others (2006) this may be because of the internalization of the thin ideal, which I will refer to in one of the case studies as well. But according to Ogden (2009) this may also be because of the fact that the cultural norms surrounding body image among African American women may be transitioning due to media discussing the higher rate of obesity experienced by African Americans and the potential health complications of carrying excess weight. Webb and others (2013) after their research also discuss that this could be due to changing social cultural pressures such as the advocating of a smaller body size as healthy. These higher rates of obesity can be because of thrifty genes which is one of the theories that explains the diabetes epidemic and why certain populations and ethnicities suffer more from diabetes and obesity The thrifty gene hypothesis I will use extensively in the paragraphs about Mexico.

According to Webb and others (2013) European American women would generally have thin athletic but curvy as the ideal body type, but for African American women it is more difficult to define and there are several body types that are preferable. But it should be noted that both according to European American and African American women, it was thought that African American men like bigger women and this was reflected in the results of their research. And also it should be noted that culturally there is generally more self-

acceptance among African American women and European American women are probably more hypercritical about themselves according to the research of Webb and others (2013).

So now that I have described some of the data of Webb and others (2013) I will try to relate the cultural violence experienced by both European American women and African American women with both groups around the age of going to college as I cannot focus on every gender and age group, I will use these two groups to demonstrate that the harmful structures that I described are also reinforcing cultural violence.

Let me start with African American women; these women are generally more susceptible to develop diabetes and obesity possibly partly due to different genetics which I will clarify later in this dissertation, but arguably also because of the cultural norm and values that are in the African American communities. If African American men like bigger women, and if we would argue for simplicities sake that this strongly influences the action of African American women who will feel insecure if they would not be larger; then these cultural norms and values can actually be harmful, as it can promote overconsumption which could lead to diabetes and obesity. Diabetes or even elevated blood sugar levels can increase the risk of a heart attack, cause chronic inflammation levels, lead to fatigue which will decrease physical activity and reinforce the disease and much more. If being bigger is a result of relatively healthy lifestyle then this would not be a problem, but if the structures of society through price, availability and marketing promote you to consume junk and drink sweetened beverages then this extra weight and these extra curves are by no means healthy extra weight and healthy curves and this causes these specific people to suffer and in this way among others ways the structural violence and cultural violence can be interrelated.

For European American women this cultural violence is possibly experienced quite differently. European American women want to be skinny athletic and with curves. So let me simplify this to being skinny and athletic. Furthermore, it was stated before that European

American women tend to be hyper critical and also according to Webb and others (2013) they often discuss their bodyweight issues with friends and share their frustrations.

The structural violence that I have described in this dissertation is definitely related to these cultural norms and values. For example if a European American woman that we name K. Moss, who suffers from the fact that she perceives herself as overweight which is already a form of cultural violence as it harms her and it would also decrease her mental potentialities. Then K. Moss will shop in American supermarkets that are similar to the Corte Ingles, Mercadona and Consum, which I researched and I added this research to Part C of the appendix, and she read on www.fructose.org that fructose is great and healthy. So K. Moss will go to these supermarkets and of course buy fruits to make these fruit smoothies that everybody talks about, she will replace her normal marmalade with fructose enriched marmalade, she buys some fructose sugar to sweeten her smoothie because she has a taste preference for sweet stuff and she just cannot resist all that sweetness. Also K. Moss is sure to eat mainly carbohydrates, because she heard that fat is bad for you so she will eat a low-fat diet. Initially, K. Moss is losing weight and she is positive that here diet is working, after a month she is noticing that her tooth gum is irritating. She is a bit worried so she decides to check www.fructose.org to see whether this could be because of all the fructose she is eating. After reading that www.fructose.org states that fructose is the sugar that is the least likely to cause tooth decay she feels relieved and drinks another smoothie. After 4 months she is starting to realize that she is starting to gain belly fat, but her overall weight remains more or less the same. She decides to go to the gym and do some low-resistance cardio to be in that miraculous fat burning zone. After 2 months in the gym there are still no results and her belly fat is even increasing and she decides to do some squats. K. Moss has been sedentary all her life but she saw the squat every day challenge and decided to do squats which are also supposed to give you curves in the form of developed gluteal muscles. After 2 weeks of

squats she has joint pain in her knees and she decides to stop training and decides to follow an extreme diet where she will only eat fruit. It is too bad that she cannot do squats because she saw a thousand squats in a row routine by a very slender fitness model. Another 3 months later, she still has fat around her tummy and K. Moss feels horribly depressed because no matter what she does she is not losing that belly fat and she suffers from inflammation in many parts of her body. She decides to go to the doctor and the doctor does some tests and two weeks later she gets notified that she has diabetes and that she has fatty liver disease and that she has to take some expensive pharmaceutical drugs and insulin injections to deal with the symptoms. K. Moss cannot believe it, she was consuming only the healthy fructose sugar and she is by no means overweight and yet she developed diabetes. Now K. Moss will be unlikely to ever get skinny and healthy and she gets even more depressed, she suffers from many symptoms and she has to pay a lot for expensive medication.

So what happened here? As mention earlier fruits and fructose are marketed as healthy and this is in line with the hegemonic discourse. Fruits are not necessarily bad, but I would not argue that they are good either. It partly depends on the fruit and its content. For fructose it can be a source of energy, but it is not the most efficient source of energy and also it should not be consumed in excess. Tapy and others (2010) clearly show in their model that fructose is clearly linked to diabetes and obesity. Fructose gets marketed as healthy, but it is unwise to do so. Some fruits in moderation can be beneficial because of a high-anti oxidant content, a relatively valuable amount of vitamins and some glucose. But fructose is not necessarily a healthy part of fruits and it is arguably in fruits so that fruits get consumed and that this way the trees and plants can reproduce themselves. Furthermore, there are numerous related hegemonic health discourses that also interact with this cultural violence. The fat burning zone is arguably a myth and an ineffective way to burn fat; in addition to that visceral fat from excessive fructose consumption will not likely be solved easily with

exercise as long as fructose is being consumed. Doing squats the right way could be beneficial, but most people jump into the exercise too fast as you need to really understand the biomechanics or be used to the exercise. Also there are ridiculous routines such as 1000 squats in a row and people will actually attempt these extreme workouts if they are done by a thin person. The average person with a sedentary lifestyle would not be able to safely do challenges like that. Perhaps people in Asia and Africa that have been squatting numerous times per day as it forms part of their lifestyle can do it, but a sedentary western person would be unwise to even try. Also as you can see the structural factors caused by the harmful structure that is violent by itself is interacting with cultural violence and this could lead to even more harmful violence. Now I would like to conclude this part on cultural violence.

Regarding the fact that smaller body sizes are advocated as healthy by Webb (2013), I do not completely agree, I believe that extremities from both parts can definitely be harmful. Physiologically women would benefit from having a higher fat percentage than men, but this is not necessarily visible fat, but mainly fat surround their organs. For pregnancy extra reserves would be beneficial, but this could also lead to gestational diabetes, so in reality it is very difficult to state which body type is ideal from a health perspective if there is any.

Personally, I believe that for every type of environment and personal situation there can be an optimal and acceptable body weight. In the past, having more fat would be beneficial for survival, this could reduce insulin sensitivity but this reduction of insulin sensitivity would probably be countered by the fact that carbohydrates were rare and that there were periods where food was scarce. But it should be noted that the environment and personal situations in the United States are very different, monocrops, processed foods and sugar sweetened beverages are everywhere and simply arguing that being a bit bigger is healthier could depending on the context also be a form of violence. Also because of globalisation there are people with a different heritage living in the same types of

environments and for each of these people a different consumption pattern and body type would be ideal. So I guess that perhaps we should stop linking health to body type and utilize more profound physiological measurements such as blood sugar levels, inflammation, insulin sensitivity, and many other factors to define what is healthy for each person. A person can be 20kg overweight and still be healthier than a skinny person that consumed over a litre of soda a day that has therefore excessive calories from fructose and has severe levels of inflammation in their body but from the outside this is not visible. This could cause this person to have diabetes and in the end these excessive fructose calories could lead to visceral fat which would be fat in the abdominal areas and the person would be skinny in every other part of their body. Also excessive fructose consumption will make it unlikely that many people will achieve the small waist that many models and celebrities have. These people generally eat very different than the products that they advertise and have the possibility to consult experts in both nutrition and physical exercise. For corporations it is great that fructose is seen as healthy because it would mean that people would consume it to lose belly fat while in reality the opposite happens. These will be likely to resort to extreme measures such as extreme diets, plastic surgery, exercise regimes and much more. And many of these are actually unsustainable and achieve only short-term results.

Corporations profit from and reinforce in my opinion both from cultural and structural violence. Combined with the media their advertisements can cause cultural violence that affects how people think about themselves. The structural violence generally causes people to never achieve their ideal body type which is arguably not even healthy. Furthermore, they benefit strongly from certain hegemonic discourses that are in place that it strongly increases my suspicions. I would love to address corporations and cultural violence more, but the main focus in this lies on harmful structures, agricultural policies and diabetes. I will now conclude

these paragraphs on the United States and then move on to the agricultural transformation of Mexico.

Conclusion of the paragraphs about the United States

I believe that it can be concluded that there are harmful structures in place in the United States and that these structures significantly contribute to the rise of diabetes. Agricultural policies play a big role, but these policies are clearly heavily influenced by hidden economic and political interests that are arguably related to the food industry.

However, it is clear that the current agricultural policies inflict violence because these policies subsidize crops that are generally unhealthy and that are used to produce even unhealthier processed foods. Healthy commodities such as vegetables are relatively expensive because of these policies.

Furthermore, the food industry can also be deemed responsible because many foods seem to be produced in such a way that they are addictive and also physically harmful, also there are many faulty discourses surrounding sucrose, fructose and HFCS. I believe that it is important to clearly explain these differences to consumers.

In addition to that if certain foods are addictive should the consumption of these foods be allowed or even encourages as it is now through the subsidies of the farm bill? Also, what about the fact that schools generally tend to sell harmful commodities to children and the fact that children seem to suffer significantly from these structural changes. Part of the people in the United States blames the food industry for marketing their products to children and the food industry respectively argues that it is the responsibility of the parents to control the consumption behaviour of their kids.

Also, I shortly want to mention that poor people suffer probably more from diabetes in the United States. According to Davis and others (2014) the United States had the worst healthcare ranking among developed countries. Davis and others (2014) note that access to healthcare in the U.S. is affected by financial barriers. I have decided to not focus too much on this in the U.S., but I will do so in other countries and I do want to mention that this also is a violation of the universal human rights. Because article 25.1 states: (1) Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control. So everybody has the right to live adequately eat proper food and also has the right for healthcare. With food that is more complex, there are possibilities to eat adequately, but the structures surely promote inadequate food, so you could argue that these structures are human right unfriendly and should be addressed. Also like there are financial barriers for adequate healthcare there are similar barriers for adequate food as harmful foods are generally promoted and subsidized and healthy foods are generally sold at a premium. With healthcare the financial barriers are very clear and this is definitely something the United States should work on if it really wants to be an example of a free and fair nation, which momentarily it is not on many fronts.

Furthermore, there may be hegemonic faulty discourses surrounding macro-nutrients in place where fats are being generalized and even demonized as harmful, while in reality this is way too simplistic and there is even research that states the exact opposite of this, both in the present and in the past. But that knowledge receives remarkably little attention. This demonizing of consuming fatty acids could lead to more consumption of carbohydrates which are heavily related to the development of diabetes. Another major problem related to these hegemonic discourses is the fact that despite that these discourses are being challenged more

and more, U.S. legislation is responding strongly to any alternative form of knowledge. Currently in the U.S., for the state of North Carolina, there is a proposal to modernize dietetics/nutrition practice act, which basically proposes that only people that are certified by the national body of nutrition are allowed to give nutritional advice. This bill names house bill 796 will empower the Nutrition body in North Carolina to sue people that will provide alternative knowledge as well as having a monopoly in determining nutritional knowledge as well as the power to exclude those who have other opinions.

I believe that this is a very undemocratic bill which can have serious harmful effects and if this bill will be accepted as well as spread to other states then policymakers would have the absolute power to come up with guidelines regarding nutrition as any person that opposes the knowledge of these bodies can get sued. This is another possible form of structural violence that is likely to occur in the future as the bill has passed its 1st reading and the power lies now in the hands of the senator to decide whether this bill will pass. Also this bill is arguably a breach in universal human rights, as scientific advancements can be made by anyone, but advancements in diet and nutrition will no longer be able to be shared freely as the State of North-Carolina will severely limit what dieticians and nutritionists can do and as a result these people can perhaps not share all of their knowledge. Human right 27.1 states that everybody has the right to share in scientific advancements and its benefits. And this bill will definitely obstruct that.

In addition, to all the structural violence, we should also take into account the existing cultural violence and how both of these forms of violence interact with each other. Cultural violence plays an important role as I have illustrated earlier in this dissertation and it can get reinforced by structural violence, also cultural violence can encourage people to suffer more from the structural violence. Corporations seem to be able to profit intensively from both structural and cultural violence and arguably some corporations and industries make almost

exclusively profit from inflicting violence such as food companies that advertise weight loss products that only work in the short-term. So if we would apply the theory of Galtung's (1996) "Peace by peaceful means", and then apply the conflict triangle to for example a personal situation/conflict. Then part A of the triangle are assumptions and emotions which in this case could consuming cereals for breakfast gives you energy and is healthy. Part B of the triangle would be that this person is really following the "rules" of the structure and really follows all the health trends, but feels depleted and has high blood sugar levels, which would be a contradiction in the current structure as the discourses of the structure do not match part A. Part C would be the goal, the structure wants you to consume cheap products such as cereals and the person wants to be healthy and energetic. This is a very simple example of how the conflict triangle of Galtung (1996) could be used to analyse certain conflicts. Unfortunately the theory of Galtung (1996) is very complex for me so I have mainly used Galtung (1969) which was much easier to understand and apply. Because applying Galtung (1996) on the complex structure; that I have described is currently not in my perceived abilities. After this example, I will continue with my conclusion.

Thus the structural violence in the United States that in my opinion manifests itself in non-communicable diseases such as diabetes, this violence is very is harmful in my opinion in the United States and also it interacts in harmful ways with cultural violence, however what is arguably even worse is the fact that organisations in the U.S., International institutions such as the world bank, that have a dominant role in global politics where the U.S. is one of the key members as well as the U.S. government itself has been promoting similar agricultural policies in other countries, the U.S. has been exporting any surplus of their agricultural products with subsidies to dump them in other countries and is selling processed food around the globe as well as the fact that many International organisations that

are based in Europe or the U.S. that sell fast food or processed food have large market shares in other countries.

All these factors result into similar structures in other countries and this could perhaps largely explain the much of the structural violence that is manifesting itself in the form of diabetes which is now considered to be a global epidemic as well as other non-communicable diseases on which I can unfortunately not focus on. I want to describe the effects of these policies and how the increase of diabetes in these countries or regions can be explained largely through the implementation of these policies and other structural changes. This will basically happen in the form of case studies. I will start with Mexico as it has been the first country where these similar policies have been implemented as a result of American influence. After that I will quickly discuss how the World Bank together with the Rockefeller foundation has further spread the concept of Mexico to other parts of the world as the “Green Revolution”. And for this I will use India as an example. Furthermore, I will use the Pacific Island region as another example, to show the effects of import dependencies in today’s world as well as to show that even if the “Green Revolution” has not directly been implemented in a country, that it can still have a very large effect on regions in the world.

I will now move on to Mexico which was one of the first developing countries where similar agricultural policies have been implemented. This dissertation will now focus less on nutrition, but more on violence and such. I believe that it was necessary to go into detail as peace is a trans-disciplinary discipline and in order to apply it, one should properly research disciplines that are related to your topic and use information and knowledge from these.

Chapter 3: Exporting agricultural policies to your neighbour

Mexico

So if these agricultural policies, consumption of processed foods and faulty discourses would contribute so significantly to the diabetes and obesity epidemic in the United States, that would be a horrible form of mainly structural violence, which manifests itself in the form of chronic diseases such as diabetes and obesity then that would be horrible right?

The United States has been involving themselves with “helping” other countries to “develop” and implement similar agricultural policies. Vandana Shiva (1991) explains in her book the violence of the green revolution, how Rockefeller agricultural scientists saw third world scientists and farmers as incapable of improving their agricultural production. And in 1945 similar policies as the US Farm bills have been implemented in Mexico, all of this with funding of the Rockefeller organisation, which according to Shiva (1991) took the name of Centro Internacional de Mejoramiento de Maiz y Trigo, which in English would mean the International improvement centre for corn and wheat. Wheat and corn are both some of the earlier mentioned commoditized crops that I have linked to the development of diabetes.

So what is the current situation in Mexico? Sanchez-Castillo and others (2004) argue that around one third of the children in Mexico have overweight and obesity. Furthermore, Sanchez-Castillo and others (2004) argue that this overweight and obesity leads to higher risks of mortality as well as the development of various diseases, such as diabetes type II, heart strokes and many others.

This situation in Mexico is striking because if you read the work of Sanchez-Castillo and others (2004) you can read about the transformation of the country, According to them in 1946 in Salvador Zubiran Anchodo was researching on how to solve the problem of

undernourishment in the Mexican population, which was one of the main problems at that time.

However, Sanchez-Castillo and others (2004) state that in 50 years the situation of the country radically changed and not in a healthy way. Sanchez-Castillo and others (2004) mention that in the past infectious diseases such as parasites were one of the most common causes of deaths, however around the time of the new millennium this has drastically changed to non-infectious diseases as the principal causes of death. These causes of death include cardiovascular diseases, diabetes mellitus and various types of tumours or cancers. In the appendix in part A.6 you can see a figure of Sanchez-Castillo and others (2004) that gives a clear overview of the causes of death in Mexico currently as well as in the past. I believe that Mexico is very representative of the effects of the Americanization of agriculture. But the current situation is unfortunately only the beginning of what is happening, Sanchez-Castillo and others (2004) demonstrate with their figures that the situation will be significantly worse in 2050. The amount of women with obesity is estimated to practically double between the periods of 2000-2050, similar terrifying numbers are there for men. When looking at number of people with diabetes, it will go from 4.5 million people in 2000, to over 10.2 million in 2050. Also the amount of people with hypertension and impaired glucose tolerance will grow off the chart, which means that the amount of people in a pre-diabetic state will also increase significantly.

I believe that it is important to not only look at the Mexicans in Mexico, but also at the Mexicans in the United-States. According to Martorell (2005) Mexicans in the United States are among the most obese people in a nation that struggles with obesity.

Martorell (2005) argues that Mexicans and diabetes are linked; also Martorell (2005) argues that many Mexicans in general have an unhealthy lifestyle, but the problem is more complex than that. He also applies a general model to describe the tendency of modernisation

of nations that are so called “developing countries” a term which I find disrespectful and incorrect, but I do see merit in his model.

In his model he describes that economic development leads to Urbanization and an increase in income. I do not completely agree with that urbanization increases income, because you could argue whether urbanization increases the income for everybody. Just because urbanization increases the GDP, I would not say that it necessarily leads to more income for the general population. Amartya Sen (1992) explains quite well the limitations of such aggregation statistics on income and poverty.

All with all this trend of economic development according to Martorell (2005) is associated with an increase in food security and diversity. Also with the diversity aspect I do not generally agree, because it seems that economic development as such can also lead to monocrops such as the main commodities of the farm bill. If you would compare the diversity of nowadays to in the past, you could argue that there is little. If you look at plants, seeds, nuts, animals, eggs, fruits, tubers, etc. We have started to mainly eat from a limited set of all of these because of their easiness to produce or because of how economically profitable certain products are. Currently, the staple of the human diet largely consists of monocrops as argued by Shiva (2014).

He argues that the consumption of Inexpensive vegetable oils increases, with which I agree sunflower oil and other cheap poly unsaturated fatty acids oils full with omega 6 fatty acids I have mentioned earlier in the paragraphs where I analysed the structure in the United States. Furthermore, he states that the exposure to media increases, which is true, it would make people more prone to consume several types of foods such as sweetened beverages and fast food which are heavily marketed in the media. When was the last time that you saw an advertisement of broccoli on television? Martorell (2005), he reasons that consumption outside the house increases, which is true due to fast food, take-away and other things, also

those that have an income are perhaps more likely to consume those products. Also, he states that the amount of physical jobs decreases, which is true factory and agricultural labour is reduced drastically due to modernisation and sedentary jobs increase significantly as a result. Motorization increases as well, this is related to modernization but it means also that transport has become motorized and thus this also strongly reduces the physical activity of those populations.

On a related note, Martorell (2005) argues that sedentary recreation increases as well due to urbanization/modernisation, which is true due to computers, cinemas, television and other things that come with modernity.

Also, he states that the opportunities for physical activities decrease, I believe that this is partly true; there are opportunities to move everywhere. All these before mentioned factors by Martorell (2005) lead to an increase in dietary changes and energy intake and to a reduction in physical activity, which will lead finally to an increase in obesity and diabetes.

Despite, disagreeing on several notes with Martorell (2005) I find this model particularly useful when combined with the other theory of Martorell (2005) which is about genetics and predisposition. Martorell (2005, p. internet) states that: “animal sources dominated our food basket and that plants (Nuts, seeds, vegetables and fruits) were only around 20%-40% of the total daily intake, also crops like cereals and other grains were generally not consumed.” Martorell (2005, online) states that: “these ancient hunters and gatherers with their high fat, high protein diet were free of signs and symptoms of non-communicable diseases.” This seems to be in line with the research of Cordain and others (2002) and Mashirani (2015) where the latter I will mention in the appendix.

Also Martorell (2005, online) states that: “There was more than enough fibre and he states that micronutrients were abundant, but that food was also scarce at times.” The micronutrients can be explained partially by the movie *Dirt!* (2009). This would imply that people

with the genotype to turn food into fat had a survival edge. And thus most likely, the majority of humans that have reproduced themselves were the humans with the ability to store fat.

I believe that Martorell (2005) is generally right with his theory, also if you take into account that due to the introduction of agriculture our food supply has become more stable and secure but occasionally harvesting went wrong and there were famines which would give the biologic edge to people with the genotype to store fat to survive. This would be another phase of the natural selection. So humans are generally “thrifty” as Martorell (2005) calls it, but certain populations are more genetically “thrifty” than others. For example, according to Diamond (2003) Europeans are less susceptible to diabetes than other populations. Which makes sense because; Europeans in general have been consuming large amounts of food for decades and generally had enough food for the last centuries due to agriculture. As a result the levels of people with diabetes mellitus type II are relatively low despite the fact that the western diet is generally harmful, but a failed harvest in the past would have been very dangerous to Europeans such as the great famine in Ireland that occurred from 1845-1852. On the other hand according to Martorell (2005) Native Americans, pacific Islanders and other population groups are very prone to developing diabetes Mellitus type II, due to being genetically more predisposed to be more efficient in storing calories. Which normally is a great predisposition, except when you are surrounded by cheap oils and carbohydrates everywhere, and that these foods are the staple of your diet.

Many Mexicans would fall under the category of Native-Americans and would thus be more prone to the development of diabetes and/or obesity. However, Martorell (2005) states that it can also be due to poor infant nutrition that could program individuals to be metabolically thrifty. So you could argue that the human body is highly adaptable over generations and even during a lifetime of a human.

The super-sizing of the Mexicans as Martorell (2005) mentions went incredibly fast, as mentioned earlier around 1946 Mexican scientists were trying to solve the food deficiencies, especially of children. So there were children of Native-American descent that had a food deficiency in their childhood which would mean that these children would be genetically incredibly gifted at converting food into fat, but would also be more likely to develop diabetes when consuming a western diet that is high carbohydrates and unsaturated fats. In just a mere decade according to Martorell (2005) the percentage of women in Mexico that were overweight or obese has grown from 33% to 59% in the time period of 1988-1999.

Another alarming fact was that obesity and chronic diseases became more and more a problem of the poor, while obesity previously was a condition that would only affect the rich. Martorell (2005) states that: “in some cases “Poor” Mexicans have a double burden which is child undernutrition in addition to obesity.” Hafnner (2000) argues that where obesity is rising, diabetes type II generally follows. So the diabetes epidemic strikes harder and will strike even harder in the future in the so called “developing countries” due to different genetics and an environment that has been changing fast

That it will rise faster is depicted in the estimations of the IDF (2013) which expects that diabetes will rise from 51 million in developed countries to 72 million in developed countries by 2025 and from 84 million to 228 million in 2025 in the so called “developing” countries. I truly believe that this is to the implementation of “western” or “American” agriculture and “western or American” food industry and not necessarily the growth of the population, since diabetes and obesity were relatively rare diseases in these countries. The increase of people with diabetes would be caused by the violent structure that causes it and the amount of people that live in that harmful structure. Diabetes will be mainly a problem of low and middle income countries if these estimations are true, but it will be a problem of those countries caused by western interference and what angers me greatly is that this western

interference has not even properly solved hunger for everybody and created a structure with a lot of dependence

So you could argue that the “Western” lifestyle gets imposed to a certain degree and furthermore you need to take into account that the so called “developing” countries have thrifty genes or bodies due to having evolved in a different setting. In theory you could argue that these people are better adapted, but when a capitalistic overconsumption pattern became the norm, these people will suffer extra hard from the foods and beverages that they consume and the problem gets worse. According to Pettit and others (1993) among a specific tribe of native Americans If the mother has gestational diabetes, then the child has a possibility of 45,5% to have developed diabetes type II by the age of 20-24. And a 70% chance to have developed the disease of diabetes type II by the age of 25-34. This number is incredible and stems from 1993 and the average amount of calories from sugars and other sweeteners has risen as I have argued before. But it should be noted that this data is very specific and involves people from a certain Native American tribe. But you could argue that it is almost certain that some of these people will develop diabetes with if they have a modernistic/American capitalistic food consumption pattern.

This is generally in line with the research of Franco (2012) who researched obesity and diabetes in adolescents. Franco (2012) surveyed three schools and his results indicated that around 64% of the adolescents had ancestors with diabetes type II. Also one should take into account that in many cases people are unaware of the fact that they have diabetes, so it is hard to say how much the possibility to develop diabetes is at this moment, but many researches such as that of Franco (2012) indicate that diabetes is very common. I believe that it is largely due to the genetic predisposition as well as the large incidence of gestational diabetes.

This pattern is so dreadful and structural that it forms a negative spiral, because if the mother of the next generation already has a 70% chance of developing diabetes their children will suffer as well and this spiral will go on and on, until something changes drastically. If not the majority of the population will suffer from diabetes and obesity, partly because the Rockefeller Foundation thought that it was necessary to develop the agriculture of Mexico. In the case of Mexico, transnational companies have also played an important role in the growing diabetes epidemic. If you look at the graph of Stuckler and others (2012) in the appendix in part A. 10-13, who compared the soft drink consumption per capita to the GDP per capita of those countries. Then you can see Mexico as the country where the soft drink consumption per capita is the highest, while the GDP per capita of Mexico is relatively low.

This implies not only that Mexicans consume more of these harmful substances than the United States, also it is likely many poor people consume large amounts of cheap processed soft-drinks which have a very harmful effect on their health and this consumption is strongly related to the diabetes epidemic that is occurring in Mexico. Stuckler and others (2012) also stated that the rate of consumption has increased faster in lower and middle income countries than it has historically occurred in high income countries. So if you would take into account the fact, that Martorell (2005) argued that many Native-Americans have a genetic predisposition to store calories as fat and that soft drink consumption in Mexico is higher than in the United States as well as the fact that this consumption has reached this level at a much faster pace, then you can clearly see how soft-drink companies together with increased carbohydrate consumption from monocultures, genetic pre-disposition and most likely more physical inactivity have led to this rapidly increasing diabetes epidemic.

Mexico has been one of the earliest examples of what can happen, when the American-like farming policies get accepted and the structure and living environment transforms very drastically in a short period of time. As well as when transnational food

companies rapidly penetrate the market and sell unhealthy commodities and the local food industry is likely to prosper as well due to the structural agricultural transformations as raw materials at a low price and in a high quantity are now available.

In the table of Stuckler and others (2012) it becomes very clear that transnational companies have penetrated the market of processed foods and beverages. PepsiCo, Nestlé, Kraft foods, Unilever and Kellogs all have large market shares. Also it should be noted that there are native companies, which produce substantial amounts of processed foods.

However, these companies produce processed foods that have been inspired by the monoculture crops of the agricultural revolution in Mexico. If you go to the homepage of Grupo Bimbo www.grupobimbo.com which has a slightly higher market share than PepsiCo, you can already see at the page "Our Brands" that this company mainly sells all types of unhealthy commodities. The fact that national companies also have significant shares in the food market can be because; that these companies have a better understanding of the local market and have perhaps lower transport costs and a better brand image. But also because of the fact that some of these national companies grow out to be transnational/multinational companies as has been the case with Grupo Bimbo which is currently the 7th largest food corporation in the world.

Besides these processed foods it should be noted that Mexicans also tend to consume a lot of what Mexicans describe as "Comida Chatarra" which is basically fried junk food. According to Franco and others (2012) in the Mexican city of Juarez where they conducted surveys in several high schools to research the consumption patterns of Mexican adolescents they came to the conclusion that over 25% of the adolescents would consume food during the night, over 50% of the adolescents consumed an excessive amount of calories and over 25% would consume chatarra foods on a daily basis. Thus it seems to be true that many Mexicans

seem to have unhealthy eating habits and this is also part of the cause of the problem and not everything can be blamed on the transformation of the agricultural structure.

Despite the unhealthy habits, there are also socio-economic factors that are related to the diabetes and obesity crisis in Mexico. For example according to Toral-Juarez and others (2012) income is related to the variety of foods that are being consumed. Families with a low income tend to have less variety in the foods that they consume. This could thus increase the amounts of Monocrops and Chatarra that are being consumed because these foods tend to be made from cheaper raw materials, but this does not have to be the case, because some families have little income, but produce their own food. Income as argued by Sen (1992) is thus not necessarily a good tool to measure poverty, but if these people are cash dependent which is most likely more frequent due to the transformation of agriculture, then low income would most likely lead to the consumption of cheap monocrops. This is likely because if the situation in Mexico is somewhat similar to the situation in which the “Green Revolution” has been implemented then it is likely that many farmers are deprived from their soils and farming has become a very industrial endeavour that is almost exclusively done by people or corporations with a substantial amount of capital.

Another structural socio-economic factor that can play an important role in the diabetes crisis is the access to healthcare. According to Juan-Pablo Guitierrez and others (2014) in 2012 around 48.49% of the Mexican population had no effective access to healthcare. Guitierrez and others (2014) argue that this number is already an improvement compared to 2006 where 65.9% of the Mexican population lacked effective access to healthcare. From this you can generally deduce that over the past decades the majority of the Mexicans had no effective access to healthcare and this surely has contributed significantly to the rise of diabetes and its casualties and not only in terms of treatment, but also prevention. Furthermore, if 48.49% of the people do not have effective access to healthcare then that

would mean that many pregnant women will not be tested for gestational diabetes during pregnancy and this will surely increase the amount of women with diabetes, which will also increase the amount of women and children with type II diabetes.

Also Mexicans are likely to experience cultural violence, Mexican culture is arguably changing very fast and there is a lot of cultural influence from the United States. This is in relation with the argument of Roberts and others (2006) who argued that there is the internalization of the thin ideal than is changing the way women perceive themselves over the world. In Mexico this cultural violence will arguably worse because of the thrifty genes and the fact that the consumption patterns are relatively worse due to the high soft drink consumption and the consumption of chatarra foods. I will not focus as much on this for the case of Mexico, as I believe that generally the same holds as for the United States there can be different values in several population groups of Mexico that have different standards, but as I mentioned before it will just change the form of violence, but it is likely that there will be some sort of interaction between the cultural and the structural violence. In the United States I did this more extensively to demonstrate that the two are related.

Finally, it is certain that the increasing sedentary lifestyle is also contributing significantly to the increasing number of people with diabetes, but unfortunately I have decided not to address this in greater detail, despite the fact that tackling the sedentary lifestyle is a great passion of mine and one of the main reasons to study physical therapy after this master.

Conclusion Mexico

It is clear that the implementations and changes in structures in Mexico had significant effects. Mexico went from a country where undernourishment was very common to one of the most obese countries in the world. The levels of diabetes in Mexico are very high and are expected to be dramatically higher in the future.

What has changed this is partially the transformation of the agricultural system. Monocrops were produced a lot more and larger harvests occurred because of this transformation. This would have most likely led to an increase in carbohydrate consumption which would significantly affect insulin sensitivity in a negative way and would lead to insulin resistance. Furthermore, the excessive calorie consumption which is nowadays frequent among adolescents also contributes significantly to the development of diabetes as well as the development of obesity, whereby the latter would also increase the risk of developing diabetes.

Also the transformation of the agricultural system will most likely have facilitated the growth of the national food industry. In addition, to the national food industry international companies have also successfully penetrated the Mexican market to a similar degree as this is the case in the United States and many countries in Europe.

The habits of the Mexicans have most likely changed as well and eating during the night, excessive calorie consumption and the daily consumption of chatarra foods is also likely to have contributed to the rise of diabetes and obesity in Mexico.

Furthermore, socio-economic factors are likely to have contributed to the spread of diabetes and obesity among the poor. Martorell (2005) argues that poor people have a double burden when it comes to undernourishment as well as the development of obesity. This is perhaps in line with the research of Toral-Juarez and others (2012) who's results indicated

that families with a low income tend to consume food in a less varied manner. This would most likely indicate that these families would consume relatively more monocrops and processed foods since that these foods are cheaper.

All these previously mentioned factors should be related to the fact that if the thrifty genes hypothesis holds that Mexicans have a genetic pre-disposition to develop diabetes. This for a large degree explains the diabetes and obesity epidemic in Mexico.

However, I believe that although all these factors play a very important role, gestational diabetes and the lack of effective access to healthcare have most likely played an important reinforcing roll. Meaning that if people with thrifty genes are born from a mother that had gestational diabetes during pregnancy these people are already substantially more likely to develop diabetes later in life and if you combine that with all the transformation of the agricultural system, eating and other lifestyle habits and socio-economic factors and again the lack of effective access to healthcare then this would explain why diabetes has and is growing so fast in Mexico and why the disease is expected to do so even more in the future. It seems that a negative spiral powered by gestational diabetes and reinforced by several other factors is dramatically affecting the health of the Mexican population.

So I would like to conclude that there is a substantial amount of structural violence in Mexico that is being reinforced by gestational diabetes and thrifty genes, which would explain these severe manifestations of violence in the form of diabetes. Would it be cultural violence according to Galtung (1969) if a foreign institution as the Rockefeller Foundation transformed the agricultural system and as a result many people lose their land and will become dependent on buying food from others which will most likely sell monocrops and processed foods and as a result these people develop diabetes and obesity? Would it be violence of the food industry to sell addictive palatable refined foods that are high in sugar and calories to people with thrifty genes or a body that is adapted due to a specific childhood

to significantly less sugar and calories? I believe that there is definitely violence in this process which was the predecessor of the “Green Revolution” which according to Shiva (1991) incorporated a lot of violence. But we should also note that the Mexican government and Mexican companies have also played an important role in this violence. But now that the structure and its harmful effects have been identified; awareness should be created among the Mexicans and they should change the structures in the way that they see fit.

Now after discussing Mexico I would like to focus on the “Green Revolution”. According to Shiva (1991) those policies were later introduced to the rest of the world as the “the green revolution” or “agricultural revolution”. I will not only draw from Shiva (1991) but her work will be particularly useful to describe the situation in South-East Asia and India.

The rest of this dissertation will explain some of the major risks of this modernisation/Americanisation that is occurring rapidly in many regions in the world. Many countries want to “develop” as rapidly as they can, but that does not go without consequences, the ecological and economic consequences are fairly known, but this dissertation will focus more on the health consequences of this rapid “development” and implementation western-like agricultural policies and the consumption of unhealthy commodities by these countries and their populations. Firstly I will discuss how the World Bank together with the Rockefeller foundation has spread the model that has been applied to Mexico to other countries under the name of the “Green Revolution”.

Chapter 4: The World Bank, Corporations and the Green Revolution

World Bank: Spreading the Green revolution

So as Shiva (1991) mentioned, Mexico was the first country in which those policies were introduced by the Rockefeller organisation. These policies were happily accepted by some,

because they thought that it would allow the country to deal with famine. But not all countries dealt with famine and also much of the agricultural policies have been imposed by the so called “developed” nations. To me it seems more like a method to expand capitalism in a neo-imperialistic manner hidden under the umbrella of “development”. Farzana Naz (2006, p. 65) states that: “development as a discourse shares structural features with other colonising discourses such as orientalism.” According to Said (1979, p.20): “Orientalism can be discussed and analysed as the corporate institution for dealing with the Orient—dealing with it by making statements about it, authorizing views of it, describing it, by teaching it, settling it, ruling over it; in short, orientalism as a western style for dominating, restructuring, and having authority over the orient. “ According to Naz (2006) who reviews the work of Arturo Escobar (1995); similarly to orientalism, development has functioned and I would add to that that it is still functioning to some degree as a powerful mechanism for the production and management of the “Third World” in the post 1945 period. When looking back to the case of Mexico this seems to have been done under the umbrella of developing the “other” and it was done in 1945 and thereafter. So I believe that it is clear that “development policies” are largely responsible for the origin of these structures. Agricultural development policies are sometimes referred to as agro-colonialism and the main goal is basically land grabs and creating a structure for cheap raw materials. This can also be read in the report of GRAIN (2015). This agro-colonialism is very relevant to the Peace, Conflict and Development master and I mainly focus on how some of the violence of agro-colonialism and capitalisation can manifest itself in the form of diabetes. So let me continue now with explaining the “Green Revolution” which was an earlier form of agro-colonialism.

One of the main actors of the spread of the “Green Revolution” was the World Bank. In these paragraphs I want to discuss how the World Bank was not necessarily trying to stop famine, but it was trying to prevent communism and expand capitalism and while doing so it

has breached several human rights. Firstly, I will shortly mention my ideas and politics behind the endeavour of the World Bank and then use an article that describes the actions of the World Bank.

The structures that result from the “Green Revolution” are similar to those that are mentioned by Kalyan Sanyal (2006) who describes the process of capitalization in one of its earlier forms where it focuses on three things. Firstly it focuses on accumulation of money by merchants, secondly the conversion of accumulated money into capital and thirdly the creation of an external market for the products produced in a capitalistic manner. I will mention Salyan (2006) occasionally in these paragraphs to demonstrate that the “Green” revolution was not necessarily implemented to prevent famines, but it was mainly a spread of capitalism.

However, I will not try to explain everything that simple as this would be a type of application of the “dependency theory”. I will try to incorporate the perspective of post-colonialism as well to create a proper trans-modern perspective. According to Bhabha (1995, p. 49): “The post-Colonial perspective resists attempts to provide a holistic social explanation, forcing a recognition of the more complex and cultural boundaries that exist on the cups of these often opposed political spheres.” So I will see the politics of the World Bank as part of the explanation, but I will also try to focus on complex political, social and cultural factors that are relevant for each case study. I will thus try to incorporate this while describing these case studies, but first I will try to explain the activities of the World Bank and how transnational companies are related to these changes in structures.

Tanya Kerssen and Eric Holt-Gimenez (2015) from food first describe how the World Bank has been basically engaging in a long war on peasants. Tanya Kerssen is a research coordinator at Food First/Institute for Food and Development Policy and Eric Holt-Gimenez

is the executive director of that same institute, which is an institute that is very political active regarding agricultural policies and matters that are related to food and development.

According to Kerssen and Holt-Gimenez (2015) the World Bank started focusing on agricultural policies in the 1970's. This was done by World Bank president Robert McNamara, who according to Kerssen and Holt-Gimenez (2015) as a U.S. secretary of defence became aware of agriculture's geo-political importance. Kerssen and Holt-Gimenez (2015) clarify that under McNamara the World Bank partnered up with the Rockefeller foundation to massively expand the Green Revolution. This entailed according to Kerssen and Holt-Gimenez (2015) transferring U.S. Style industrial agriculture to the Global South through debt-financed programs and infrastructure.

The "Green Revolution" rapidly spread through Asia and Latin America and the implementation failed in Africa according to Kerssen and Holt-Gimenez (2015). The implementation of these agricultural measurements resulted in dramatic increases in agricultural production. Kerssen and Holt-Gimenez (2015) state that in the period of 1970-1990 which were the two main decades of the green revolution the total available food per person increased with 11%. In theory this seems great, but according to Kerssen and Holt-Gimenez (2015) the benefits of this increase in food availability were poorly distributed. In addition to that the "Green Revolution" according to them caused profound environmental and social problems. Kerssen and Holt-Gimenez (2015) state that in Latin-America for example, the food supplies per capita rose with 8%, but the number of hungry people also went up by 19% in the same period.

This would probably mean that the amount of people starving went up as well as the amount of people with diabetes went up in these countries, since there is more food, but it is more unevenly distributed. Furthermore, this would mean that the monocultures that were mentioned by Shiva (2014) were implemented during this period. However, this violence

does not only manifest itself in the form of diabetes, but also in less wealthy farmers being displaced, as wealthier farmers were using the credit opportunities of the World Bank. This violence also manifested itself to a certain degree as diabetes, because mechanization of agriculture started and the less wealthy farmers either went to poor soils and suffered from hunger or tried to look for a job in the city. As a result millions of people migrated to the cities which led to urbanization. As argued previously by Martorell (2005) urbanization and mechanisation are related to diabetes, also if you take into account that poor people would either be subsistent farmers or consume the cheapest food out there which then would be produced by the wealthier farmers and this food would consist of the harmful monocultures.

This clearly illustrates that the World Bank and Rockefeller Foundation have created a violent structure in which people are displaced and are either hungry or consuming harmful industrial bred monocrops that could lead to chronic diseases such as diabetes.

However, after this “Green” Revolution”, there was a Neo-Liberal follow up and the violent structure transformed into a structure where also transnational food companies aside local food companies play a dominant role, which I will explain later after discussing that even the manner in which this violent structure has been created has been done in a violent way. The actions of the World Bank were not in line with the tenure guidelines which the World Bank claims that it is following.

The Land Research Agricultural Network (2014) which will hereafter be mentioned as LRAN; clearly describes how the World Bank is not respecting the tenure guidelines which the bank claims that it is following those guidelines. It should be taken into account that these tenure guidelines are already very contradictory itself. For example, the LRAN (2014) mentions that the tenure guidelines which is like a global guideline contain a contradictory mix of philosophical and political positions, according to them it ranges from conservative market-based mechanism to radical views on human rights and social justice.

This would basically imply according to the LRAN (2014) that different actors will identify these tenure guidelines differently. On top of disrespecting the tenure guidelines I see several breaches of human rights that have been committed by the World Bank.

So despite the controversy and contradictions of the tenure guidelines the World Bank claims that it is following these guidelines and refers to their Land Governance Assessment Framework (LGAF). The LRAN (2014) critically analyses the LGAF of the World Bank and comes up with the following points. The LGAF seems to be far from the spirit of the tenure guidelines, for example LRAN (2014, p.50) quotes the LGAF which states the following in the area of dispute resolution and conflict management: “It is important that affordable, clearly assigned, transparent, and objective dispute resolution mechanisms exist and that these mechanisms are sufficiently efficient to maintain the level of unresolved disputes low enough not to affect the productivity of land use or threaten social stability.”

This clearly demonstrates that the LGAF of the World Bank focuses mainly on productivity of the land, which brings the LRAN (2014, p. 51) to their next point that the land access is not equal for everybody since the World Bank states in the LGAF that the land should be used by “efficient” users. So how is this social justice if you only promote land access to efficient users which will probably be the industrial activities, agro business and other large corporations? However, in the tenure guidelines according to the LRAN (2014) is stated that there should be a non-discriminatory equal access to land.

However, there are more flaws in the application of the tenure guidelines of the World Bank according to the LRAN (2014). An important dimension of the tenure guidelines is the dimension of broad stakeholder participation. These stakeholders included some of the people that were most likely affected by the tenure insecurity, this included peasants, fishers, indigenous peoples, pastoralists, rural workers, women, landless people, etc.

However, according to LRAN (2014) the stake holder process of LGAF of the World Bank is substantially different. The LRAN (2014) mentions that the approach of the LGAF; is characterised by a technical and expert approach. The LRAN (2014) argues that from a country-wide perspective there might be “Experts” from diverse stakeholder categories, but according to the LRAN (2014) this mechanism does not guarantee a balanced representation of the various groups.

Furthermore, the LRAN (2014, p. 51) states that:” the LGAF standards such as indicators and dimensions have been worked on by representatives from the World Bank in collaboration with technical experts of international organizations and without the participation of state representatives and particularly those of developing countries.”

So how are the World Bank measurements incorporating a broad stakeholder participation if they do not engage the guidelines with the representatives of countries, which does not even involve the previously mentioned peasants, fishers, indigenous peoples, rural workers and more?

This alone is already enough to seriously question the implementations and motives of the World Bank and how its investments would change the structure to deal with poverty while the very people that are affected by the plan are left out of the process. But there is more the world bank is also directly inflicting violence with some of its implementations. Which can be read in the LRAN (2014) report, but I will shortly mention parts of their conclusion about the actions of the World Bank.

The LRAN (2014) Concludes that the LGAF of the World Bank is extremely weak in terms of legitimacy and normative status, furthermore the LRAN (2014) argues that it is hard to understand why the governments of developing countries have accepted the tool designed by the World Bank to assess their lands, while this tool has been created without the involvement of the affected governments and its people.

Finally, the LRAN (2014, p. 58) states that: “On the other hand, there is ample evidence that the World Bank’s land policy advice and lending practices have had serious impacts on the ground in terms of human and tenure rights of the rural poor. Thus, the World Bank cannot claim that it is acting in line with the standards set by the Tenure Guidelines. Both the existence of very problematic lending practices within inappropriate safeguard mechanisms and the shift to lending outside these weak mechanisms are extremely worrying”.

By analysing the actions of the World Bank and by comparing it to the guidelines that they are ought to follow, it is clear that the violent structure that has been created by the World Bank is not in accordance with any proper international guidelines and the actions of the World Bank do not necessarily take into account the governments and people of developing countries that are affected by their actions. Proper international guidelines as argued earlier do not exist, but even the current guidelines do not get followed properly. Before analysing the actions of the World Bank further I would like to apply continue with the explaining the structure and the actions the World Bank, but as you can see the World Bank will no longer be the only main actor.

Transnational food companies

Kersen and Holt-Gimenez (2015) state that:” the funding for “Agricultural development” withered in the late 1980’s.” The World Bank according to them abandoned the state-led, debt financed model of the “Green Revolution” and put development in the hands of the private sector.

Furthermore, Keressen and Holt-Gimenez (2015) state that:” the World Bank in contrast to its earlier ideas supported the idea that “poor” countries should buy food from transnational corporations on the global market rather than growing the food themselves.” Keressen and Holt-Gimenez (2015) argue that it is difficult to oversee the harmful cocktail that has been caused by International Monetary Fund (IMF) and the World Bank, which according to them promoted a cocktail of liberalization, deregulation and privatization. This cocktail harmed these countries in several ways. I would like to add to that these policies first promoted the accumulation of money through investments and credits, which were the first building blocks of capitalization according to the theory of Sanyal (2010). After that this money was transformed into capital as agribusiness and other industry was invested in and finally the final step occurred were goods were exported to an external market which was likely the west. It was a good opportunity for the west to obtain cheap resources.

But it turned self-sufficient agricultural economies into import dependent economies, because first they destroyed the agricultural system as it was and were lending credit to wealthier farmers. But in the end they encouraged these economies to import food as the implemented system was not sustainable.

Additionally, small farmers had to compete with industrialised countries such as the United States. Finally, wealthy foreign and domestic investors had it easier to access land and resources without the need to adequately protect human rights and livelihoods.

So the World Bank basically encouraged transnational companies to take part in the exploitation of these countries, and this has significantly changed the structures surround agriculture and food security. This structure remained more or less the same until 2007 when global food prices spiked and a global crisis started. After this crisis the World Bank changed its policy once again, but according to Keressen and Holt-Gimenez (2015) the World Bank was still of opinion that peasants should either get big and start large commercial agricultural

companies or go out of agriculture. Also Kerssen and Holt-Gimenez (2015) mention that; small peasants consist of around 1/3 of humanity with 2.5 billion, but that the World Bank wants to transfer all that land and resources to big companies. While the World Bank according to them remains agnostic about the fate of these people.

When reading the 2008 World Bank report on agriculture for development this becomes clear. World Bank (2007, p. 26) states the following: “Three out of four poor people in developing countries—883 million people—lived in rural areas in 2002 Most depend on agriculture for their livelihoods, directly or indirectly. So a more dynamic and inclusive agriculture could dramatically reduce rural poverty, helping to meet the Millennium Development Goal on poverty and hunger.”

So what is this dynamic and inclusive agriculture of the World Bank? The World bank (2007) talks about measurements such as bringing industry to rural areas, reducing poverty through creating a favourable social political climate, sustainable development, adequate governance and sound macro fundamentals. How is this inclusive? What about the former peasants?

According to Kerssen and Holt-Gimenez (2015) the World Bank basically funded more land and resources grabs. The World Bank provided low-interest loans to agribusiness and other land-based industries. Furthermore, according to Kerssen and Holt-Gimenez (2015) the World Bank engaged in activities that went beyond agriculture. For example, they supported many different industries that restructured the country-side as a site of dirty extraction and capital accumulation. These industries consisted of for example timber, mining, fisheries, tourism, energy and plantation agriculture which included agro fuels.

These industries basically destroyed large part of the country-side, polluted the soil and the land of the poor peasants was basically useless. As a result the peasants started performing cheap labour in the very industries that uprooted them. The World Bank (2007)

talks about creating exciting opportunities, but you could apply the thoughts of Michel Foucault (1980) here and ask yourself for who this development discourse of the World Bank serves by posing the following questions, who profits from such a structure and for who are these opportunities that the World Bank talks about exciting?

To answer that you could argue that the new structures cause countries to be dependent on the products of transnational companies. Also this new structure is a structure that promotes processed foods consumptions and also the consumption of monoculture crops that are high in carbs and thus according to Shiva (2014), promote non-communicable diseases such as diabetes. This structure is remarkably similar to structure of the United States, except for the fact that these countries get exploited and that the applied structures will allow the United States and other western nations to obtain cheaper raw materials for their industries. It seems clear that corporations and “western” Nations are benefitting from all these measurements and implementations.

To conclude, the Rockefeller Foundation, the World Bank and transnational corporations have basically destroyed the former structure and placed a capitalistic exploitative structure that has a high dependency on food import from countries such as the United States, while the country itself is exploiting their lands and sells these products on the global markets.

Furthermore, the former peasants that were previously able to sustain themselves are now industrial workers that work for a minimum wage and now consume processed foods from transnational companies which, has had detrimental effects on their health and will most likely lead to the development of diabetes and other chronic diseases among many of them.

This clearly illustrates how the previously existing structure has transformed into a structure where the countries for a large part are dependent on the import of food and this

food becomes imported from transnational food companies. So how is this related to diabetes and other chronic non-communicative diseases?

Stuckler and others (2012) researched the processed food consumptions in their article manufacturing epidemics. They came to several important conclusions which are very relevant for this dissertation. Stuckler and others (2012) argue that the rate of increase of consumption of “unhealthy” commodities such as soft drinks, processed foods, alcohol and Tabaco are the fastest in low and middle income countries, while in high income countries there is little or no expected growth in the consumption of these commodities.

So this is a great way for these multinational/transnational food companies to make more profit, because if the markets in high income countries are mature, which according to Investorwords (2015) means that the market has reached a state of equilibrium marked by the absence of significant growth or innovation. Given that the type of products that these companies are selling; are foods and beverages innovation is unlikely to bring radical changes in their market growth. So what would be a good way to increase the growth if you were a multinational/transnational that produces food and beverages? Penetrating other markets that are not yet mature where significant growth and thus profit is still possible would be the most likely solution and that is exactly what many of these corporations did.

Furthermore, Stuckler and others (2012) argue that: “the pace at which consumption is rising in LMICs is even faster than occurred historically in HICs. Like Martorell (2005), Stuckler and others (2012) mention that there are two faces of malnutrition. They refer Eckholm and Record (1976) who discussed that in certain households there can occur, both undernourishment and obesity at the same time. Furthermore, Stuckler and others (2012) also argue that obesity/diabetes is becoming more a problem of the people with lower incomes in society, so this is also very relevant for my dissertation as the “development” policies lead to poverty and a dependency of monocrops and processed foods. Stuckler and others (2012)

accordingly argue that poverty and not high income may be a risk factor for the consumption of unhealthy commodities.

Furthermore, Stuckler and others (2012) say that multinational/transnational companies obtained a similar market-penetration in low and middle income countries to the amounts of market penetration that has occurred in high income countries.

Also Stuckler and others (2012) mention that urbanisation is no longer a strong risk factor for the consumption of unhealthy commodities. This can perhaps be explained by the article of Kerssen and Holt-Gimenez (2015) who argue that policies of the World Bank have changed the structure of these countries and have made them dependent on the import of food. Consequently this would mean that even in rural areas, the population would most likely consume imported foods which are most likely processed foods from multinational/transnational companies.

Finally, Stuckler and others (2012) do mention that higher income is related with more consumption of unhealthy commodities, but this seems only to be the case when there are high amounts of direct foreign investment and free-trade agreements. This would most likely imply that with direct foreign investment that multinational/transnational companies are directly investing in those countries to penetrate these markets as well as the fact that products from multinational food companies are being imported since there are free-trade agreements and it would thus be very profitable for these companies to enter these markets.

Thus, World Bank policies have changed the structures of many countries. Agriculture has transformed from small farms that provided food for rural communities as well as cities to rural areas that focus on industrial activities. The debt financed system led to complications and as a result the World Bank encouraged these countries to import food from transnational companies, as well as providing more credits to start a new wave of land and

resource grabs. Agriculture in these countries focused mainly on agribusiness after the reforms.

Harriet Friedman (1990) who I mentioned earlier argues for example how the shift to durable foods changed the fact that agricultural products were no longer end products meant for consumption, but rather that these products served as raw materials for industrial purposes such as the production of processed foods. This in combination with the market penetration of transnational companies that according to Stuckler and others (2012) have penetrated the markets to a similar degree as that of higher income countries, have created the new structure in these countries.

However, the introduction of these unhealthy commodities has happened much faster than has happened in the past in high income countries in the past. If you would take into account the article of Martorell (2005) in which he states that childhood hunger and genetic predisposition are important factors for the development of diabetes, then you can surely imagine what kind of consequences the rapid implementation of these unhealthy commodities will cause to a large part of population of these countries to develop non-communicable diseases such as diabetes and obesity. The situation of Mexico is an example of this and surely the effects of this structure will vary due to several factors, but it is likely that these structures have caused and will cause a lot of suffering in the future.

Which according to both Friedman (1990) and Shiva (2014) have led to monocultures of crops. However, the yield of these crops usually serves as raw material for processed foods, which will then be imported and consumed. Stuckler and others (2012) argue that the unhealthy commodities are more and more consumed by the poor and obesity and undernourishment can occur in the same household which imposed a double burden on the residents of these countries with less income and less access to food. The violence caused by this structure is and will manifest itself in non-communicable diseases

So now that I have described the structure, I would like to discuss this structure in relation to the universal human rights. Are there any breaches of human rights as a result of the policies and actions of the World Bank and Corporations? Could you argue that the World Bank has breached article 17 of the universal declaration of human rights? This article of the United Nations (2009) states the following: “1. everyone has the right to own property alone as well as in association with others” and it states: “2. No one shall be arbitrarily deprived of his property.” Could you not argue that the implementation of the “Green Revolution” has deprived many farmers of their fertile soil? In addition to that seeds which according to Shiva (1991) were previously managed by farmers and were a sort of both tangible and intangible possession of farmers and they have been deprived of that; because these seeds have been monetized, patented and more.

Furthermore, what about article 21 of the human rights which states the following: “(1) everyone has the right to take part in the government of his country, directly or through freely chosen representatives. (2) Everyone has the right of equal access to public service in his country. (3) The will of the people shall be the basis of the authority of government; this will, shall be expressed in periodic and genuine elections which shall be by universal and equal suffrage and shall be held by secret vote or by equivalent free voting procedures.”

Concerning point 1, if everybody has the right to participate in the government of his country, how does this get represented in the LGAF of the World Bank that does not even approach the governments and its people when creating the guidelines that are related to the implementation of the “Green Revolution? And concerning point 3, what authority does a government have when the World Bank does not even invite the governments when creating these guidelines?

Let me continue with human right number 22 which is defined in the following manner: “Everyone, as a member of society, has the right to social security and is entitled to

realization, through national effort and international co-operation and in accordance with the organization and resources of each State, of the economic, social and cultural rights indispensable for his dignity and the free development of his personality.” Many of the societies that were transformed by the “Green Revolution” had no official social security, but many farmers had a form of safety nets that would secure them when something would go wrong. The “Green Revolution” has removed these safety nets and has arguably deprived these farmers of their social security.

Also parts of right number 23 have arguably been breached such as part 1,2 and 3. Which respectively state the following; 1 everyone has the right to work, to free choice of employment, to just and favourable conditions of work and to protection against unemployment. 2 Everyone, without any discrimination, has the right to equal pay for equal work. 3 Everyone who works has the right to just and favourable remuneration ensuring for himself and his family an existence worthy of human dignity, and supplemented, if necessary, by other means of social protection. So if everybody is free to choice employment, how is this reflected in the policies of the World Bank? Former peasants are basically forced by hunger to work for Agri-business and industrial enterprises. They can no longer be farmers because either the soil has been polluted or they have been deprived of it, so where is the freedom to choose? Regarding point 2 is there really an equal form of pay? As people from the rural areas work for minimal wages and under horrible conditions? Regarding point 3; people either work for a very low wage without even the possibility to consume the foods that they consumed in the past. You could argue that if human rights would be universal; then everybody should have relatively the same wage which is definitely not the case with the new jobs that have been created in sweatshops, raw industry and other locations.

Also nowadays they are both pushed and pulled to consume monocrops and processed foods. This is arguably also a breach of human right 25.1 as every human has the right to

health and food and the consumption of these foods would lead to diabetes and other diseases and these foods are arguably not proper foods as they are toxic. Before the implementations of these structures many of the health problems that are currently experienced such as diabetes were very rare. Also people get into debts because of the new structure and even commit suicide as has been common on the Indian country side; in what way is this structure of the Green Revolution that clearly discriminates against the poor farmer, a structure that respects human dignity?

Finally regarding right 27.1 which states that everybody has the right to freely enjoy scientific advancement and their benefits, but it clearly seems that not everybody is benefitting from the implementations of the “Green Revolution”

Chapter 5: Case studies in India and the Pacific Islands

South-East Asia: India as a case study

I would now like to discuss the consequences of the implementation of these policies that were financed by Western States and institutions and illustrate the harmful effects of the “Green revolution”, “world bank agricultural development” and processed foods sold by transnational corporations. I would want to start with South-East Asia and more specifically India which will serve as a general example and describe how the “Green” Revolution has been implemented and how it has led to diabetes and more importantly how dramatically this structure will lead to diabetes in the future.

According to the IDF (2013) in 2011 around 71.4 million people are estimated to have diabetes in India and this number is expected to rise to almost 121 million by 2030. The IDF (2013) argues that this is largely because of the population growth in India, however before the “Green revolution” diabetes and was relatively rare. The percentage of the adult

population with diabetes is expected to go from 8.3% in 2011 to 10.2% in 2030. However, I would like to state that I believe that diabetes will rise faster in these countries due to the rigorous and fast implementation of “modern” farm techniques, urbanization, market penetration by transnational companies and capitalistic consumption of unhealthy commodities and the fact that a large part of the population has perhaps lived in a sustainable manner which from a western perspective would be defined as scarcity.

The transition from a traditional agricultural system to a heavily modernized agricultural system in the countries in South-East Asia generally, went much faster than in the United States or Europe because of the investments of the World Bank. If you combine that fact with the theory of Martorell (2005) who argued that people who have experienced frequently hunger in their childhood are more likely to be more susceptible to developing diabetes later in life when these people will consume a “modern” diet.

If you look at the slums in India or think about the floods in Bangladesh which do not only cause human deaths, but can also cause hunger and starvation. These people have most likely thrived from small amounts of food per day or even did not have food for some days. A rapid transition to a high carbohydrate consisting mainly of monocrops would be very harmful.

An example of this is the implementation of golden rice are likely to do more harm than good, since golden rice will function as a staple food, this can be extremely harmful and develop obesity and diabetes, due to its the high-carbohydrate content. This is also argued by Shiva (2014) who extensively discusses not only the harmful effects of golden rice, but also mentions how it is not even an effective way to deal with malnutrition. So would it not be better to provide balanced meals to these populations? Instead of letting them thrive on a single genetically modified crop of which the long-term health effects are so far unknown?

Furthermore, it should be noted that according to the IDF (2013) India has a very high prevalence of type I diabetes; type I diabetes was more something of the so called “developed” regions. So why does India experience such a rapid increase in type I diabetes patients?

This could imply that similar structures have been established as those in Europe and the United States. These changes in structures as argued by Gale (2002) are most likely related to the increases amounts of type I diabetes. These structures could include the exposure to foreign proteins at an early age such as those of cereals and cow milk, which as I have illustrated earlier can also lead to the development of type I diabetes.

However, I believe that there are more factors that should be taken into account. I believe that it might also have something to do with GMO’s and toxic exposure. This would also make the mass-implementation of the golden rice very harmful. The effects of GMO-exposure are still relatively unknown, but more and more often you hear of diseases such as cancer and strange mutations that are arguably causes by the exposure to GMO’s or the related chemical pesticides and fertilizers.

Furthermore, it should be noted that South-East Asia has the second highest number of deaths due to diabetes of all the 7 identified regions of the IDF (2013). This also hints at violence and likely low access to healthcare, which I will investigate later in this dissertation. So how did the so called “Green Revolution” start in India? Raj Patel (2012, p. 11) states what John Rockefeller voiced during his tenure on the Rockefeller Foundation Board from 1946 to 1956 that: “The impoverished and hungry people might be more amenable to communism. So both the main proponents of the “Green Revolution” the World Bank and the Rockefeller Foundation were at least partly motivated by fear of peasant revolts and communism.

Patel (2012, p.11) argues that in a strategic document of the Rockefeller Foundation that was entitled: “The World Food Problem, Agriculture, and the Rockefeller Foundation” which stemmed from 1951 and was written by the Advisory committee for agricultural activities wrote the following sentences: “whether additional millions . . . will become communists will depend partly on whether the communist world or the free world fulfils its promises. Hungry people are lured by promises, but they may be won by deeds. Communism makes attractive promises to underfed peoples. Democracy must not only promise as much, but must deliver more.”

This demonstrates that the “Green Revolution” was perhaps more motivated by political motives than philanthropic motives. Also it should be noted that American foreign policy had strong interests of preventing communism from spreading, statements were made such as where hunger goes, communism follows.

In addition, to that the U.S. struggled with an agricultural overproduction crisis according to Patel (2012). Patel (2012, p.11) writes that: “The priorities of the US government itself were bent toward managing domestic as well as international crises. The crisis of agricultural overproduction within the US was, for example, fixed in part through the US Agricultural Trade and Development Assistance Act (PL 480) in 1954, which allowed the US to export surplus production as aid on US carriers to the Global South”

So the U.S. wanted basically two things deal with its surplus of wheat as well as preventing communism and India would be one of the major recipients. It would be a perfect country, for the “Green Revolution” since it is a country with a large population and it had millions of peasants. An example of this mind-set can be seen in the statement of Karl T. Compton who in 1951 as the president of the Massachusetts institute of technology mentioned the following to the Rockefeller Foundation according to Perkins (1990): ‘I

suspect that India may be fertile ground for activity in this field. The overpopulation, the low living standards and the threat of communism are of course well known’.

So the motives of the U.S., Rockefeller foundation and the World Bank were clear. According to Patel (2012) the Rockefeller foundation began investigating the potential of replicating the model that has been implemented in Mexico for India.

According to Vandana Shiva (1991) by the mid 60’s the Indian agricultural policies were adjusted to make use, but also promote the new so called miracle seeds. Shiva (1991, p.62) states that; by the summer of 1965 both India and Pakistan, have ordered around 600 tons of the dwarf seeds from Mexico. And so the implementation of the “Green Revolution” in India began.

Shiva (1991, p. 62) states that by the time of 1972/1973 16.8 million hectares were planted with dwarf wheat and another 15.7 million hectares were planted with dwarf rice. So both of these crops are cereals and as I have explained earlier, cereals generally have a high glycaemic Index, but also can cause all kinds of mineral deficiencies as well as auto-immune reactions. On top of that it should be noted that both dwarf rice and dwarf wheat are crops that have been heavily genetically engineered and come with chemical pesticides and fertilizers. So having modified wheat and rice as a staple food might not be ideal and even harmful in many cases and could lead to the development of non-communicable diseases such as diabetes, as well as soil pollution which in the long term could lead to nutrient deficiencies as well and would be dramatic for the ecological environment.

Also it should be noted that prior to the introduction of these seeds as explained by Shiva (1991), natural seeds were often given to other farmers as a gift. Seeds were seen as a gift of nature and since these were so abundant giving them away would do no harm to your own financial situation. However according to Shiva (1991) the farming system shifted from a system that was controlled by peasants to a system that was controlled by agrichemical

organisations and seed corporations as well as international agricultural research centres. Seeds were transformed from a free commodity, to a heavily monetised commodity for which farmers had to go the bank for credits to purchase seeds and countries had to purchase international loans to access these seeds. Could this be seen as a deprivation of a property? If so then this is a breach of universal human right article 17.

This monetisation of seeds can also be seen as a form of violence and it is related to the structure that has been created that causes diabetes. So it really seems that Shiva (1991), Patel (2012) and Kerssen and Holt Gimenez (2015) describe similar matters

Thus you can clearly argue that the traditional agricultural system in India has been largely transformed and that a new structure has taken place, this is similar as the general picture that resulted from the World Bank policies that I depicted earlier.

However, the Green Revolution did not end for India, it was an ongoing endeavour. According to Raj Patel (2012), the “Green Revolution” in India was a long revolution. In the year 2006 for example according to Patel (2012, p.1-2) who quoted Rao (2006); U.S. President George W. Bush stated the following:

“The United States worked with India to help meet its food needs in the 1960s, when Pioneering American scientists like Norman Borlaug shared agriculture technology with Indian farmers. Thanks to your hard work, you have nearly tripled your food production over the past half-century. To build on this progress, Prime Minister Singh and I are launching a new Agricultural Knowledge Initiative. This initiative will invest US \$100 million to encourage exchanges between American and Indian scientists and promote joint research to improve farming technology. By working together the United States and India will develop better ways to grow crops and get them to market, and lead a second Green Revolution. (applause). . . The great Indian poet Tagore once wrote, ‘There’s only one history – the history of man’. The United States and India go forward with faith in

those words. There's only one history of man – and it leads to freedom.” A quote from Rao (2006)

However, it should be noted that this terminology of Bush is confusing because arguably a second “Green Revolution” has already been started decades before 2006. It is hard to state when the “Green Revolution” actually continued in my opinion because it seems to be more of an ongoing process of exploitation and capital accumulation to me where the policies might vary over time, but the overall goal remains the same. However, the fact that it is a process means that for some people the “Green Revolution” has been a success. So according to Foucault (1980) you should ask yourself the question to whom does the discourse that the “Green Revolution” is a success? Most likely it has been beneficial for the economy of the “west” and possibly it has been successful to fend off communism and most likely many government officials and wealthy Indians have also benefitted greatly with the implementation of the “Green Revolution”.

Patel (2012) also argues that the fact that the “Green revolution” has been continued over these years means that the “Green Revolution” according to some people has been perceived as a success. And directly after Patel (2012), quotes Perkin (1997, p. 258) who stated the following: “If success means an increase in the aggregate physical supply of grain, the green revolution was a success. If success means an end to hunger, then the green revolution was a failure. People without access to adequate land or income, regardless of their country of residence, remain ill fed.” So if the statement of Perkin (1997) is correct, then this success is not experienced by the people without income or land. This would be strange right? Did the World Bank not state that it wanted to stop poverty and hunger? What happened to that statement? How was it incorporated with the policies of the World Bank? This has clearly not been on the agenda of the World Bank.

This is clearly in line with article about the “World Bank” by Kerssen and Holt-Gimenez (2015) who argue that the “Green revolution” has not necessarily helped the poor and it seems in line with the LRAN (2014) that stated that the World Bank for example, created the guidelines of their policies without the involvement of the locals. Thus, in my opinion it is not a surprise that the “Green Revolution” has not been very successful in dealing with issues such as hunger.

Griffin (1974) partially explains why the “Green Revolution” in India has not been very successful in reducing poverty. He argues that extension agents focus on large farms, while credit agencies focus on low-risk borrowers. So credit agencies will be more likely to lend credit to wealthy farmers than doing so to farmers with a low income. In addition to that Griffin (1974) argues that sellers of fertilizers, pesticides and other chemical inputs also focus more on cultivators that likely to buy the largest quantities. Furthermore, Griffin (1974) mentions that the state organisations tend to provide services to those of which the government seeks approval. Which according to Griffin (1974) would be usually large land owners. After summing this up Griffin (1974) argues that unless there is scale-neutrality in the institutions that support the “Green Revolution” and if small peasants would have equal access to knowledge, finance, material inputs, etc. then the innovations of the “Green Revolution” will most inevitably favour those that are prosperous and those that secure and this will be done so at the expense of the poor and insecure.

This logic of Griffin (1974) is spot on, since it is clear that the World Bank does not even take into account all stakeholders as well as the world bank according to Kerssen and Holt-Gimenez (2015) favours efficiency, expertise and such.

So it is clearly debatable whether the “Green Revolution” has been a success; politicians and some economists say so, but there are many scholars such as Patel (2012), Shiva (1991), Kerssen and Holt-Gimenez (2015), Perkin (1997) and Griffin (1974) that

strongly doubt about the success of “Green Revolution” unfortunately I will not go into further detail than mentioning that the “Green Revolution” severely changed the structure in many regions of India and that it favoured the prosperous and that it has largely destroyed small scale farming and that it is likely that monocrops harvesting has been established as has been done in the United States and Mexico and as a result, carbohydrate consumption has been likely to go up and this would most likely lead to a higher incidence of diabetes.

However, what about the consumption of soft drinks and refined foods that have played such an important role in the American diabetes and obesity epidemic?

So as I mentioned before in the general picture that I have drawn, is the increased import of unhealthy commodities how does that relate to South-East Asia and more specifically India? When looking at the work of Stuckler and others (2012) and look at their data which can be found in the appendix part A.10

You can clearly see that for the region of Asia-Pacific under which South-East Asia falls, from the period 2000-2010 there was more than a 100% increase in the consumption per capita of Soft-Drinks and almost a 250% increase in the consumption per capita of ready meals. Also all the consumption of all the other unhealthy commodities has increased.

Furthermore, the expected consumption growth from the period of 2010-2015 is still expected to rise moderately, so this does not mean that the consumption has increased because of the population, but it implies that the consumption per capita has increased in decade with insane numbers. This could hint at the import dependency of the countries in South-East Asia which was mentioned by Keressen and Holt-Gimenez (2015) as well as the fact that transnational companies are successfully penetrating the local markets. Also please remember that this increase in consumption is not necessarily caused by an increase in income, because Stuckler and others (2012) mentioned that income only leads to more consumption of these unhealthy commodities if there is direct-foreign investment or when

there are free-trade agreements. And if the traditional agricultural system has been destroyed it seems logical that people are consuming more processed foods, since natural foods are harder to obtain.

In India, companies such as Nestlé, Kraft foods and PepsiCo have acquired already a large market share when you look at the graph of Stuckler and others (2012) if you look in the appendix in part A.13. However, just like Mexico there are also native companies that have high market shares and generally also produce processed products that stem from the harmful monocrops that were mentioned by Shiva (2012). Which can probably explained in a similar way as was the case with Mexico, local companies understand the local market probably better than the transnational companies do. Also, the implementation of the “Green” revolution has likely empowered some people that already had a significant amount of capital with opportunities to expand their business and thus transform their company into a large corporation. However, it should also be noted that companies such as Danone have been co-owners of some of the major Indian corporations. So you could argue that these companies can partly take over the market, because the transnational companies are partly controlling those companies from the shadows. This is very common all over the world as you can see in the Appendix in Part A.18. But what is interesting is that the market leader of the Indian food industry is Amul which is a co-operative of 3 million farmers. So with methods like that it is possible to keep local companies in power, but if you look at the products that Amul sells you will see that it is the same types of foods that other companies in the food industry produce and sell, so such an initiative might be great for the Indian Economy, but it will inflict structural violence that will manifest itself in the form of diabetes like products of multinationals and transnationals.

So these companies generally sell similar stuff as companies in Mexico, India and the United States. Thus, the raw material for these products is generally unhealthy and can lead

to diabetes, but then they get processed and the end result consist of processed foods which are generally even more harmful. Despite, the fact that these companies sometimes add extra vitamins and minerals; it will not transform an unhealthy food in a healthy food, since human physiology and reality is more complex than that. Artificial minerals and vitamins simply do not have the same effects as their natural counterparts.

It is safe to say that these food companies have also played a dominant role in the rise of diabetes and other chronic diseases in India. After the rapid urbanisation that has occurred partially due to the World Bank policies and the destruction of the previous agricultural system, multinational companies and native companies that produce processed foods have rapidly penetrated the food market and the pace at which the consumption of these foods increases is very worrying. Also it is likely that many of the factors that Martorell (2005) mentioned for Mexico are likely to happen for India such as an increase of the sedentary lifestyle, reduction in physical activity and many other factors that would lead to diabetes and other non-communicable diseases.

Another factor that is relevant which is related to the consumption of unhealthy commodities is that according to Stuckler and others (2012) the consumption of soft drinks is expected to grow the most rapidly in India and Vietnam. So if you would take into account this factor, then most likely diabetes will rise much more rapidly than has been projected by the IDF (2013) previously. As argued earlier there is likely a causal relationship between soft drinks and type II diabetes, since many of the criteria of the Bradford Hill model apply to this relation.

Furthermore, I believe that the number of people that get diabetes, but also that die from diabetes in India will be much higher than expected. The country is transforming rapidly, but the public health care system is not capable of dealing with such a large epidemic. According to Victoria Fan in Luthra (2012) who wrote her Harvard dissertation on

the health care system India, there are several problems with the public healthcare in India. Which is why according to Fan in Luthra (2012), most Indians seek healthcare in private facilities. You should not think that private facilities are necessarily high quality expensive health care facilities. Sometimes it is the complete opposite, for example Fan in Luthra (2012, online) states that: “private healthcare varies greatly in quality of care, being unregulated and financed largely through out-of-pocket payments. In the private sector, there are a large number of health workers who have only a high-school education or do not have a medical degree.”

So clearly the private healthcare system is very broad, but why do people not opt for the public health care system? According to Fan in Luthra (2012) people prefer the private healthcare system because: “the public healthcare system suffers from many years of neglect, lower-level public healthcare facilities often suffer from a variety of problems, including worker absenteeism and dual public-private practice, low demand for their use, and shortages of supplies and staff.” From this it is clear that there are problems with both the public and private healthcare systems, but what about the access to healthcare in the rural areas of India? These are the areas where the “Green Revolution” has largely transformed the country-side.

Singh and Badaya (2014, online) state the following: “in the present scenario Indian rural health care faces a crisis unmatched to any other social sector. Nearly 86% of all the medical visit in India are made by ruralites with majority still travelling more than 100 km to avail health care facility of which 70-80% is born out of pocket landing them in poverty.” From this statement you could deduce that there is a big health care crisis on the Indian country-side. So even before the harmful structure was implemented there was already a breach in universal human right article 25.

So most likely the “Green Revolution” has not only transformed a large part of the Indian country-side and left the peasants without fertile lands, but also it is likely that the new

harmful structure will lead to diabetes and other non-communicable diseases as the consumption of unhealthy commodities is rapidly increasing, furthermore the fact that utilizing healthcare can land these Indians into poverty as argued by Singh and Badaya (2014) then this would cause a dramatic situation on the Indian country side, this would explain why the deaths due to diabetes are so high in India, because the structure inflicts harm and the health care system is most likely not adequate to treat or reduce the effects of diabetes. Also type I diabetes could land these Indians into poverty or death because an exogenous source of insulin will be necessary to survive.

So to conclude the situation in India; again I would argue that if you take these factors into account, then diabetes in India and the countries in the other regions that I mentioned, will rise probably much more rapidly than has been expected by the International Diabetes Federation (2013) and other international institutions. This is due to the rapid transformations of the agricultural sector as well as the rapid market penetration of transnational companies. Also the lack of a proper healthcare system will most likely lead to a lot of suffering and even death. India clearly demonstrates how these transformations of agricultural systems can be very harmful and that as a result violent structures are put in place. The violence in India can be partly traced back to Rockefeller Foundation, the World Bank, The United States and the Indian government, but I believe that it is relatively difficult to hold specific actors accountable thus according. However by utilizing the theory of Galtung (1969) I would like to argue that there is at least a clear case of Structural violence, which inflicts clear physical harm on the habitants of India and this violence largely manifests itself in non-communicable diseases such as diabetes, poverty and in the worst case death. Type I diabetes is starting to become more and more common in India which is likely caused by infant formulas that contain dairy or cereals. Also type II diabetes is becoming more common and the soft-drink consumption per capita is increasing at a worrisome rate. The consumption of processed

foods in general is increasing and also more and more monocrops are being produced which according to Shiva (2014) also cause a lot of cases of diabetes.

All these factors play an important role, but another worrisome aspect is the fact that many Indians do not have effective access to proper healthcare and this could lead to a lot of cases of gestational diabetes which would significantly increase the risk of many women and children to develop diabetes. But this lack of effective healthcare would also increase the amount of deaths of people with type I diabetes as the disease might be undiagnosed and with type I diabetes this could rapidly result into death. Regarding type II diabetes it would also imply that perhaps many people are unaware of the fact that they have diabetes and these people also have an increased risk to suffer from diabetes and if not managed well type II diabetes will also likely result into premature death. India is not in the same epidemical stage as Mexico, but it is likely that the epidemic in India will grow rapidly in the future if nothing will be done to deal with these harmful structures.

Pacific Islands

Besides India and Mexico I would like to discuss one more region, the Pacific Islands. This region offers a very clear example of how imported foods that are substantially different from the traditional diet of the people in the region can have detrimental effects on the health of the population. This region is different from India and Mexico because the import dependency of this region is extremely high. This case study of the Pacific Islands will be a great example, for countries that are important dependent.

Import dependencies can lead to many effects and consequences but I will discuss two very different scenarios. For the first scenario I will use the famines in Bangladesh in the

years of 1973 and 1974 as an example and for the second scenario I will use the Pacific Island region.

Amartya Sen's (1981) book on poverty and famine clearly describes the situation in Bangladesh. In this book Sen (1981), mentions that by the year of 1974 Bangladesh was already chronically dependent on imported food from abroad. Bangladesh according to Sen (1981) had been receiving food aid from several countries in the world and received regular aid from the United States of America. However, the aid of the United States according to Sen (1981); came with a severe threat. Bangladesh was to stop its trade with Cuba, if the country would like to receive more grains from the USA. Sen (1981) mentions; that Bangladesh in 1974 was also suffering from a dollar shortage and since it was not able to trade with Cuba, it eventually had to cancel two large purchases from American grain companies. As a result, another large famine occurred in Bangladesh. So this demonstrates how a dependency of food can cause undernourishment as well as how America uses its grain surplus as a political tool instead of true aid, since the USA has had a grain surplus for decades and has sold grains to "developing" countries with the use of subsidies.

I would like to note that I do not believe that the U.S. is solely selling these products with good will, first of all they could give grains for free or a lower price, since they have a surplus and secondly it seems like the USA is using the food-import dependency of countries as a political tool to invoke the political changes that the USA desires.

Furthermore, it is important to note that the Green revolution has caused a lot of import dependencies in the long run which is remarkably profitable for many corporations. Also for Bangladesh this is the case as is explained by Firdousi Naher (1997), who explains that thanks to the "Green Revolution" in the beginning of the revolution, the agricultural sector has achieved a remarkable growth, but that there was instability in the period after the "Green Revolution" and Naher (1997) argued that although that it was a reducing instability;

Bangladesh was still not a self-sufficient country. And if you look at the other implementations of the “Green Revolution” it will be unlikely that the country will become self-sufficient with only following the ideal of the “Green Revolution”. Also it should be noted that due to the “Green Revolution” Bangladesh agricultural policies focus almost exclusively on wheat and rice. So even if the country can become self-sufficient.

I believe that diabetes, obesity and other health problems will then start to occur.

However, it is unlikely that the “Green Revolution” will completely solve hunger as is argued by Eric Holt-Gimenez (2006, p. 1) who quotes Frankel (1973) who states that:” the “Green Revolution” actually deepens the divide between rich and poor farmers.” Frankel (1973) also quotes that in both Mexico and India seminal studies revealed that the Green Revolution’s expensive “packages” favoured a minority of economically privileged farmers, put the majority smallholders at a disadvantage, and led to the concentration of land and resources.

So most likely there will be a double burden of the poor where the poor have an increased risk of both obesity and undernourishment as was the case for Mexico as argued by Martorell (2005) if the “Green Revolution” in countries like Bangladesh succeeds.

My case study however will focus on the second scenario which involves import dependent countries that have generally sufficient economic capabilities to import foods, but where the natives who are actually treated as second-rank citizens and therefore have fewer socio-economic opportunities and because of their limited economic resources these people are inclined to consume monocrops and processed foods. The Pacific Islands an interesting case study due to its complex structure and it is another example of a region with many inhabitants with thrifty genes thus the structural violence gets significantly reinforced like that was the case in Mexico.

Martorell (2005) who spoke about thrifty genes, mentioned Pacific Islanders as one of the groups of people that just like Native-Americans have thrifty genes. As you can imagine that food on Islands have traditionally been scarce and most likely the people with thrifty genes could survive longer periods without food, would have had a substantial survival edge. If a famine occurred on an island it would definitely be more difficult to get food from other regions. So considering the fact that Pacific Islanders generally have thrifty genes, what is the current situation in the Pacific Islands, what structure is in place and how many people have diabetes?

According to the World Health Organisation (2010) around 40% of the population have been diagnosed with non-communicable diseases such as diabetes, cardiovascular disease, hypertension, obesity and more. It should be noted that the Western Pacific region under which these islands fall has around 138 million people with diabetes according to the IDF. So this region; is the region in the world with the most cases of diabetes, but it should be noted that for some reason China is included in this region, so that has to be taken into account. The Pacific Islands is a small sub-region of this region on which I will focus. In this region a large part of the population suffers from non-communicable diseases such as diabetes.

Also please note that these are only the people that have been diagnosed with these diseases, according to the IDF (2013) a large part of the people with Diabetes is not aware of the fact that they have diabetes. The IDF states globally that 1 out of 2 people is not aware of the fact that they have diabetes, I am not sure whether this is generalizable for the Pacific Islands regions, since it is a very common disease there, but it can be expected that the actual number of people with non-communicable diseases such as diabetes is higher than 40% of the population.

Furthermore, according to the WHO (2010) in at least 10 Pacific nations over 50-90% of the population is overweight or has obesity. In American Samoa there is an 80% prevalence of obesity. As argued before by Haffner (2000) where obesity is rising, diabetes type II generally follows. This statement is clearly illustrated in American Samoa where 47% of the adults have diabetes according to the WHO (2010). However, also in other parts of the region, the prevalence of diabetes is very high, the WHO (2010) mentions that the prevalence in the other countries of the region is generally between 14%-44%. This 14% is already much higher than most countries in the world, but countries with rates close to 40% or higher have incredibly high rates of diabetes and this would be a major problem. Most likely the situation would be similar as with native-Americans where gestational diabetes significantly affected the amount of people with diabetes.

If for example a large part of the mothers have gestational diabetes during pregnancy, then this would mean that the children are more likely to develop diabetes and the same holds for future generations. This problem would go on and on as a negative spiral where eventually almost everyone would have diabetes if this negative spiral does not get broken at some point in time.

Dramatic consequences could include premature death. Doctor Waqanivalu in the article of the WHO (2010, online), states that:” currently in Fiji only 16% of the population will become older than 55 years old.” I have not come across other literature that can confirm this statement, but it is clear that the diabetes and obesity epidemic will severely affect the life expectancy of the pacific islanders. So now that I have discussed the amount of people with diabetes, it would be interesting to discuss what has caused this scenario.

Agriculture on Pacific Islands is generally difficult, for example www.ruralpovertyportal.org states the following: “Producing food crops on an atoll island requires patience, hard work and some good fortune. Infertile coralline soils and long spells

without rain make any form of agriculture a challenge and leave atoll communities with poor diets and weak economies.”

This would explain the import dependency of these countries, but it would also imply that the “Green” revolution has not directly influenced the agricultural policies and structure of the rural areas. The fact that agriculture is difficult in these countries would also explain the thrifty genes of the Pacific Islanders. So if the “Green Revolution” did not directly affect these countries, how has the structure changed and did obesity and diabetes become so common?

Because of modernity and increasing globalisation, international trade and many other factors, the population of these island nations had the opportunity to grow and consume more food due to the increased opportunities of importing food.

According to the WHO (2010, online); Doctor Collin Bell says that: “Historically, food was imported from Australia and New Zealand, but now it comes from much further afield: China, Malaysia and the Philippines. Malaysia and the Philippines have been regions where the “Green Revolution” occurred, I will not go into further detail in those regions, but I would like to state that the processed foods that are imported from those regions are most likely products that stem from monocrops. So these agricultural products are already harmful, but in addition to that it is likely that many products have been processed in factories and will thus have an elevated Glycaemic Index and will generally cause inflammation due to unbound molecules, oxidation and due to their high sugar content, which is basically similar to the United States, Mexico, India and many other countries.

So the region is thus mainly dependent on the harmful crops that I have mentioned in the paragraphs about the United States. The effects are seen clearly due to the fact that there is a high prevalence of non-communicable diseases. But also many people experience nutrition deficiencies. According to the WHO (2010) micronutrient deficiencies are appeared

in 15 of the 16 surveyed countries, this would most likely imply the consumption of processed foods that are low in nutrients and also often contain anti-nutrients that interfere with the bio-availability of vitamins and minerals within the body. Common problems appeared to be anaemic pregnant women, iodine deficiencies and vitamin A deficiencies.

The WHO (2010) argues that great progress has been made through the iodization of salt, but as I have explained earlier, this intake of artificially added iodine can cause thyroid auto-immune diseases. These thyroid diseases will make the people that have them fatigued. People with diabetes already generally suffer from fatigue, so their suffering would be worse. Also if you reason that physical activity would reduce the prevalence of diabetes, then fatigue due a thyroid disease would have an adverse effect and would most likely increase the likelihood of developing a disease such as diabetes as blood sugar will remain high.

Pacific Islanders probably can solve this iodine deficiency by themselves if you create awareness of the fact that seaweed and kelp are full of natural iodine, as a matter of fact sea vegetables are the best natural source of iodine also contains a lot of other nutrients. Like this you can solve hypothyroidism and also prevent Hashimoto's thyroiditis which is the auto-immune thyroid disease that I mentioned earlier which is so common in the United States. The only this is that kelp should be consumed in moderation or it could lead to hyperthyroidism which are high thyroid levels. But let me get back to the diet of the Pacific Islanders

So I am not aware of what these people are consuming exactly, but it seems that they have a high consumption of legumes and cereal grains or processed foods that stem from these monocrops if they suffer from iodine deficiencies as well as from a vitamin A deficiency, which is also mentioned by the WHO (2010). This vitamin A deficiency can partly be solved by consuming or and seaweed, as they also have small amounts of vitamin A and other vitamins. Most mineral deficiencies could be cured by kelp on the other hand.

So by deducing from the deficiencies that occur, I can get a general idea of what the Pacific Island consists of, but I would like to also draw from the literature to have a more profound argument.

Michael Curtis (2004) writes about the obesity epidemic that is occurring in the Pacific Islands. According to Curtis (2004) one of the main consequences of this epidemic is the decrease in physical activity combined with a shift in dietary factors. Curtis (2004) argues that there was a shift from traditional food such as fresh fish, meat, local fruits and vegetables to other foods such as rice, sugar, flour, canned meats, canned fruits and vegetables, soft drinks and beer. Many of these foods are typical foods that get are produced by the harmful agricultural structures that have been implemented in Malaysia and the Philippines from which many imported foods in the Pacific region come from and also many are processed foods with soft drink and beer this is obvious, but also canned meats and canned fruits and vegetables are generally processed foods. So, I would like to add to that there is probably also a substantial increase in the consumption of unhealthy commodities such as processed foods.

I thus conducted a literature review to see how much processed foods and such were consumed and I came across interesting data from Wendy Snowdon and others (2013). Snowdon and others (2013) made clear through a graphic representation that the processed foods that are consumed in the Pacific are largely imported from the U.S.A. This graph can be seen in the appendix in part A.15

This graph makes it clear that transnational/multinational companies and mainly those from the western countries such as U.S.A., France and Australia are active and have a large market share in the Pacific region.

However there is more relevant data from Snowdon and others (2013) which includes their figure that shows the number of products in several sub-categories of processed foods.

This gives an impression of what types of processed foods are being consumed in those countries.

As you can see from this figure there is a large amount of sauces and biscuits available in the Pacific region. This of course does not have to imply that these products are being consumed more than other products. But if there would be no demand for such products then there would not be such a large offer of these products.

Curtis (2004) argues that there is more consumption of canned meats rather than natural meats this will most likely also affect with the amount of calories that are being consumed; packaged meat such as sausages are generally high in fat and these fats, are generally not healthy fats that can be present in meat such as CLA or omega 3.

Snowdon and others (2013) describe the mean average fat content of sausages in the Pacific region and from analysing this figure; you could say that the content of these sausages on average in the Pacific is roughly around 15-20%. Grass fed beef which could perhaps compare with the local meats that have been eaten traditionally would contain around 12g per 100g of fat. But if the Pacific islanders would generally consume more poultry or wild game, then that amount of fat would be even lower. So the amount of animal fat would have increased slightly and I do think that this plays an important role, but then again you could argue that these people traditionally were eating fresh fish which would also be high in fat, so it might be more of a quality of fat issue.

Snowdon and others (2013) mention that the saturated fat consumption in general is part of the problem, but I believe that if you take into account the fact that traditionally coconuts have been consumed in these areas as well as animal meat and fish, then the traditional diet would thus have been relatively high in saturated fats. It should be noted that saturated fats from coconuts, wild meat, fish and nuts are generally considered as healthy fats, but I think the shift in diet consisted mainly of a significant increase in calories and

carbohydrates and an increase in omega 6 fatty acids that came with a drop in omega 3 fatty acids which would increase inflammation and lead to all kinds of diseases. But also it is likely that the amount of fat consumption increased slightly and this with all the other changes would have also led to a significant increase in calories.

Furthermore, if you consider the study of Cordain and others (2002) who investigated the diets of Eskimos and other groups of people that have traditionally had diets high in fat and protein and were free of non-communicable diseases such as obesity and diabetes. Then the most important macro nutrient would most likely be carbohydrates.

This can be seen back in the literature of Snowdon and others (2013) who also analysed the sugar content of sauces this content is relatively high. In the table of Snowdon and others (2013) that can be found in the appendix in part A.17 you can see that on average tomato sauce/ketchup contains around 20g/100g of sugar. This is very high and if you take into account that according to Curtis (2004) the population consumes other products such as rice, flour, sugar and canned fruits which usually have added sugar as well. So most likely the carbohydrate and sugar consumption of the population has increased substantially.

So most likely carbohydrate consumption and the increase in calories; play a very important role in the epidemic on the Pacific islands. You should still consider that if thrifty people consume substantially more calories than they have done so in previous generations, then this could also be related to the high numbers of diabetes and obesity. Also carbohydrates were most likely relatively rare in the traditional diet which would be higher in protein and fat. So the quantity, quality and type of the food play an important role.

The Pacific Islands, just like Mexico offers a very clear case study what the effects of monocrop consumption and processed food consumption have on a population with thrifty genes. These monocrops and processed foods are directly influenced by the “Green Revolution” on the Philippines and Malaysia, so there is definitely a relationship between the

epidemic on the Pacific islands and the “Green” Revolution. So now that relationship has been made clear I would like to focus on further describing the structure in the Pacific Islands.

The Pacific Islands structure is a complex structure, agriculture is difficult in these areas. So the region is not directly affected by the “Green Revolution”. Yet being important dependent of many of the countries that have been affected by the “Green Revolution” has significantly shifted the diets of Pacific Islanders as can be read in the article of Curtis (2004).

Furthermore, it is clear that processed foods from transnational companies are also inflicting much harm on the population. The WHO (2010) quoted Doctor Waqanivalu who stated the following:” Promotion of traditional foods has fallen by the wayside. They are unable to compete with the glamour and flashiness of imported foods.” Clearly the marketing and packaging of transnational food companies is also very appealing, but these foods can be harmful and this has led to diabetes and obesity in many regions through an increased consumption of unhealthy commodities. However, despite all of this I do not believe that the “Green Revolution” and the processed foods of the transnational companies are the only cause of diabetes in the Pacific Islands, from a post-colonial perspective one should also take into account some specific factors that are relevant for that area.

I believe that it is important to mention that there are also cultural and socio-economic factors that are partly to blame to the diabetes epidemic and these cultural and socio-economic factors also cause violence.

With the socio-economic factors it is quite clear that this is the product of violence. According to Fitzpatrick-Nietschmann (1983) native Pacific islanders are treated as second-class citizens similar to how Native Americans are treated in the U.S.A. and this among other factors contributed significantly to several serious problems that are experienced by the

native population. For example according to the World Bank (n.d) one out of three households in Samoa could not meet their basic needs. This article from the World Bank is from around 2000-2002, but I could not find a specific date, my apologies for that. On a related note, the World Bank (n.d., p. 4) states the following: “The 1996 survey of Tarawa found that: “Many aspects of poverty that are common in the Pacific. Many households live in badly overcrowded conditions with poor basic services, are increasingly dependent on cash incomes, most of which is spent on food, but include few adults with paid jobs.”

Additionally, the World Bank (n.d.) states that: “Unemployment and social problems are increasing in many towns, environmental conditions and health are deteriorating, inequality in access to income is growing, and evidence of poverty, vulnerability, and hopelessness is increasingly visible among the underclass of landless urban poor.”

From these quotes of the World Bank (n.d) that I cited, you can clearly see that there is a lot of inequality in the pacific islands which by itself is violence and a breach of human right article 1, because all humans are born equal but that is clearly not the case in some Island nations and that people are dependent on cash incomes and this is largely spend on food. This scenario really explains to a large degree the scenario that has been sketched by Evans and others (2001).

According to Evans and others (2001) the situation in Tonga which is one of the pacific Islands is not just a health-related issue, but it is also an issue that is related to economics. According to Evans and others (2001) in general the Tonga prefer the traditional food over imported foods such as mutton flaps, bread and other products, the Tonga still continued to eat the less preferred imported food at a higher rate. Evans and others (2001) also investigated whether the Tonga were sophisticated about nutrition and this was the case. So the Tonga population is well aware of which food is healthy and which food is not healthy. Yet Evans and others (2001) state that:” Despite the success of education programs

in increasing awareness of what nutritional foods contribute to a healthy diet, Pacific Islanders nonetheless choose to eat foods with “dubious” nutritional value because of cost and availability. In other words, “they make economically rational, but nutritionally detrimental decisions to consume certain food.”

Then this could indicate that because processed foods and other unhealthy commodities such as bread, rice, canned fruits and other products that are currently consumed by Pacific Islanders, are merely consumed because they are cheaper and this is related to the fact that native Pacific Islanders get less social and more importantly economic opportunities as non-native islanders. I would like to elaborate on the fact that the Tonga population is aware of what healthy foods are and what are not; because this is related to another social-economic factor that could arguably contribute to the development of diabetes.

It is logical that the Tonga know which food is healthy because both according to the article of the WHO (2010) and Curtis (2004) schools educate the students about nutrition. However, in the article of the WHO (2010) Ateca Kama who is a senior nutritionist at Fiji’s national food and nutrition centre; schools not only educate the children about good nutrition, but they also sell junk food in the school canteen, because they need to make a profit. So this double standard of schools due to their economic mind-set to make a profit can also be considered to be an important factor that contributes to the obesity and diabetes epidemic.

Another factor that could partially explain this behaviour of the Tonga’s beside socio-economic factors is the physical and psychological factor of food addiction. If you take into account that not only sugar can be addictive as argued by Avena and others (2008), but that junk food and processed foods in general are possibly addictive. According to Ifland and others (2009) who researched refined food addiction: “their findings are sufficiently compelling to warrant further basic and clinical research.” Personally, I believe that it is

likely that these foods are addictive, but it is a very attractive hypothesis because it would largely explain the overconsumption of these foods.

Also there is another theory that can help with explaining the overconsumption of processed foods and food in general and especially by certain people and populations, which is the theory that genetic predisposition can affect taste preferences. Dotson and others (2012) reviewed the literature on this subject and argue that it is likely that taste preference is partly caused by genetic predisposition and that these taste preferences could explain some of the consumption behaviour of people. Taste preference and genetic predisposition is still a relatively new concept, but it could perhaps be combined with the thrifty genetics theory. Dotson and others (2012) argue that taste impacts food selection, and food intake also impacts the nutritional status. The taste of food is a major factor in determining food selection. From infancy, we derive pleasure from sweet foods and have an innate dislike for bitter-tasting foods. This pleasure from sweet food and dislike for bitter tasting could explain why we prefer eating sweets rather than vegetables, also many of the monocrops that produced nowadays are relatively sweet such as corn, wheat flour, rice and sugar. It is likely that corporations are aware of this fact, because they have been increasing the sweetness of added sugars over time as I have explained in the paragraphs on the United States where I explained the article of Laidler (2012). So food addiction as well as a natural preference for sweeter foods could also explain the fact that the Tonga's consume certain foods while they are fully aware of the consequences, but they cannot resist the sweet temptation of certain foods. This factor is surely interrelated with the fact that schools sell sweets and other processed foods in order to make a profit. Exposure at a young age to these foods could create food addictions, but even if they are not addicted their taste preference will most likely influence to opt for the sweeter options.

However, there are other important social and cultural factors why Pacific Islanders are generally more likely to develop obesity or diabetes. Furthermore, this is arguably part of the structure in the Pacific Islands but it can also be seen as cultural violence, either way both are heavily intertwined. According to Curtis (2004) culturally speaking a large physical size is considered a mark of beauty as well as a mark of social status. This cultural value perhaps has to do with the fact that an abundance of food was generally rare and food could even be scarce on the island at times so people that get big are seen as healthy people that are more likely to survive.

This cultural value is a strong contrast to the western obsession of being skinny which is explained extensively by Jane Kilbourn (2004, 395) states in Fallon and others (2004) that: “The current standard on excessive thinness for women is one of the clearest examples of advertising’s power to influence cultural standards and consequent individual behaviour”.

So in the Pacific Islands the cultural standards generally consider overweight as a good quality. It is possible that this view is slowly starting to change due to the influence of western media which has caused an internationalization of the thin body type as ideal as argued by Roberts and others (2006), but I believe that still in many parts of these islands these cultural values are held strongly, but that is something that I will have to research in person.

Because according to Russel (2009) overweight and obesity are the main causes of health problems in the Pacific Islands. Russel (2009) mentions that in some countries such as Tokelau and American Samoa over 90% of the adult population has overweight or obesity. I believe that these statistics would not be so high if there would be an obsession of being skinny as occurs in the west. Although, I believe that obesity might not generally be a healthy characteristic, I do not think that overweight is necessarily harmful

I would like to argue that overweight is not necessarily bad and one can be perfectly healthy while being overweight, but if almost half of the population suffers from non-communicable diseases such as diabetes then this should not just be considered as being overweight and this means that there might be other factors such as lifestyle characteristics and diet that are leading to these health problems.

For example, it is possible that with the traditional diet people could become overweight and be perfectly healthy; since the traditional food would not affect insulin sensitivity as strongly as the consumption of monocrops and processed foods would do. Then overweight would generally be caused by an excess in calories and this would be stored as fat, but this would not be the same storage of fat as when excessive amounts of fructose are being consumed and fat stores up in specific areas.

However, as I mentioned earlier the problem is more complex than that when you take into account that the Native Pacific islanders are being treated as second-rank citizens. The heavy import dependency surely has affected the local food market and because of this traditional food is relatively more expensive as well as the fact that Pacific islanders might have less economic opportunities and are thus not capable of purchasing the traditional food which is not as detrimental for their health.

Also if a Pacific Islander wants to be considered beautiful which in this specific cultural setting would mean being overweight, then this Pacific Islander due to socio-economic factors has to generally consume monocrops, junk food and other processed foods to achieve that. And this consumption pattern will surely have a negative effect on their health.

So, I do not want to argue that their cultural standard should be changed since I do not only perceive this as a cultural violence as how Galtung (1969) would define it, but it would also not necessarily solve the problem, because even if you change the cultural standard,

pacific islanders would still consume unhealthy commodities because they do not have the social-economic opportunities to purchase the food that they prefer. It would perhaps be better to limit the consumption of unhealthy commodities and monocrops and increasing the socio-economic opportunities of pacific islanders.

A final factor that I want to elaborate on is the access to healthcare. According to Curtis (2004) most pacific islanders have access to healthcare, but also most of those who have access to healthcare do not take advantage of the service. According to Fitzpatrick-Nietschmann (1983) this is mainly because of two factors. The first factor has mainly to do with cultural differences. Fitzpatrick-Nietschmann (1983) argues that the Western view on health is that of individual responsibility. The medical profession or the state in the west generally does not drive the behaviour of individual choice. Fitzpatrick-Nietschmann (1983) argues that this is a cultural imperative that pacific islanders may not share.

Pacific Islanders like many indigenous cultures will most likely not think as individualistic as people think in the West. They possibly hold more value to collectiveness rather than individualism.

The second factor that is mentioned by Fitzpatrick-Nietschmann (1983) is due to socio-economic barriers that prevent proper medical care for Pacific Islanders. As I have mentioned earlier pacific Islanders are treated as second-rank citizens and in many cases they do not even have the economic opportunities to consume the traditional foods that they prefer. Also as has been argued by Bloom (1986) there is little money for rural health needs as well as a scarcity for trained health personnel. As this article Bloom (1986) and Fitzpatrick-Nietschmann (1983) are old, I searched for a new article to inquire whether the current situation is different from in the past.

This does not seem to be the case, according to Russell (2009) who also argues that the rising prevalence of non-communicable diseases such as diabetes which have become the

leading causes of death in these Pacific Islands, but are also the most significant challenge that the healthcare services are currently facing.

Furthermore, Russel (2009) argues that there are limited funds available that support the delivery of public health and the health care services and the training and ongoing professional development of the health workforce. Russel (2009) argues that most health expenditure for non-communicable diseases falls under tertiary care. Tertiary care is defined by John Hopkins Medicine (2015, online) as: “Specialized consultative care, usually on referral from primary or secondary medical care personnel, by specialists working in a centre that has personnel and facilities for special investigation and treatment. (Secondary medical care is the medical care provided by a physician who acts as a consultant at the request of the primary physician.)”.

So tertiary care mainly involves highly specialized medical care, but non-communicable diseases are generally preventable from a functional medicine perspective such as that of Hyman (2012). Russel (2009) mentions that there is very little funding available for prevention; prevention is of essential importance when dealing with non-communicable diseases such as diabetes. In addition to that Russel (2009) argues most funds for prevention activities come from external sources.

However, the lack of healthcare does not only come from the funding, but also as Bloom (1986) mentioned because of the fact that there is a scarcity in healthcare personnel Russel (2009) also mentions factors that indicate this scarcity of healthcare personnel. Russel (2009) says that the number of physicians in most Pacific islands is very low and that these numbers of physicians per 1000 inhabitants is on a similar level as countries such as Myanmar, Nepal and Cambodia. Furthermore, Russel (2009) argues that the Pacific Island countries are at a disadvantage in competing with wealthier countries in terms of training,

recruiting and retaining the skilled workforces. So this would mean that Pacific Islanders that become skilled doctors are likely to pursue the job opportunities in wealthier countries.

Russel (2009, p. 22) sums up that the major challenges that in the health care are the: “shortage of staff and uneven distribution of the health workforce due to geographical factors, the aging of the health workforce, gender issues which affect workforce participation, insufficient production of health workers, which is also related to insufficient investment in training institutions, loss of staff due to dissatisfaction with working conditions and environment, and inappropriate recognition and remuneration for health workers”

So if you would take into account all these social, cultural and economic factors; such as the fact that pacific islanders have thrifty genes according to Martorell (2005), they are treated as second-rank citizens, many islands have difficulties with agriculture due to environmental factors which makes the countries more import-dependent, furthermore many households are cash dependent and consume the cheaper imported foods from the green revolution, processed foods and other unhealthy commodities that may even be addictive rather than their preferred traditional food. Also healthcare does not focus sufficiently on preventing diseases and much of the budget goes to expensive specialists. Qualified physicians are likely to pursue opportunities abroad due to several factors. And finally there are cultural factors that prefer big people over small people which would stimulate some people to consume large amounts of food.

All of this makes the structure of the Pacific Islands a very complex structure, but I believe that if one would want to prevent the rise of non-communicable diseases this structure should be properly understood and then it should be transformed, also more efforts to prevent non-communicable diseases should be made.

Discussion, Limitations, Conclusion and Recommendations for further research

Discussion

Diabetes is a serious non-communicable disease, but I would like to argue that we can never prevent the disease if we look at it solely from a western health perspective that argues that health is the responsibility of each individual. There are definitely structures in place that negatively affect the health of individuals. I am not a big fan of nation states, but I would like to state that in the current system, the government of nation states should be more responsible for its citizens as well as the inhabitants of other nations that are directly or indirectly affected by individuals, organizations and corporations that are from that nation state. We should really question ourselves whether following the path to economic profit is really the right way, as non-communicable diseases seem to be adverse side-effects that are caused by the mindless pursuit of economic profit. To me there seems to be a clear relationship between harmful structures and the incidence of non-communicable diseases.

Diabetes and other non-communicable diseases in my opinion can be seen as indicators of structural violence. Diabetes can be seen as a manifestation of violence and this violence can be traced back in order to identify the actors and/or structures that are responsible for this violence. Diabetes has started becoming an epidemic in the “west” which is why I first focused in this dissertation on analysing the structures that have caused diabetes in the West.

The problems of diabetes experienced in the “West” seemed to be the most prominent in the United States of America; which is why I analysed the situation further. I came across the article of Hyman (2012) who mentioned clearly how Big Pharma, Big Farming and Big Food are largely responsible for the non-communicable diseases diabetes and obesity. Because I want to address many things in a single dissertation, I decided to focus largely on

big farming and also partly on big food. The arguments of Hyman (2012) were logical, but lacked support from academic sources. After analysing the literature as well as the crops from the farm bill, there was clearly a relationship between the agricultural policies in the United States and the diabetes epidemic. The American agricultural system seems to be largely dedicated to providing raw material for processed foods and mainly in the form of cheap monocrops for which a link to diabetes can be established for all of these crops except for cotton, which is used to manufacture clothes.

The relationship with diabetes for the crops corn and sugar was quite clear. However, when analysing these crops in greater detail, it became more evident that these crops are related to diabetes in many ways as well as the fact that there is a lot of violence related to the consumption of these crops. Namely, mental violence such as the discourse about fructose which gets promoted as the sugar that is naturally present in fruits and for this reason it would not be so harmful. This statement is not only ambiguous, because glucose and sucrose are also present in most fruits as well as other types of sugar. But it is also far from the truth that fructose is healthy. Research from Bocarsely and others (2010) clearly showed how fructose is related to diabetes however, false discourse regarding fructose are hold intact by organisations such as the corn refiners association and these discourses are most likely strongly situated if the situation in the United States is similar as in Spain where I conducted a short field research and found that fructose is being marketed as something healthy while it can actually be very harmful considering that we generally overconsume fructose. This can even be seen in Spain where I am studying. Where certain products are very high in fructose and on the label it says that these products are diabetics friendly, while most likely they will worsen the situation significantly.

Fructose consumption seems to be one of the main causes of the diabetes and obesity epidemic in the United States. Also, there is a high likelihood that many of the products that

contain HFCS or sugar are addictive in nature and could be related to binge-eating disorders and other eating disorders. Also, HFCS and sugar are processed into many types of processed foods including some foods that are normally unlikely to contain such substances. Also, palatable food in general under which processed foods surely falls, are expected to be addictive as argued by Ifland and others (2008)

Furthermore, even crops that have a healthy image such as wheat and rice have actually contributed significantly to the diabetes epidemic. These foods have a high GI as well as high carbohydrate content. Also there is a trend of consuming these foods more and more in their refined forms which reduces the fibre content in the food and this is also strongly related to the development of diabetes. As can be seen in the graph of Gross and others (2004) there seems to be a clear relationship with the decrease in fibre consumption combined with the increase in carbohydrate consumption and the development of diabetes. Also cereals as well as legumes seem to be related to auto-immune diseases among humans as argued by Pruimboom and Punder (2013). Soy and dairy are also controversial foods. Soy in many ways seems to be toxic as was even argued by two of the top scientists of the Food and Drug Administration, yet nothing seems to have been done with their protest. There seem to be many factors such as the reduction of bio-availability of minerals and such that would make soy harmful, as well as many other legumes and cereals that contain large amounts of phytic acid and other harmful compounds. Many minerals such as zinc and magnesium play an essential role in the prevention of diabetes as well as the overall functioning of the human body and deficiencies of these minerals can occur through soy consumption despite the fact that the product is very high in magnesium. Also infants are actually exposed to a very high degree to these compounds and this could perhaps also lead to type 1 diabetes, but also many other diseases and could arguably even influence personality due to an over exposure to phytoestrogens.

Also soy consumption has been related to thyroid dysfunctions which “western” science tries to solve with artificial iodine supplementation, which has most likely led to auto-immune diseases such as the Hashimoto thyroid disease which is relatively common in the United States. The fatigue that is caused by dysfunctionalities that are related to the thyroid levels can be related to diabetes. As well as it would make some of the symptoms from which diabetic people suffer from worse.

Dairy in many researches is praised as food that can help with the prevention of diabetes and this discourse especially mentions the low-fat variant. This research is very debatable since dairy has properties that stimulate the insulin production in humans. So especially the low-fat dairy that contains lactose a milk sugar, insulinotropic properties and that is low in fat would likely induce insulin resistance that will lead to diabetes. Furthermore, dairy consumption by infants is most likely related to type I diabetes.

Also it should be noted that cows suffer from diabetes because they are fed with corn and cereals and other commodities that are unnatural for them to eat. In order to stop the manifestation of violence from these agricultural policies then dairy and meat consumption from animals that have been fed with these commodities should be stopped. I believe that all structures that cause diabetes and obesity should be deconstructed and this includes structural violence towards animals that manifests itself as diabetes and obesity.

Thus in general all crops on the farm bill seem to serve mainly the interests of the food industry as well as all of these crops except for cotton can be linked to diabetes. In addition, to that there are simplistic discourses regarding fat consumption in place which could be one of the major factors that could reduce the effects of this diabetes and obesity consumption.

The very existence of these discourses is arguably to promote the consumption of the monocultures which are heavily subsidized. In addition, to that it gave rise to a large

consumption of poly unsaturated fatty acids such as canola and sunflower oil which are cheap and easy to process. I am not certain about it, but the substances that are used by companies are generally promoted through health-related hegemonic discourses, while much of the actual science on these substances is not in line with these discourses.

These substances all have in common that they are easily processed into products of the food industry and form an adequate base to be transformed into palatable refined products of the food industry. This is just my personal superstition, but I believe that further research into this is necessary.

For example, why are there so little subsidies for fruits and vegetables? Fruits and vegetables, which are considered to be healthy by hegemonic discourses since ancient times, yet they are not subsidized to the extent of vegetal oils, monocrops and dairy. I believe that this is simply due to the fact that it is not in the interest of economic organisations and companies to have these products as the main staple of the diet.

The structure that is existent in the United States has clearly been identified as harmful, where certain crops which can be linked to the development of diabetes are the crops that are subsidized the most. Some people might argue that you could link every food type to diabetes. However, I would have to disagree, fibrous vegetables that are relatively low in calories but high in fibre will be extremely difficult to link to diabetes.

Also the extent to which these substances can cause diabetes as well as the interaction of certain nutrients with others should be taken into account. For example, low fat dairy which has insulintropic properties that is processed into ice cream that also contains sugar or HFCS will surely be heavily correlated with the development of diabetes due to it being high in sugar or HFCS, the dairy has insulintropic properties and the food is low in fat and fibre. While a meal that consists of fruits with some walnuts which for example also has glucose and fructose, but is also high in fibre and in healthy fats will be significantly less likely to

lead to the development of diabetes. The low-fat discourse can in this aspect thus be very harmful and contribute significantly to diabetes.

As mentioned before the subsidized monocrops usually serve as raw materials for processed foods. Corn for example is generally a raw material for HFCS, while wheat serves often as the base for flour to make bread and pastries. In the United States diabetes and obesity are very common and it is clear that the consumption of processed foods also plays an important role in this.

Furthermore, despite being perceived as one of the richest nations in the world, In the United States there is a significant amount of inequality; many people do not always enjoy the same opportunities to consume healthy foods that are not subsidized to the extent as that of monocrops are subsidized. This makes these monocrops and the processed foods for which these monocrops serve as raw materials as a cheap option and for some people these cheap options are the only options. This difference in economic equality can also be seen as structural violence and this violence often manifests itself in differences in income, but it can also play an important role in the manifestations of diseases such as diabetes. In relation to that, the ineffectiveness of the American healthcare system also clearly illustrates a significant amount of inequality. It is clear that low and middle-income families are more likely to suffer from diabetes than high income families.

My goal of discussing the United States was to demonstrate how structures that are formed by agricultural policies and economic interests can become structures that cause structural violence. In addition, to that the model of the United States is representative for many of the agricultural models that have later been applied in other parts of the world. The United States as well as other “western” nations have exported or in some cases even imposed their ideas on agriculture and liberal economics/capitalism.

The spread of these models has led to structural violence in many regions in the world and part of this violence has manifested itself in the form of diabetes, hence why diabetes is a problem in many countries as well as why this non-communicable disease has gained the status of epidemic, while it is in fact not a contagious disease.

As argued by Gale (2002) type I diabetes has been a cause of structural factors that have changed the environment of our children. The same can be argued for type II diabetes according to Shiva (2014) and Hyman (2012), but has hopefully also been made clear in this dissertation.

These structures are being applied globally and this has serious consequences for the overall health of humanity. I have tried to demonstrate the effects of these transformations of structures through case studies where I feature societies that in the past have been relatively free of diabetes and had a traditional agricultural system, did not consume unhealthy commodities such as processed foods and these societies were later transformed by the implementation of agricultural policies that are similar to those in the United States and/or because of the consumption of unhealthy commodities of processed foods.

Also I have used the theory of Martorell (2005) combined with these structural changes that have occurred so much more rapidly in these countries as in the “west”. These factors result in more structural violence due to their rapid implementation and the existing genetic differences between populations over the world. These genetic differences are generally a good thing, because they are a result of adaptations to certain environments.

However, if the environment changes so rapidly that these populations cannot adapt to it, then the consequences of this in the case of these structures that cause violence that manifests itself as structural violence then the consequences of the implementation of these policies, consumption of these foods that differ dramatically from the traditional diet cause dramatic consequences that create a cycle of perpetual violence that becomes reinforced

because of the fact that mother who have gestational diabetes generally increase the risk of their children to have diabetes and all of this in an environment where these people due to different genetics generally develop faster.

As a result large amounts of these populations get diabetes and this faith is partially determined by birth. This is in my opinion one of the most extreme cases of structural violence, because these people due to the fact that they will develop diabetes will never be able to reach their full potential. According to Galtung (1969) violence occurs when there is a difference between the potential and the actual and this is clearly the case in these countries. The violence is unavoidable with today's knowledge but for this the structural violence in these areas has to be deconstructed and then be positively reconstructed so that these people can reach their actual potential.

To illustrate these changes in structures and the violence that they have caused I followed a somewhat historical order. First I directly gave the example of Mexico which was one of the first implementations of these structures. The case of Mexico is similar to many of the other implementations, but Mexico occurred earlier than the other cases and this was slightly before the World Bank played an active role in this. The case of Mexico has largely been a project of the Rockefeller Foundation and the Mexican government.

Being one of the first countries where these structures where implemented, the manifestations of violence in Mexico are already becoming very clear. By using the theory of Martorell (2005) as well as the research of Sanchez-Castillo (2004) the changes that these structures have resulted in are already starting to become very apparent.

The country transformed from a country where undernourishment occurred in many regions of the country, to a country where the levels of obesity and diabetes are among the highest in the world and this is probably only the beginning of the obesity and diabetes epidemic that is occurring in Mexico. The future is estimated to become a lot worse.

Mexico serves as a clear example of a change in structure due to the change in the agricultural system as well as the market penetration of transnational food companies as well as native companies that have started selling more and more unhealthy commodities. These factors that have changed the structure of the country much faster than in the “west” combined with the genetic predisposition as well as the fact that many people have experienced food scarcity during their childhood and thus according to Martorell (2005) would be more susceptible to develop obesity and diabetes. This susceptibility with the rapid change in the diet has reinforced the diabetes epidemic. This epidemic becomes a negative spiral where gestational diabetes during pregnancy increases the probabilities of future generations to develop diabetes as well. Childhood type II diabetes which in the past was seen as a disease for adults in their 50’s is more and more frequent developed by children and adolescents. The situation in Mexico is alarming, especially if you consider that in the future the crisis will increase significantly in both scale and severity.

After discussing the situation in Mexico, it was necessary to first explain how the World Bank has modified slightly the model for Mexico and introduced it to many other countries in the world. These transformations of agricultural systems all over the world were defined as the “Green” Revolution.

Many countries as well as scholars see the “Green” revolution as one of the best ways to deal with the hungry in the world as well as to reduce poverty. The “Green” Revolution gets often mentioned along with the millennium goals. Thus the World Bank and the Rockefeller Foundation, both mentioned in public documents how they were afraid of communism from spreading, addressing the needs of the peasants was of vital importance according to them to stop communism. The “Green Revolution” spread through South-East Asia and Latin America and the implementation failed largely in Africa.

Personally, I would argue that these implementations were a failure. The World Bank has changed the agricultural system, but it did not solve hunger and poverty despite the fact that much more food has been produced. Furthermore, it severely increased the risk of developing non-communicable diseases such as diabetes. It did not solve the problems. I believe that the failure in the World Bank investments is partly due to the focus on capital accumulation as well as their top-down approach. Meaning that they hired all kinds of technicians and so called “Experts” and “Specialists” from large international organisations, but they failed to incorporate the views of locals into their guidelines and thus their policies as well as the implementations. For example, the LRAN (2014) argued that the World Bank did not even consult the locals and not even the local government when creating the guidelines when they tried to change their policies after the food crisis that occurred in 2007.

I believe that any measurements designed with such a poor communication-structure will generally not generate optimal results. The World Bank in my opinion should have engaged in a type of trans-modern debate with a large variety of stakeholders. However this debate should have first focused on creating the guidelines before even discussing investments and implementations of policies.

As a person that has studied International Business Administration, I would argue that even from a business perspective the World Bank has failed, because they do not sufficiently take into account the needs of the customer which in this case would be the farmers, hungry and needy. It is like developing a service without even properly analysing the demand for this service. Surely you can argue that the people are hungry and that the demand is food and ways to cultivate food, but this is too simplistic. It is this simplicity that has led to a system where monocrops that are considered to be unhealthy both by my personal research where I draw from various studies from the field of health and nutrition which I extensively discussed

in the paragraphs about the situation in the United States as well as by scholars such as Vandana Shiva (2014).

Thus, I would argue that the World Bank even from a modernistic business perspective has used a dubious approach and even more so from a trans-modern perspective. Trans-modernity in my opinion is necessary to properly address these issues. Grosfoquel (2006) argues that post-modernity still reproduces a form of coloniality. A trans-modern approach is necessary in my opinion to properly address matters such as agricultural policies in foreign countries, if not it imposes a form of coloniality where you are trying to develop the other. You cannot expect to impose your own ideals everywhere in the world just because you have incorporated so called experts and technicians and assume that your measurements will be successful. Are the locals perhaps not the people with most expertise on these issues as well as the people that will be affected the most by changes in policies and in the agricultural systems? I see it as utterly inconceivable to not have addressed the locals and to not have engaged in a dialogue with these people in order to find a suitable approach. And the most suitable approach could very well be no implementation of the “Green Revolution” whatsoever. But perhaps the World Bank had other objectives than that it publically stated and their approach was very successful for them or certain specific actors.

In addition to these half-fetched approaches of the World Bank, there are also corporations that should be taken into account. Multinational/transnational food companies have sought to increase their market shares in these new markets and the market penetration of these companies seems to be related to the consumption of unhealthy commodities as well as the rise of non-communicable diseases such as diabetes. Also, one should not only take into account the unhealthy commodities of multinationals, but also the production of unhealthy commodities by native companies. Investments in these countries as well as initiatives from within these countries and the opportunity for obtaining credits have

significantly changed not only the agricultural system in many countries but have also changed the food industry in these countries.

These native companies understand the local market often better and thus it is not surprising that native companies are often market leaders in the processed food markets in these countries. However, the effects of processed foods on the development of diabetes are quite clear, these products generally have refined sugar or HFCS added to them. In addition to that the Glycaemic Index of Processed foods is generally higher than that of unprocessed foods. Finally, processed foods are generally high in calories due to oils of poly unsaturated fatty acids. Also, it can be argued that these foods are generally addictive and unfortunately for some people they are the only options, since processed foods are usually made out of the cheapest materials which also happen to be subsidized.

Ok then, so what is the effect of this structure where the former agricultural systems have changed and a model that is similar to that of the United States has been implemented, combined with an increase in sales of processed goods by both domestic companies as well as multinational companies on diabetes?

To answer this question, which is basically clear because of the Mexico case, but I also wanted to illustrate the effects with different case studies to strengthen my argument. Firstly, I used the example of India which was one of the major countries that was affected by the “Green Revolution”. In many parts of India the former agricultural structure has been changed and a new structure that was largely funded by the Rockefeller Foundation, the Indian government and the World Bank has been put into place. Indian people have become very dependent on these new monocrops because the formerly existing agricultural system has been transformed, According to Shiva (2014) these monocrops are very harmful and lead to all kinds of diseases including diabetes.

Furthermore, the amount of consumption of processed foods is increasing dramatically in India. For example, soft drink consumption per capita at one point was going up with more than 200% per year. Both domestic companies as well as multinational companies have a large share in the Indian food market. This combined with the increasing amount of consumption of unhealthy commodities, would partially explain the increasing number of people that obtain diabetes. Also in India the amount of people with type I diabetes is rapidly rising; this could be due to the fact that GMO rice and wheat are more likely to cause auto-immune responses. But it could also mean a shift in diet where babies are nowadays fed foreign proteins at a younger age than was historically the case. Furthermore, it is important to state that Indian people in general suffer more from diabetes than in the United States. This is represented by the number of death due to diabetes, which in India is among the highest in the world. The epidemic in India is still only beginning and the consumption of unhealthy commodities is still relatively low, but it is growing at a rapid pace and this could lead to a similar situation as Mexico. I believe that diabetes will become a serious problem in India, perhaps not as serious as in Mexico, but there will probably be many similarities between the two countries.

After India, I discussed the Pacific Islands where diabetes is a very serious problem. Some of the Island nations in this area have some of the highest rates of diabetes with over 40% of the adults that have diabetes. The structure in the pacific islands is a bit different than in India, Mexico and the United States.

Agriculture is difficult in many of the island nations and these nations are generally dependent on the import of food products. The structure that causes diabetes is quite complex in the pacific islands, but the rise in diabetes in these countries is mainly due to the high consumption of processed foods. For example, in the past natural foods were imported as

well, but lately more and more processed foods are being imported and this is evident when reading the article of Curtis (2004).

Numerous amounts of processed foods can be found in the shelves of Pacific Islands. Also surveys indicated that even though many Pacific islanders are aware of the harmful effects of the consumption of processed foods they still chose to consume them despite the fact that the majority points out that they prefer eating their traditional diet. This is most likely related to the fact that the native Pacific Islanders are treated as second-rank citizens and because of this they do not enjoy the same economic opportunities as for example white residents of these islands.

This socio-economic inequality is apparent when you consider that in several Pacific island nations, many households cannot meet their basic needs. Also because agriculture is difficult and the economies of these countries are becoming even more import dependent. The poor people are generally cash-dependent and need to consume imported foods and since they do not have a lot of resources to buy food; they will be more inclined to consume cheap processed foods compared to quality food that will benefit their health. The Pacific Islands are a clear example of how structural changes as well as an import dependency can lead to the higher numbers of diabetes in populations.

Food Import dependencies have become more common at some point in history to countries where the “Green Revolution” has been implemented as is argued in the article of Kerssen and Holt-Gimenez (2015) who give an example of this dependency with the global food crisis and even before the food crisis there are numerous writers that state that the “Green Revolution” did not solve hunger.

These import dependencies are consequences of these structural changes of the “Green Revolution” that also have led to an increase in import dependencies. This makes the Pacific Islands a very good example, despite the fact that the “Green Revolution” has not

directly been implemented in this region. The situation for Pacific islanders is very dramatic since these health problems due to the consumption of processed foods combined with less physical activity have a significant effect on the life expectancy of these populations.

This is also partly due to the inequality as well as the cultural differences which result into the fact that Pacific islanders cannot access the healthcare or do not perceive healthcare in the same manner as the west. Furthermore, there is a serious shortage of qualified health workers in these regions; making diabetes even more harmful.

Also public policies focus not enough on prevention and large parts of the health-budget go to specialised and expensive tertiary services. All of these factors combined with the fact that it is culturally good to be big having led to a structure which results in a lot of obesity and diabetes. Also this violence is likely to perpetuate due to the rigid structure as well as the fact that gestational diabetes will increase the likelihood of future generations to develop conditions such as type II diabetes.

The case of the Pacific Islands clearly demonstrates what kind of effects, a shift from a traditional diet that consists mainly of natural food to a shift of a diet that is based on GMO monoculture crops that are high in carbohydrates and low in nutrients as well as the consumption of unhealthy commodities such as processed foods has. When analysing the structural violence around all the areas you can see a common general factor which is that of social inequality and poverty play a very important role in the development of non-communicable diseases such as diabetes.

I would argue that modernity that is promoted by the “west” is harmful in many ways. It changes the traditional structure of the system where people hunt, gather or cultivate foods for their traditional diets, which are generally healthy and do not lead to such a high prevalence of non-communicable diseases such as diabetes. However, society changes largely because of this exogenous influence of the “west” and in the case of Pacific islanders these

people became second-rank citizens due to colonialism and the settling of foreigners. So the islanders who originate from the area and their ancestors have lived there for centuries have become second-rank citizens and this is actually likely to increase the risk of developing diabetes.

Furthermore, there are other factors that have likely caused these extreme numbers of people with diabetes and obesity. Such as the thrifty genes hypothesis of Martorell (2005), but also the fact that childhood with food scarcity according to Martorell (2005) can increase the risk of developing a disease such as diabetes, because of the adaptation of the body in those early years.

If you combine this with the fact that the shift from a traditional diet to the consumption of processed foods is happening so much faster in these countries due to direct foreign investment and other factors. In India for example in just a year the consumption of soft drinks per capita went up with more than 200%. If the theory of Martorell (2005) holds then this would have detrimental effects for the Indian population and the prevalence of diabetes in India will shoot through the roof. Furthermore, one of the reasons that the consumption of processed foods is increasing so rapidly is the fact that poor have become much more cash dependent and in the case of the Pacific islanders people have usually not even enough income to support their basic needs, this people will have no choice but to consume the cheaper unhealthy commodities in order to survive, despite being aware of the fact that these products are unhealthy as this has explained well in schools. However these schools also sell junk food in order to make a profit. I believe that the effects of the transformation of structures and rapid changes of environments and how these changes and transformations have caused diabetes is quite clear.

But finally, I want to mention that it is possible that the States, Institutions and other organisations that have been the main driving force of the “Green Revolution” had good

intentions. However, the Implementation of their plans failed in many ways. Firstly, the beneficial effects of GM crops on health are doubtful; the crops mainly consist of monocultures as was mentioned by Shiva (2014). In addition to that the GMO model is unlikely to be sustainable and is ruining the soil of the earth as can be watched in *Dirt!* (2009) Furthermore, the companies focus on increasing the nutritional value of crops, but it seems that they have chosen the wrong crops to do so. Cereals and legumes are generally high in anti-nutrients such as phytic acid as I have explained earlier in this dissertation. So even artificially enriching rice will not necessarily increase the bio-availability of those enriched vitamins and minerals. Also the environmental effects and health effects of chemical fertilizers, pesticides and other substances are heavily debated. Many of the people that are in favour of the GM-Crops mention how cotton has been so great in reducing harmful insects and such as well as the reduction of pesticide use. However, the crop has been planted in large parts of the world without the exact consequences being known. Vadakattu and Watson (2004, p. 4) who conducted a research on the bt-crop which was funded by the Australian government and stated the following in their summary: “However, little experimental data (especially quantitative) is available on the environmental consequences of sustained expression and/or presence of Bt toxin in various parts of bt cotton plants. “ But for example in *Dirt!* (2009) bt-cotton has been one of the main causes that farmers went out of business and committed suicide in India.

So even if there is little quantifiable data available for the environmental effects of bt-cotton these crops can be very harmful to society in one way or another. However, despite the fact that cotton is one of the main crops promoted by the “Modern” American agricultural system, people do not eat cotton. So using cotton as an argument that gm-crops are safe for health and reduce pesticides is simplistic and not even very relevant when it comes to the consumption of GM crops. GM-crops have been implemented as well quite rapidly in many

parts over the world and there was little quantifiable data available on the long term effects on the consumption of GM-crops.

Limitations

There are several limitations; firstly I have not done my own empirical research. I have used empirical data and I have attempted to create case-studies to demonstrate my points, but of course I have been trying to prove my arguments through these case-studies and some field research. But I am not sure whether empirical research would have significantly improved my dissertation. I believe that due to time constraints, but also due to financial and geographic factors it would be quite difficult to have done proper empirical research.

Another limitation is my knowledge regarding diabetes and nutrition. I have read a great deal on the internet and in books about nutrition and I have followed lectures via Coursera (2014) on diabetes, exercise physiology and human physiology, but I would not consider myself an expert in any of these areas.

However, I plan to study physical therapy and thus human physiology after this master as well as nutrition in order to be capable of better addressing issues such as this. So currently, I am still lacking in knowledge, but if I will obtain a bachelor in physical therapy and a bachelor in nutrition on top of my bachelor in International Business Administration and hopefully this Peace, Conflict and Development master, I believe that I will be able to utilize multiple perspectives. But in the end I should also engage into debates with other people to enrich my knowledge.

I will be able to more or less understand the economic/business perspective, understand the health perspective and also this master has allowed me to view things from not only a peace perspective but also a more complete structural perspective.

However, I must admit that only studying will not make me an expert. I should also travel to these regions that I have addressed in this dissertation. Not having been there in person and not having analysed these areas and structures in person is also a great limitation.

Hopefully I can address these limitations in the future after more obtaining both more life-experience by traveling to these regions and more academic knowledge by studying more.

Another limitation is that I cannot know what the true motivation was behind the actions of the Rockefeller Foundation, national governments and the World Bank. It is possible that they wanted to prevent communism, as the former president of the World Bank, was secretary of the state in the defence department. Also the Rockefeller foundation also expressed some anti-communistic sentiments. However, it is also possible that their actions were those of good will with philanthropic motives or they were only interested in spreading capitalism so that specific actors could make more profit. However, it is dubious why they have implemented it like this and I believe that for philanthropic motives they have not taken the most effective method which from institutions that consider themselves rational would be strange. So it is highly likely that there were other motives in place.

Furthermore, the current agricultural structure that focuses mainly on producing monocrops can be, because of economic profits, but it can also be because of the ignorance of the effects of these high carbohydrate crops. Possibly policy makers believe that these crops are healthy. However, it is also possible that consumers prefer sweet crops and consumer demand has shaped the agricultural structure the way it currently is.

Also the discourses surrounding food consumption and nutrition are ambiguous after all and there are many different views. Knowing the truth in the field of nutrition is very difficult and I hope to get a little bit closer to that truth with studying nutrition.

Conclusion

After having given a summary/discussion of what I have written about in these dissertation as well as mentioning some of the limitations of my research I would now like to answer the main question and after that give future recommendations.

The main research question was the following: “How the economic and political structural factors behind agricultural policies and the related growth of the food industry cause violence that manifests itself in the form of diabetes in the United States and how the implementations of similar structures in other countries cause similar forms of violence?”

So the way that agricultural policies lead to diabetes is quite clear because; the essence of the farm bill is basically subsidizing certain commodities and for all of these commodities except for cotton which humans do not eat, a link to the development of diabetes can be established. Furthermore, many of these commodities are being processed into processed foods and these generally have added sugar or HFCS and also have a higher glycaemic index due to heating and other steps of the processing process. Furthermore, these products are generally enriched with poly unsaturated fatty acid oils which significantly increases the amount of calories that these processed foods contain. So the relationship between the consumption of processed foods and diabetes is also clear. I did not focus that much on discourses, but it is clear that hegemonic discourse regarding saturated fatty acids favours the production of the commodities of the farm bill as well as the cheap poly unsaturated fatty acids oil. So all these issues can be related to the development of diabetes and partially explain this crisis.

Also it seems likely that economic interests are shaping the very policies that have led to these structures. Most likely this influence comes from the food industry which most likely directly or indirectly affects politicians. In the case of soy policymakers ignore the protest of

two of their scientists and this could indicate a conflict of interest with that of the food industry and as a result this protest has been disregarded by the Food and Drug Administration. Furthermore, many of the crops that are on the farm bill are not very nutritious and some such as sugar can be clearly harmful. In some countries such as France there is a sugar tax on food products and many governments try to limit sugar consumption, but in the United States that has not been the case. Describing the structures has helped me to identify some of the structural factors that are behind the farm bill, but it is definitely hard to uncover all of what is behind these structures. Also we should look at the interaction with other forms of structural violence such as the access to healthcare which I only did in minor detail. Also the media, advertising and marketing of corporations clearly play an important role in supporting or causing this structural violence. I focused mainly on agricultural policies, but I have tried to also discuss in minor detail other structural factors.

Also there is definitely a clear relation with cultural violence as I have depicted and we should not just look at the severity of the structural violence, but also how it interacts with cultural values. Furthermore, it is possible that there is an overlap in the actors of both structural and cultural violence. For the United States it was already quite clear that the structures that I mentioned cause violence and much of this violence gets manifested as diabetes.

But, if similar policies are implemented in other countries combined with the consumption of processed foods; the effects are also similar or even worse due to genetic predisposition, different childhoods and the pace at which these changes occur. The driving forces behind the implementations of these implementations in other countries are generally much clearer. The Rockefeller Foundation, the World Bank, transnational and multinational corporations, the American government and also the national governments of the affected countries have played an important role have clearly played an important role in the

expansion of these structures. Also like in the case of the United States, it is likely that corporations had an economic interest in these implementations and changes as it would allow them to expand their markets and generate more profit.

It should be noted that in each of the countries the structures are different, for example in some countries consumption patterns are more affected by the marketing of companies that have targeted consumers in their childhoods. Other countries might suffer from structural poverty and these commodities are the only choice because they are cheap and the traditional agricultural system has transformed into a system that focuses on the production of raw materials. However, it is also possible that cultural factors lead to excessive amounts of eating; because in some cultures big is beautiful, which is not necessarily bad, but if this is done by consuming large amounts of processed foods from a health perspective this is unhealthy and can perhaps be seen as inflicting violence on yourself in a similar way as that of undereating or other eating disorders. Each case study was in a different stage of implementation and although much of the structural factors were similar, each country had different cultural and environmental factors that interacted with the structure causing different types of outcomes, but generally it is safe to say that generally speaking a lot of violence is experienced by people and animals all over the world because certain structures have been put in place.

Finally it is also very important to take into account the effect of gestational diabetes, which can give this diabetes epidemic a perpetual nature as people are more likely to develop diabetes from generation to generation.

So to finalise, would it be possible to classify the structures that lead to diabetes as structural violence? In my opinion this is absolutely the case, since people are inhibited from reaching their true potential which is an important aspect of the theory of Galtung (1969). As in their actual state they are not only limited by knowledge, but their bodies will not function the way that they should function. Also for many people they may not have a choice due to

inequality, addiction, marketing, import dependency, economic opportunities and other factors. So unless, these structures will be addressed and positively transformed this structural violence cannot be addressed. Finally, I believe that because similar scenarios are occurring in different countries over the world and much of this change has been to agricultural transformations, capitalization and other factors it becomes very clear that there are harmful structures in place and these structures in each country clearly interact with the existing cultural violence.

Recommendations for further research

During this study I have come to realise that non-communicable diseases such as diabetes can be seen as manifestations of violence. High prevalence of non-communicable diseases could imply that a lot of violence is going on, this violence may be traced back to actors, but it is very likely that this violence is structural in nature. So first of all I definitely recommend that more peace research focuses on the manifestations of non-communicable diseases and tries to deconstruct from there how these diseases can be caused by structural and cultural violence.

Regarding diabetes, I think that it will also be necessary to investigate the relationship of the sedentary lifestyle with diabetes and to view to what extent modernisation and its change in lifestyle characteristics other than diet can cause these non-communicable diseases.

Furthermore, I believe that more research should be done by different scholars from all over the world. After those investigations a trans-modern debate should be held with those scholars, the inhabitants of the regions, the local governments, the national governments, international institutions and other relevant stakeholders. After that research a trans-modern debate should occur.

Also more experts in nutrition, biology, physiology, etc. should also engage a research into this topic. If people with a profound understanding in nutrition and human physiology would independently analyse the effect of the consumption of monocrops over the long run, then these effects would be very interesting to see.

In addition to that the structures that are likely to cause this structural violence should be analysed in a similar way. People with studies that develop a critical perspective such as this Peace, Conflict and Development master, can be very suitable for this. However, I must admit that despite my theoretical basis, I will need to go out of the classroom as Professor Omar has always said and see the real world. I should experience these structures, live in these structures and discuss with others, this will surely give a lot more depth to my statements.

Also it would be recommendable to analyse different countries, the “Green Revolution” also targeted large parts of Latin America, South-East Asia and Africa. Despite the fact that the initial revolution did not go as planned in Africa, the current World Bank policies focus very much on sub-Saharan Africa. Eric Holt-Gimenez (2006) focused on the efforts of the “Green” Revolution to transform agriculture in Africa. Also it should be noted that the consumption of unhealthy commodities in many African nations is increasing rapidly. Africa is a huge continent, but in general the IDF (2013) is expecting a major rise in the prevalence of diabetes. Diabetes has been generally rare in Africa, but that might largely be due to the lifestyle characteristics and the different natural diets.

However, should this change then there will surely be many people who will suffer, not just because of unequal structures that might be put into place, but it is also likely that on a huge continent such as Africa there are many people with thrifty genes and according to Martorell (2005) this would increase the risk of these people to develop non-communicable diseases such as diabetes. The same holds for people who have experienced food scarcity in

their childhood, these people might also be more prone to drastic and rapid changes of the structures that surround them.

Thus, I urgently recommend nations in Africa that want to implement similar structures as in Mexico and India that these nations would critically revise the possible effects that these structures will have on their countries. Dealing with hunger is great and I strongly encourage that, but I am not sure whether the “Green Revolution” is the right type of revolution. Maybe all what we need is a revolution of sharing, after all on a global level we produce more food than that we need and there are many sustainable options out there. But I would recommend that real food gets shared with a good amount of variety instead of genetically modified monocrops that seem to be more of a large scale experiment to see what adverse effects occur than actual aid. Also we should take more into account what effects our actions have on the soil as can be seen in *Dirt!*(2009); as the soil is incredibly important for life on earth and in general we humans are treating it like dirt.

Also occasionally consuming monocrops will not be that harmful, but if these monocrops form the staple of a diet, I believe that harmful consequences should be expected. But also a lot of the harm of monocrops can be partially prevented by learning from our ancestors and how they prepared foods such as grains, soy, dairy and nuts. I believe that the knowledge of food preparation has been lost in everyday life. Fermentation, soaking, rinsing and many other procedures have allowed many ancestors to decompose anti-nutrients and live a healthy and happy life, but I would not recommend the same diet because our ancestors were not sitting so many hours per day in a chair. So carbohydrates should be consumed in moderation and this especially holds for fructose.

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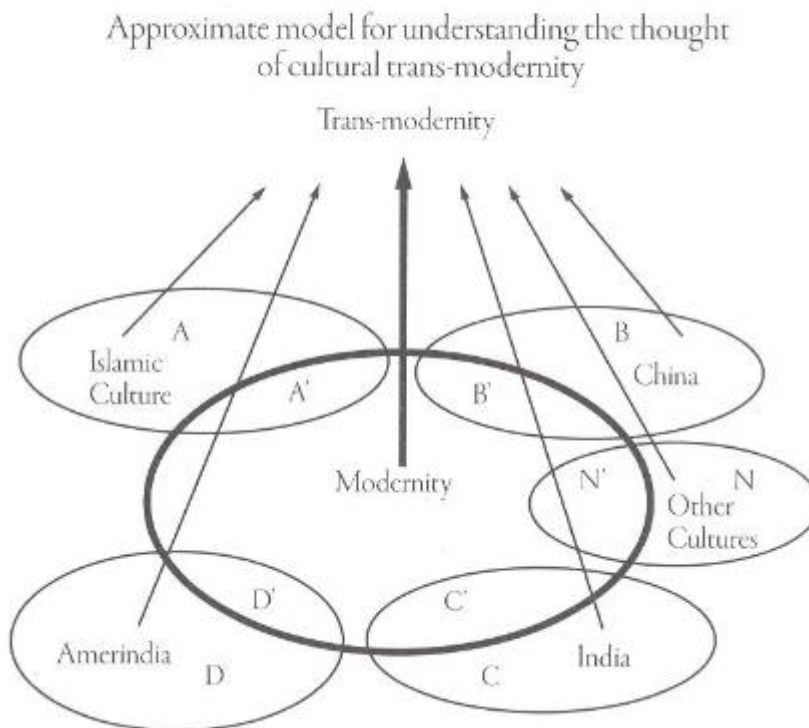
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Appendix

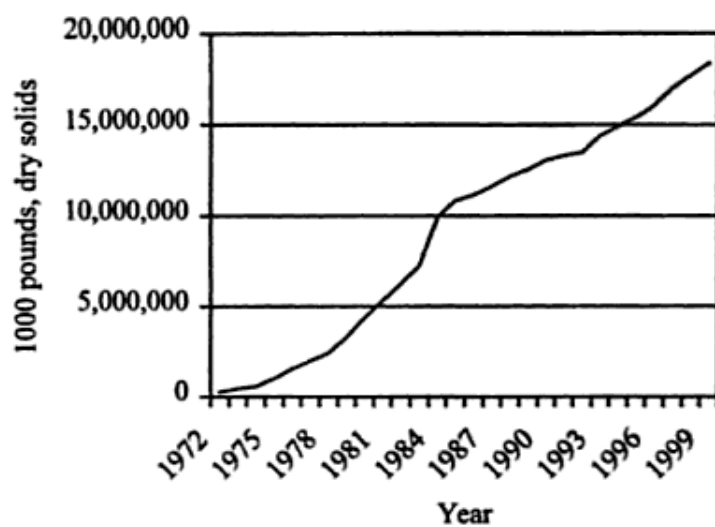
Appendix A Diagrams, Models and Statistics

A.1 Cultural trans-modernity by Enrique Dussel (2006)k

Diagram 2
Rough sketch of the meaning of cultural trans-modernity

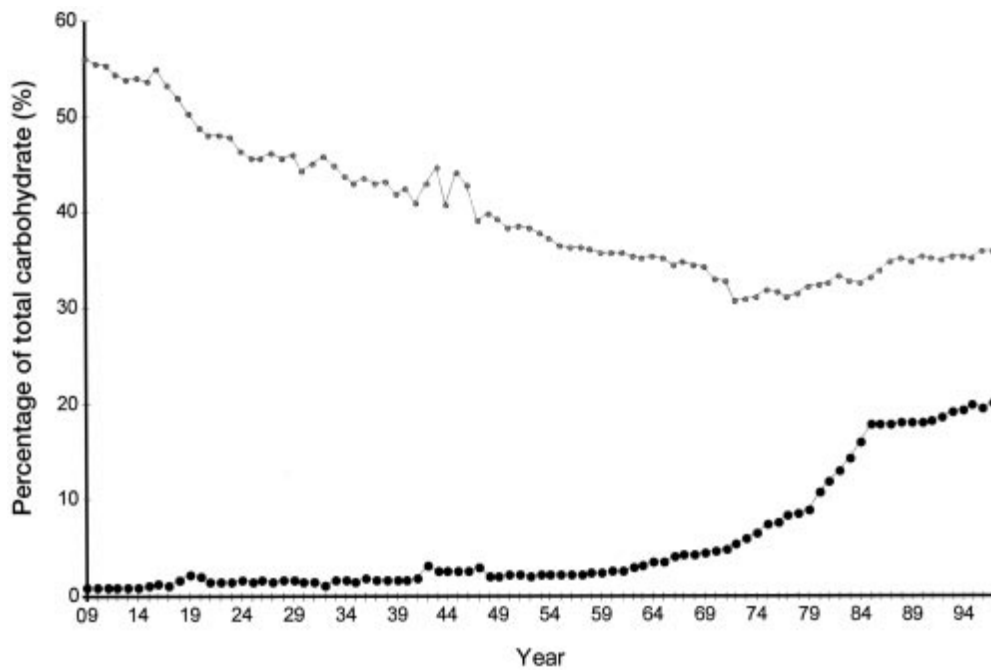


A.2 Shipping of HFCS by Buck (2011)

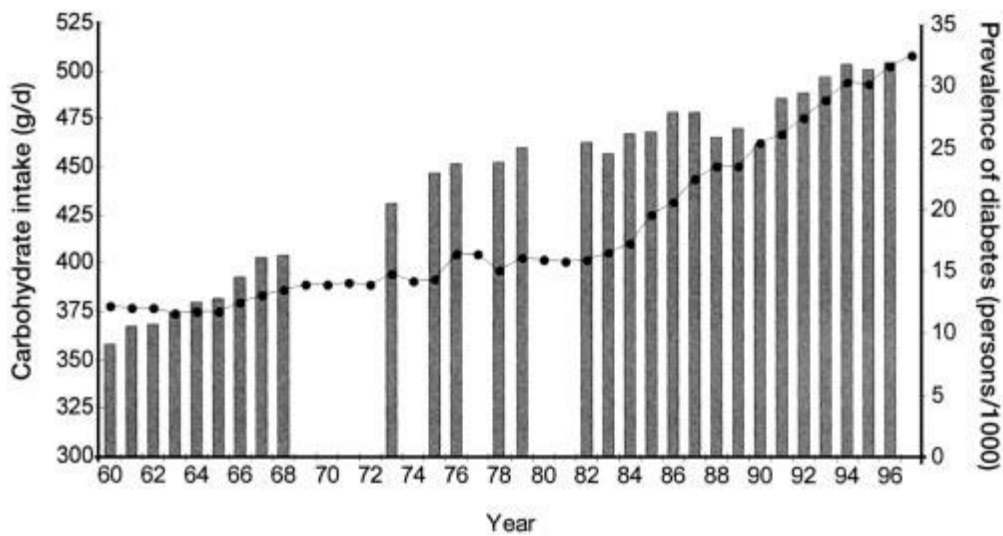


A.3 A.4 Whole grain and HFCS dots (HFCS)/ Small dots Whole grains Gross and others

(2004)



A.4 Prevalence of type II Diabetes in the United States which are the bars compared to carbohydrate intake which are the dots. Gross and others (2004)



A.5 Carbohydrate consumption and fibre consumption United States – Gross and others (2004)

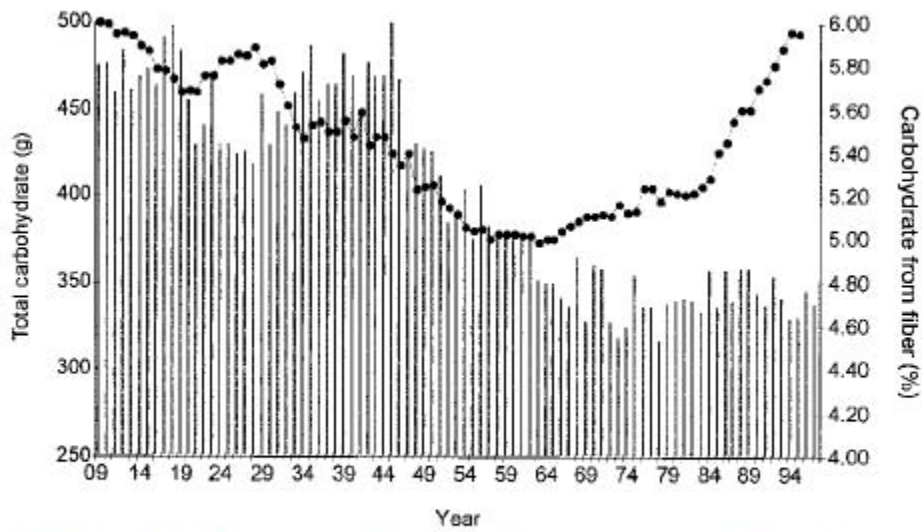


FIGURE 1. Change in total carbohydrate consumption (●) and the percentage of carbohydrate from fiber (vertical bars) in the United States between 1909 and 1997 (17).

A.6. Caused of deaths Mexico: Sanchez-Castillo (2004)

Epidemiología de la obesidad

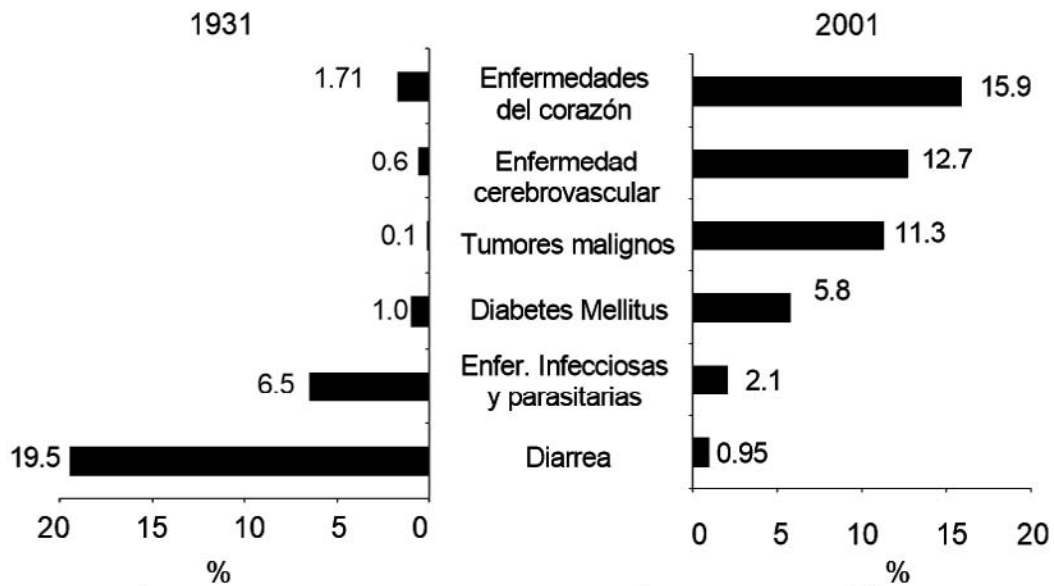


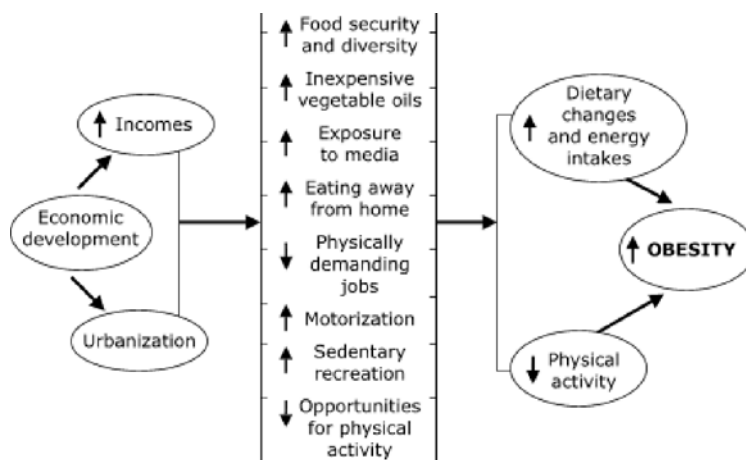
Figura 1. Distribución porcentual de causas de mortalidad general seleccionadas México, 1931 y 2001. Fuente: 56-59

A.7. Bradford-hill model application to type II diabetes and sugar sweetened beverages Malik and Hu (2012)

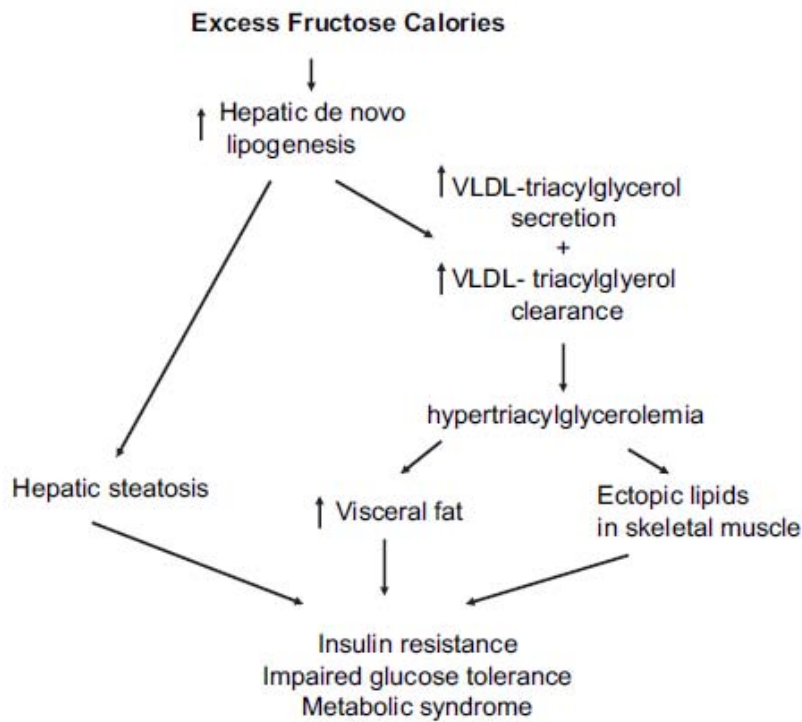
Table 1 Bradford Hill criteria for causality applied to evidence evaluating SSB consumption and risk of T2D

Bradford Hill criteria	SSB consumption and risk of T2D
1) Strength of association	Significant positive association RR: 1.26 (CI, 1.12, 1.41) for 1–2 servings/day
2) Consistency	Consistent data from large prospective cohort studies
3) Specificity	SSB has been shown to increase risk of related metabolic conditions and unrelated conditions such as dental caries and reductions in bone mineral density
4) Temporality	Prospective studies have established temporality
5) Biological gradient (dose–response)	Increase of 1 SSB/day associated with about 15% increased risk of T2D RR: 1.15 (CI, 1.11, 1.20)
6) Biological plausibility	Evidence regarding incomplete compensation for liquid calories, glycemic effects of consuming large amounts of rapidly absorbable sugars, and metabolic effects of fructose provide biological plausibility
7) Experimental evidence	RCTs with clinical T2D as an end point are logistically difficult; however, experimental evidence from studies of biomarkers of T2D and cardiovascular risk provide support

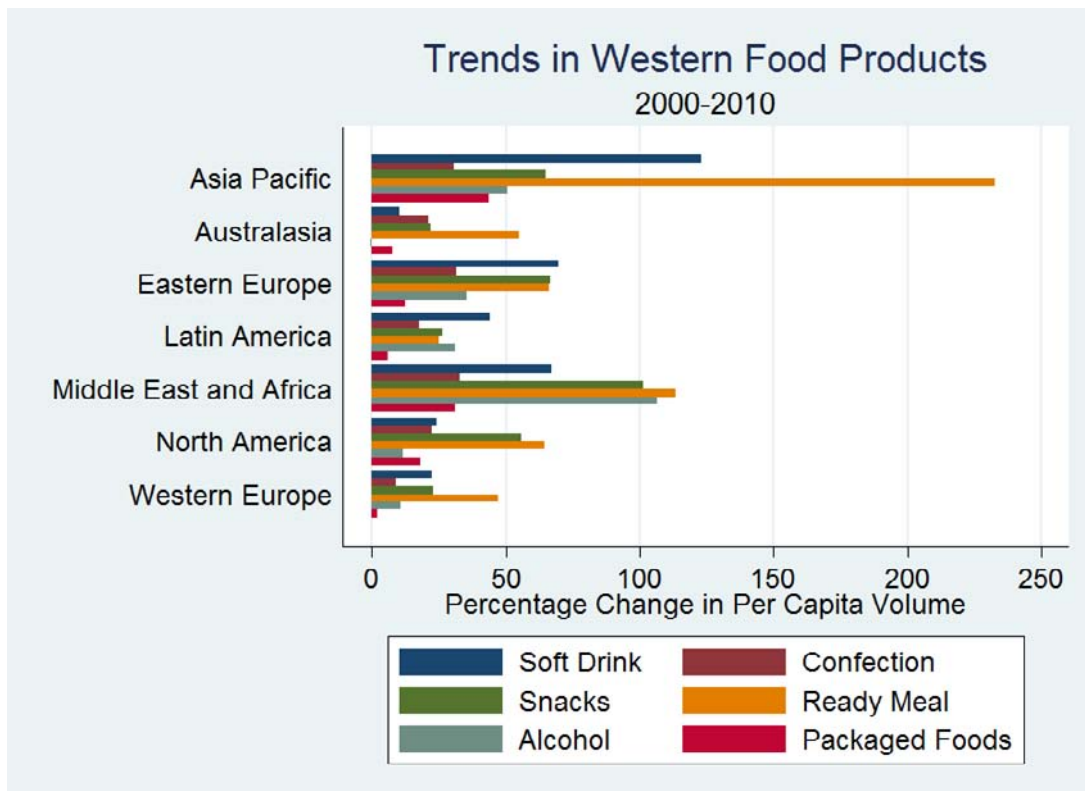
A.8 Economic development and obesity Martorell (2005)



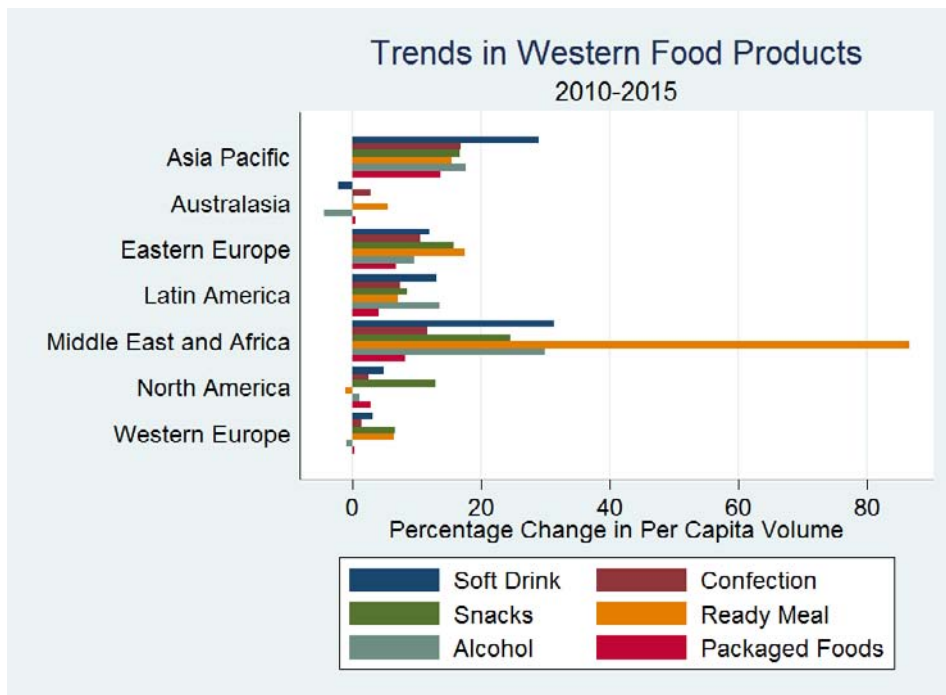
A.9 Excess fructose calories Tapy and others (2010)



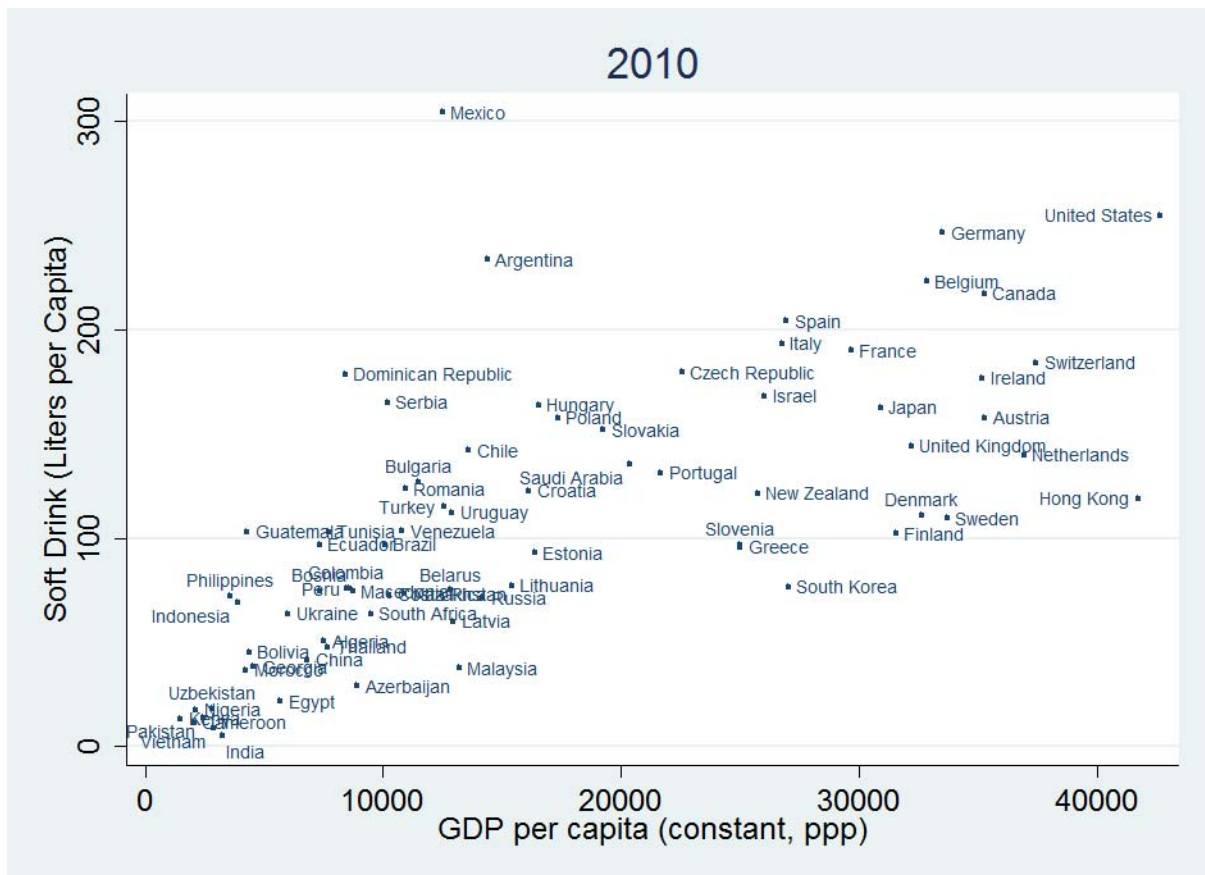
A 10 Stuckler and others (2012) trends in Western Foods (2000-2010)



A.11 Stuckler and others (2012) trends in western foods 2010-2015



A.12 Stuckler and others (2012) soft drink consumption and GDP

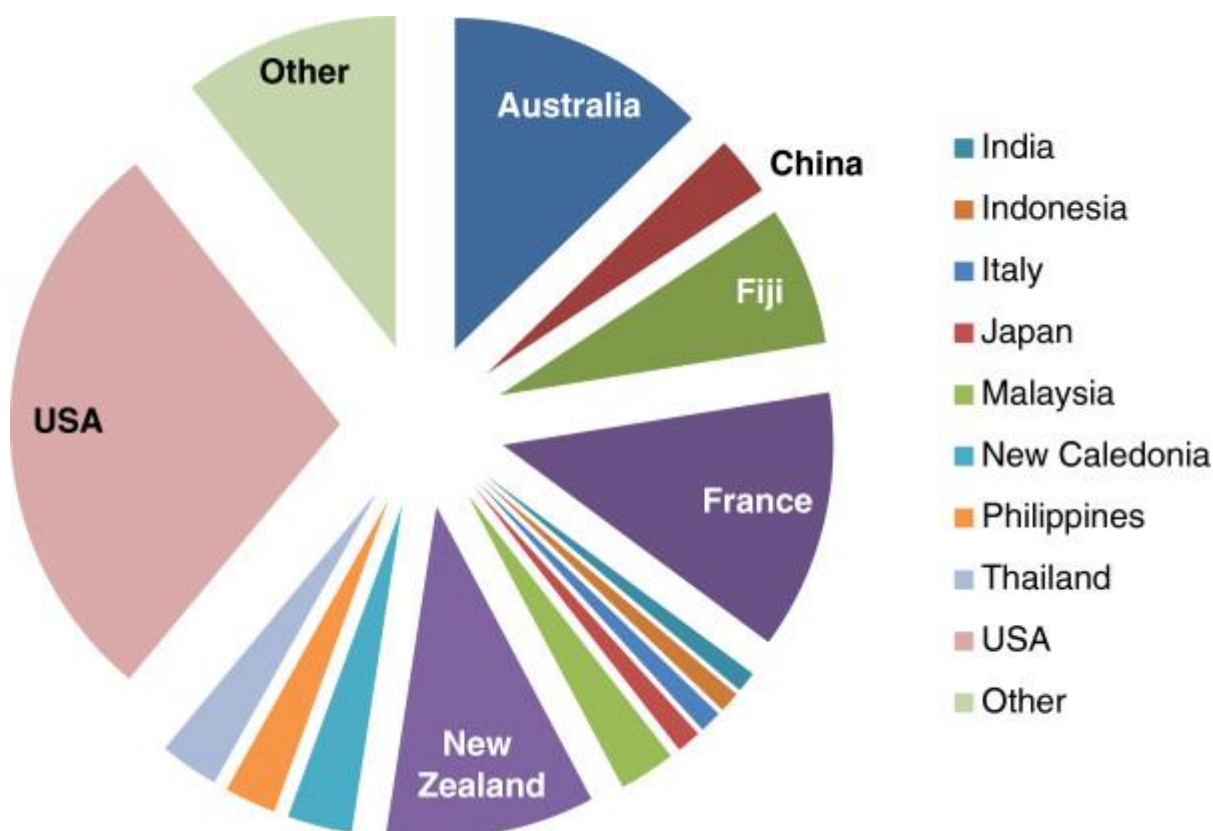


A13. Market penetration multinationals Stuckler and others (2012)

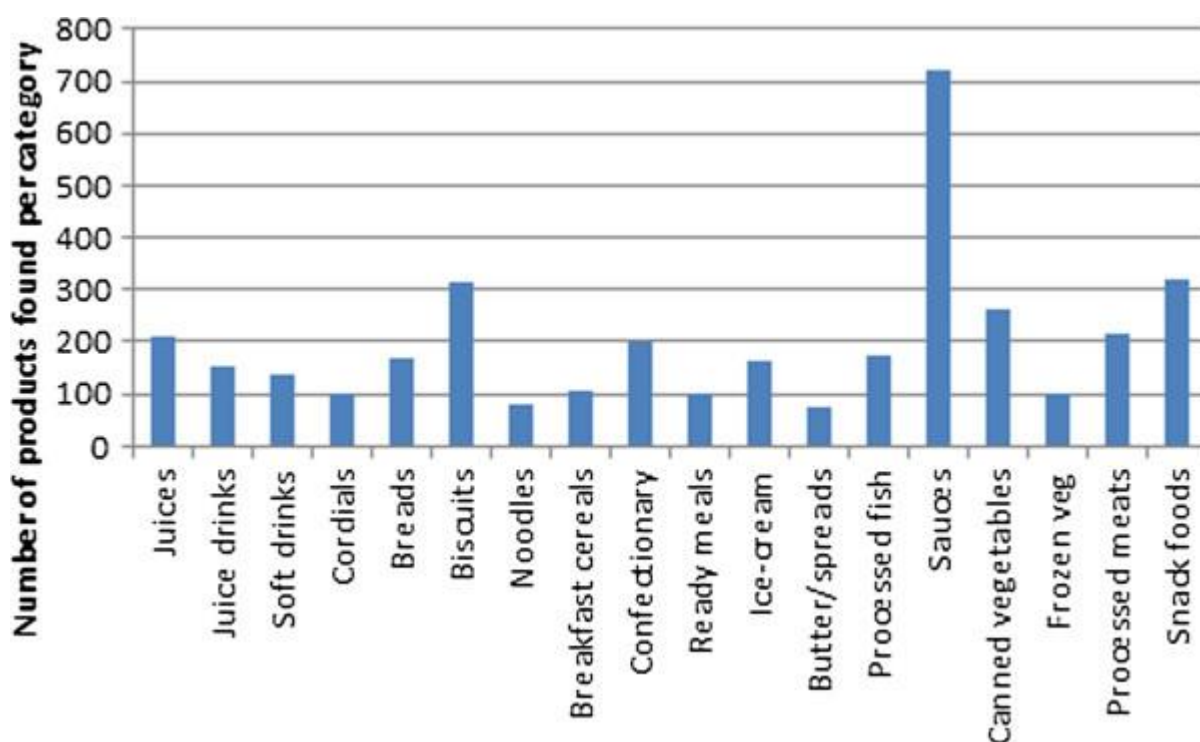
Brazil		China		India		Mexico		Russia		South Africa	
Company	%	Company	%	Company	%	Company	%	Company	%	Company	%
Nestlé SA	8.4	China Mengniu Dairy Co Ltd	4.9	Gujarat Co-operative Milk Marketing Federation Ltd	7.9	Grupo Bimbo SAB de CV	9.1	Wimm-Bill-Dann Produkty Pitania OAO	4.7	Tiger Brands Ltd	19.5
Brf Brasil Foods SA	5.0	Inner Mongolia Yili Industrial Group Co Ltd	4.7	Britannia Industries Ltd	5.0	PepsiCo Inc	5.3	Danone, Groupe	4.3	Pioneer Food Group Ltd	6.3
Kraft Foods Inc	3.9	Kuok Oils & Grains Pte Ltd (KOG)	3.5	Nestlé SA	4.9	Nestlé SA	3.8	Nestlé SA	2.8	Nestlé SA	4.7
Unilever Group	3.3	Ting Hsin International Group	3.1	National Dairy Development Board	4.8	Industrial Lala SA de CV, Grupo	3.6	Obiedinenye Konditery UK OOO	2.3	Clover Ltd	4.7
Groupe Danone	2.8	Shineway Group	2.9	Parle Products Pvt Ltd	4.8	Kraft Foods Inc	2.8	Mars Inc	2.1	Parmalat Group	4.6
PepsiCo Inc	2.5	Hangzhou Wahaha Group	2.2	Kraft Foods Inc	3.1	Ganaderos Productores de Leche Pura SA	2.1	Kraft Foods Inc	1.7	Unilever Group	4.4
Bunge Ltd	2.0	Want Want Group	2.0	Karnataka Cooperative Milk Producers Federation Ltd	2.8	Sigma Alimentos SA de CV	1.8	Unilever Group	1.2	Dairybelle (Pty) Ltd	4.0
M Dias Branco SA Indústria e Comércio de Alimentos	1.7	Bright Food (Group) Co Ltd	1.6	GlaxoSmithKline Plc	2.7	Kellogg Co	1.7	Valio Oy	1.1	Kraft Foods Inc	3.4
Private Label	1.6	China National Cereals, Oils & Foodstuffs Imp & Exp Corp (COFCO)	1.4	ITC Group	2.4	Unilever Group	1.7	Cherkizovsky APK	0.9	AVI Ltd	3.3
Itambé SA	1.5	Mars Inc	1.3	PepsiCo Inc	2.3	Conservas La Costeña SA	1.1	Yug Rusi APG	0.9	PepsiCo Inc	2.4

doi:10.1371/journal.pmed.1001235.t001

A14 Processed foods sold in the pacific Islands Snowdon and others (2012)



A15. Types of processed foods in the Pacific Islands Snowdon and others (2012)



A16. Fat content sausages Snowdon and others(2010)

Table 3

Fat content in sausages by country

	Fiji	Guam	Nauru	New Caledonia	Samoa
Number of sausage products recorded	24	24	3	0	8
Mean fat (g/100 g)	15	23	10		18
Lowest fat content (g/100 g)	7	7	5		11
Highest fat content (g/100 g)	25	45	14		26

Snowdon *et al.*

Snowdon *et al. Globalization and Health* 2013 **9**:53 doi:10.1186/1744-8603-9-53

[OPEN DATA](#)

A17 Sugar content tomato sauce/ketchup Snowdon and others (2010)

Table 4

Sugars content of tomato sauce/ketchup by country

	Fiji	Guam	Nauru	New Caledonia	Samoa
Number of products recorded	11	15	4	8	3
Mean sugars content (g/100 g)	19	14	22	16	21
Lowest sugars content (g/100 g)	4	3.2	20	9	16
Highest sugars content (g/100 g)	30	24	23	23	25

Snowdon *et al.*

Snowdon *et al. Globalization and Health* 2013 **9**:53 doi:10.1186/1744-8603-9-53

A. 18. Diagram of Corporations owning almost everywhere (Next page)

Appendix B - My diet recommendation for diabetics and pre-diabetics and other people.

Mashirani and others (2015) analysed the effects of a paleolithic type of diet and the metabolic and physiologic effects, the consumption of this diet had in relation with type II diabetes. They also compared the effects of this with a diet based on the recommendations of the American Diabetes Association (ADA). The diet of the ADA consisted of moderate to low salt intake, low-fat dairy, whole grains and legumes whereas the Paleolithic diet consisted mainly of lean meat, fruits, vegetables and nuts and some non-paleolithic foods such as cereals, dairy and legumes.

Mashirani and others (2015) measured mean arterial blood pressure; 24-h urine electrolytes; hemoglobin A1c and fructosamine levels; insulin resistance by euglycemic hyperinsulinemic clamp and lipid levels.

The results of this experiment of Mashirani and others (2015) which only lasted a few weeks demonstrated significant differences. Both groups had an improvement in metabolic measures, but the paleo group had greater improvements on blood glucose control and lipid profiles. Furthermore, the results of Mashirani and others (2015) indicated that the insulin sensitivity of most insulin-resistant subjects improved for the paleo group while the diet of the ADA did not improve insulin sensitivity.

Blood glucose control and insulin sensitivity are of vital importance to reduce the effects of Diabetes and increasing insulin sensitivity could even partially cure the disease of Diabetes. This however, depends on whether there are still sufficient Beta-cells in the Pancreas to produce sufficient amounts of insulin. The ADA diet does thus not seem to improve drastically the situation of people with type II Diabetes and thus also not the people that are in pre-diabetic state. It seems that there are significantly more effective diets out there to manage and even prevent diabetes than the diet recommended by the American Diabetes

Association. Furthermore, it will be interesting to see what the effects of a true paleo-lithic type of diet that excludes cereals, dairy and legumes can do for people with Diabetes, since as I have argued earlier these foods can be related to the development of Diabetes. Also the long term effects of such a diet will be interesting and I believe that it should be tested for healthy individuals, pre-diabetics, type II diabetics and even people with type I diabetes since it would improve blood glucose control.

Thus a true paleolithic diet would consist of wild fish, lean meat, fruits, vegetables, nuts and seeds, some tubers and some other types of foods. I would like to note that there is not one type of a paleolithic diet, since nowadays the paleolithic diets are increasing rapidly in popularity, but these diets over emphasise meat consumption which is not necessarily needed to pursue a paleolithic diet. Vegetarian or vegan adoptions of paleolithic diets are possible, perhaps these are less effective for the management of Diabetes than paleolithic diets that include large amounts of meat and fish, but they are considerably more sustainable.

If paleolithic food would be the staple of the diet, I believe that many communicable diseases could be prevented. Sweets, monocrops and other substances can be consumed in moderation. But I believe that if you seriously try a paleolithic diet you may not be inclined to consume many monocrops anymore because you will feel great. Sweets are only a challenge if they are right under your nose, but if not you can generally resist them.

But I would also like to recommend that if people want to consume legumes, nuts, grains and dairy that they look back to the past and learn from our ancestors. Our ancestors did consume grains, legumes and dairy but they fermented these products. This fermentation removed many of the harmful anti-nutrients such as phytic acids and also added beneficial bacteria to these products. Nuts and Seeds were soaked, rinsed and dried to get rid of the anti-nutrients and I do not believe that this has been a coincidence. Our ancestors were very advanced in food preparation and most likely they felt that their bodies would function better

if they prepared the foods in these ways. Personally I also felt a huge difference in energy levels and mood when properly applying these habits of preparations.

Furthermore there are less bad options such as pseudo-grains such as buckwheat, quinoa and amaranth which are not necessarily good for health even though they get marketed so, but these products do not contain gluten and some other harmful proteins. But also these pseudo grains should be prepared properly. Some tubers such as Sweet potatoes, Yams and Cassava can also be a more healthy carbohydrate source, but also these products should be prepared in a special manner.

Also for very active individuals they could consume white rice, which is low in micro-nutrients but also low in anti-nutrients and it basically serves as a good energy source of the body. Other grains, cereals and pseudo grains should be prepared properly to get rid of the anti-nutrients.

For Diabetics and Pre-diabetics basically the same recommendations hold, but they should perhaps be more careful with over consumption as their bodies will be less efficient in reducing blood sugar. Also high glycaemic and high sugar fruits, tubers and pseudo-grains (seeds high in carbohydrates such as quinoa, buckwheat, etc.), should be eaten in moderation.

Finally, I want to conclude that I do necessarily recommend any diet in particular, but I believe that more awareness of anti-nutrients should be created. Carbohydrates should be consumed relative to your activity levels and these should be quite high to eat a lot of carbohydrates. Doing sports every day for 1 hour is not necessarily being active, it is moving a lot throughout the day and move intense or semi-intense for at least 1 time per day for 20 minutes to one hour. Fructose should be consumed in moderation and foods that are toxic but which people enjoy should be prepared properly. I also want to try raw veganism, to investigate whether it has those amazing effects that some people say, but if I will be consuming exclusively raw vegetables and fruits I would like to have access to organic fruits

and vegetables as many fruits and vegetables nowadays come with a lot of toxics. Organic food is almost always a better option for yourself and the environment. So whatever you eat if you have the possibility eat organic! And better than organic food from the supermarkets visit local bio-farms that are fortunately still more apparent than is thought and buy your products there.

Appendix C Field research

C.1 Corte Inglés (Spanish supermarket): Section Alimentación sana y bio (Healthy and biological food)

In the health and bio section of the Corte Inglés there is almost exclusively high carbohydrate products such as biscuits, chocolates and sweets.



The nutritional values of the chocolate pastries:

- Per 100 gram 59.1 g of carbohydrates (14.2g sugar)
- 26.4g maltitol sugar alcohol, slightly less caloric as normal sugar, but still increases blood glucose levels significantly. The product label causes confusion because arguably 40.6 grams of the product are from sugar or a similar substance as a sugar alcohol.
- Maltitol is highly laxative, surely it can lead to weight loss with such a high amount of maltitol, but this is definitely not the weight loss people are trying to achieve. (The label warns for a laxative effect.
- 464 kcal per 100 grams
- High in fat



Baby food in the Corte Inglés

- Claims to reinforce the immune system of the baby, claims like this are generally not based on solid scientific evidence.
- The label should mention more clearly that this product cannot be consumed by the baby at a young age. It does not mention the adverse effects that can occur, it mentions only in small letters that it should be consumed after 6 months.



Sugar sweetened beverages and fruit juice in the health and bio-section

- All are enriched with sugars and they tend to be pretty high in fructose
- The drinks contain around 10g of sugar per 100ml and of some drinks this sugar consists of 85%-90% fructose and the cans are 330ml; so 1 can would be 29.7g of fructose



As you can see this drink contains agave syrup which comes close to pure fructose.

- Agave is marketed as healthy, but the agave syrup of nowadays does not compare to the ancient recipes of the Mexican Natives in the past
- Agave syrup has research that focuses on the short-term effects and surely in short term affects it would lead to less weight gain and insulin resistance than beverages higher in glucose, but in the long run it will lead to weight gain, insulin resistance and inflammation.
- For more info: check a clear explanation: <http://authoritynutrition.com/agave-nectar-is-even-worse-than-sugar/>
- Evidence that fructose can be harmful in the longrun:
 1. <http://ajcn.nutrition.org/content/76/5/911.full> effects of fructose
 2. <http://www.medpagetoday.com/upload/2013/3/1/journal.pone.0057873.pdf> econometric analysis of sugar consumption and its relation to diabetes.
 3. <http://www.nutritionandmetabolism.com/content/2/1/5> Fructose and diabetes.



Marmalade with added fructose in the health and bio section



Ingredients and description of this marmalade

- Prepared with 60% fruit per 100g and added fructose is 34%
- The fruit is Plums which is generally healthy and low in fructose with 3.3g of metabolic fructose content per 100g. But now the fructose content per 100g is at least $3.3 \times 0.6 = 1.98 + 34 = 35.98$ grams per 100g, yet the package states 40g of fructose per 100g. Which could imply that specially modified plums are used that are high in fructose, or they have added more than 34% fructose
- The description is promoting fructose, it says the following: The consumption of products with fructose produce a smaller increase in blood sugar than the consumption of products that contain sacharose or glucose. It is recommended to follow a varied and balanced diet and a healthy life style.

- But you could ask yourself whether a product that high in fructose is a balanced product, also the product contains glucose since the metabolic glucose of the plum is around 4.2 g /100g that's right plums are slightly higher in glucose. Also there are more carbohydrates in the product as the 4.2g glucose, so most likely blood sugar will still go up significantly
- It is true that fructose will not increase blood sugar so fast as let's say 40g of glucose, but by no means is such a high fructose content healthy and it would still considerably heighten blood sugar levels and most likely cause inflammation due to excessive fructose calories.



In the healthy and biological food section:

- Pure fructose which is not only non-existent in nature, but also it has severe effects on the health of the consumer, if consumed in excessive amounts. The average consumer already consumed too much fructose per day. The fact that this product is sold in the health section can be harmful and is arguably violence for the average consumer.



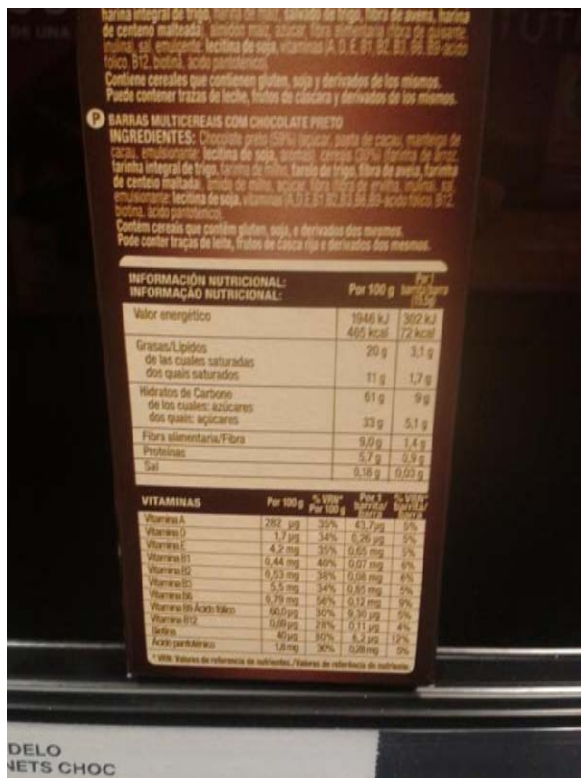
In the control your weight section, you can find almost exclusively snacks.

- All products are generally high in carbohydrates and contain forms of sugar. These snacks will generally do the opposite than weight loss and could even lead to an increase in bodyweight for people that are trying to lose weight, generally these people may already be overweight and are perhaps at an elevated risk of developing diabetes or suffering from heart attacks and other health problems.



Here is the nutritional value of a randomly picked chocolate snack that is described as good for weight control.

- It contains 62 grams of carbohydrates per 100g of which 33 are sugar and the rest come generally from wheat flour which also has a high glycaemic index.
- Also it is high in fat and therefore not only high in carbohydrates, but also in kcal it contains 465 kcal per 100g.
- It does contain quite some fibre, but this fibre does not come from fruit and vegetables and comes most likely from wheat which means that it might reduce the bio-availability of minerals in the body, despite the fact that it contains a lot of added vitamins and minerals.



C.2 Consum (Spanish supermarket)

Breakfast cereals of Nestlé named “Fitness Chocolate”

- Per 100g it has 72.7 grams of carbohydrates which is very high for a product that gets consumed in the morning.
- Nestlé recommends it with skimmed milk, but as argued before skimmed milk leads to more weight gain than full milk and milk protein has insulinotropic qualities.
- Also Nestlé calls them breakfast cereals, but generally in the morning you do not want to consume a high carbohydrate food that gives a strong insulin response such as cereals with skimmed milk. During your sleep; hormone production generally elevates your blood sugar, a breakfast like this will elevate it even further causing elevated blood sugar levels that can lead to stress during the day.



Description of Chocolate fitness from Nestlé

Some things are always a delight: Sun, the perfect dress and a bowl of Fitness chocolate for breakfast



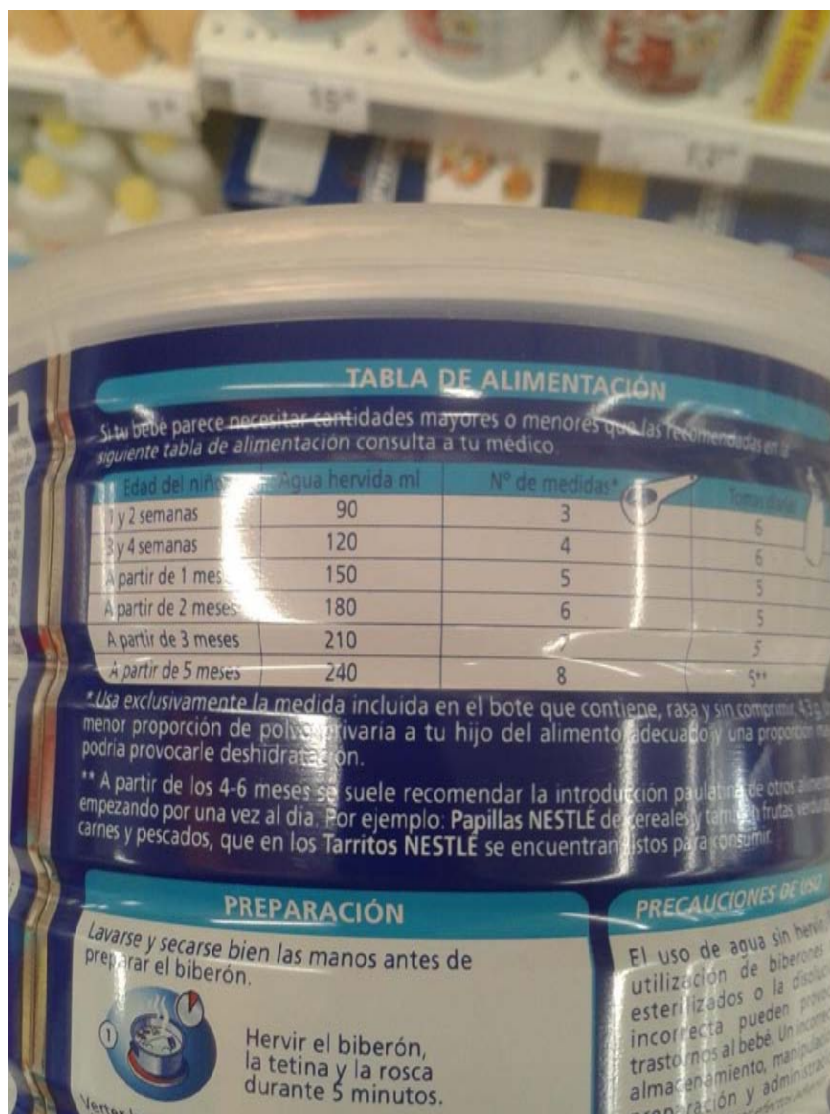
Similar arguments hold for Special K from Kellogs

- 79 grams of carbohydrates per 100g (17g sugar) marketed as a healthy product, does not contain HFCS as it does in the United States
- Also high in vitamins and minerals which through the wheat are unlikely to be absorbed completely.
- Also combining this dish with milk would basically diminish the effect of the added Vitamin D which has the same receptor as calcium. Also it should be noted that the type of Vitamin D is not specified, humans need Vitamin D3 and any other form cannot be absorbed.



Nativa: Baby food from nestlé

- that actually recommends this food at the age of 1 and 2 weeks and other ages under 3 months
- Foreign proteins at this age are found to be harmful and will most likely lead to auto-immune disorders as argued in the literature part of my dissertation such as diabetes type 1 and other diseases that are the result of an auto-immune response.
- Recommends other foods such as cereals after 6 months





Ingredient list of Nativa (see next page for the picture)

- Milk proteins
- Vegetal oils which are likely to be oxidized and high in omega 6 which can lead to inflammation.
- A whole lot of dietary vitamins and minerals
- Contains soy-lecithin which is advised to be avoided by pregnant mothers and infants.

According to WebMD (2009) and studies on rats have shown negative side effects of consumption during pregnancy and consumption by infants Bell and Lundberg (1985)



Información Nutricional

Ingredientes: Suero de leche, leche desnatada, aceites vegetales (palma, nabina, coco y girasol), lactosa, proteínas de leche, sales minerales (citrato cálcico, citrato potásico, cloruro de magnesio, cloruro sódico, cloruro potásico, fosfato potásico, hidróxido de calcio, fosfato cálcico, sulfato de zinc, sulfato ferroso, sulfato cúprico, sulfato de manganeso, selenato de sodio y yoduro de potasio), emulgente (lecitina de soja), L-fenilalanina, vitaminas (L-ascorbato sódico, DL-alfa acetato de tocoferol, acetato de retinol, nicotinamida, filoquinona, D-pantotenato cálcico, colecalfiferol, mononitrato de tiamina, clorhidrato de piridoxina, riboflavina, ácido fólico, cianocobalamina y D-biotina), taurina, L-histidina, inositol, nucleótidos (citidina, uridina, adenosina y guanosina) y L-carnitina.

Valores medios		por 100 g	por 100 ml
Valor energético	kJ	2,171	281
	kcal	519	67
Grasas	g	27,7	3,6
de las cuales:			
saturadas	g	11,2	1,4
monoinsaturadas	g	9,7	1,3
		5,1	0,7

Fructose enriched Almond paste

- States that it is suitable for diabetics (apto para diabeticos)
- 37.2 g of fructose





C.3 Mercadona (Spanish supermarket)

- Also almond cream enriched with fructose
- Likewise it states that it is suitable for diabetics (Tolerado Diabeticos)
- Contains 42 g of fructose per 100g which is very high, it comes close to the fructose content of honey, sugar and is equal to HFCS 42 in terms of fructose content.



Appendix D. Letter of the Weston Price Foundation: Fallon and others (2004) that includes the letter of Doerge and Sheehan (1999)

Shellee Anderson

Team Leader, Nutrition Policy

Division of Dockets Management

Food and Drug Administration

5630 Fishers Lane, Room 1061 (A-305)

Rockville, MD 20852

June 14, 2004

Docket # 2004Q-0151 Solae Company Health Claim re Cancer

Dear Ms. Anderson:

Please consider the attached information as you evaluate the petition filed by the Solae Company regarding a health claim for soy-protein-containing products and a reduced risk of certain cancers.

The petitioner Solae contends that its data is “based on the totality of publicly available scientific evidence” when, in fact, their evidence represents a very small portion of the available published studies. We find that the petitioners were highly selective in their choice of evidence and in their commentary, omitting many studies that show soy to be ineffective as a cancer prevention agent, emphasizing favourable outcomes in studies where

results were mixed, and providing excuses for results of the few unfavourable studies that they included to give the illusion of balance. Solae states that “to the best of the knowledge of the undersigned, this petition is a representative and balanced submission” although it omitted all mention of the many well-designed studies that have suggested that soy protein can contribute to, cause and accelerate the growth of cancer.

The petitioner Solae contends that their data “establish that there is scientific agreement among experts qualified by scientific training and experience to evaluate such claims regarding the relationship between soy protein products and a reduced risk of certain cancers.” In fact, no such consensus exists, and numerous experts qualified by scientific training and experience -- including scientists from the FDA’s own National Laboratory for Toxicological Research -- have warned of soy protein’s carcinogenic potential and of the health dangers of excess soy-food consumption. We are further concerned because the petitioner fails to consider soy protein’s well-documented risks to the digestive, immune and neuroendocrine systems of the body as well as its high allergenicity.

We have attached a response to Solae’s petition to this letter for your consideration. We have included an extended commentary, summaries of important journal articles, quotations from qualified researchers and complete references to publicly available studies, all of which raise questions about or disprove the validity of the proposed health claim.

We maintain that the benefits cited by Solae are putative, not proven, and that longstanding concerns in the scientific community about soy’s possible role in carcinogenesis need to be addressed. In the interest of public safety, we therefore request that the Solae petition be declined and the health claim be denied.

Sincerely,

Sally Fallon, President

The Weston A. Price Foundation

(202) 333-4801

westonaprice@msn.com

safallon@aol.com

Kaayla T. Daniel, PhD, CCN

wholenutritionist@earthlink.net

(515) 982-0887

William Sanda, Director of Public Affairs

The Weston A. Price Foundation

(703) 823-3153

bsanda@verizon.net

A. PRELIMINARY REQUIREMENTS

A 1 Solae provides basic information about the amount of soy protein in various soyfoods and states that “soy products contain other nutrients such as carbohydrates, vitamins and minerals, as well as naturally occurring constituents such as fibers, isoflavones and saponins.” It neglects to mention here that isoflavones are listed as “carcinogens” in the American Chemical Society’s 1976 textbook *Chemical Carcinogens* as well as other toxicology textbooks and that saponins have traditionally been considered antinutrients.

Solae also does not mention that soy protein contains many other constituents that have traditionally been considered antinutrients or toxins. These include protease inhibitors (most notably trypsin inhibitors), phytates, lectins, oxalates and oligosaccharides,

which may possess valuable pharmaceutical properties but which have also been linked in more than 100 studies to digestive distress, intestinal disorders, mineral deficiencies, flatulence and even cancer development and growth.

Finally, Solae fails to note that genetically modified soybeans have not been proven to be “substantially equivalent” to regular soybeans and that safety issues have not been properly addressed. Yet soy foods made with both GM and regular soybeans would be eligible for the proposed health claim.

* * * * *

In its discussion of types of soy foods, Solae states: ‘Historically soybean curd and soymilk have been viewed as “traditional” Asian foods. This is only partially true. While tofu dates back to 164 BC, soy milk has a much more recent history in Asia. The earliest historical reference to soy milk as a beverage appears in 1866. *Chinese Medical Journal* articles from the 1930s report that soy milk was not traditional but had become popular as an occasional drink served to the elderly by the 1920s and 1930s. Dr. Harry Miller, an American–born Seventh Day Adventist physician and missionary, was the person in China to invent a commercially feasible method to manufacture soy milk. Dr. Miller also found out that soy milk was not traditional in Japan and in 1959 wrote an article for *Soybean Digest* entitled “Why Japan Needs Soy Milk.” Furthermore, soy milks in today’s marketplace bear little relationship to those made in Asia, for they are often made with soy protein isolate and other non-traditional ingredients.

SOURCES

Shurtleff, William. Chronology of soymilk worldwide: Part 1, 220AD to 1949. Special Exhibit, Museum of Soy, 2001. Soyfoods Center, Lafayette, CA.

Guy RA. The diets of nursing mothers and young children in Peiping. *Chinese Med J*, 1936, 50, 434-442.

Guy RA, Yeh KS. Soybean 'milk' as a food for young infants. *Chinese Med J*, 1938, 54, 1, 1-30.

Miller HW, Wen CJ. Experimental studies of soymilk in human nutrition. *Chinese Med J*, 1936, 50, 4, 450-459.

Miller Harry W. Why Japan needs soymilk. *Soybean Digest*, April 1959, 16-17.

A1 b

Although Solae claims that soy protein is “safe and lawful,” it concedes that soy protein isolate has never actually received GRAS (Generally Recognized as Safe) status as an additive to food. Soy protein was rejected for such status as late as 1999 when a petition submitted by Archer Daniel s Midland for GRAS status for soy protein was returned by CFSAN because of a failure to properly report adverse effects. The petitioner also fails to note that unlike most GRAS substances in use prior to 1958, soy protein isolate was not originally developed as a food but as an industrial product to bind and seal paper products. It therefore does not qualify as a product having a long history of safe use in the food supply. More seriously, soy protein

isolate is known to include a number of toxins and carcinogens introduced by the high temperatures, high pressures and chemicals used in its manufacture. In 1979, the Select Committee of GRAS Substances (SCOGS) examined safety issues pertaining to the manufacture of soy protein isolate and recommended that acceptable levels of the carcinogens nitrite and nitrosamines and the toxic amino acid lysinoalanine be established “to avoid future problems.” To this date, safe levels have never been established and levels of these substances in edible food products are not closely monitored. The SCOGS committee determined that 150 mg per day of soy protein was the maximum safe dose, an amount far less than the 4.48 grams that is likely to be consumed by the average American should Solae succeed in obtaining a soy protein and cancer health claim. Solae claims that such “intakes are reasonable and present no safety concerns.”

SOURCES

Evaluation of the Health Aspects of Soy Protein Isolates as Food Ingredients. Prepared by Life Sciences Research Office, Federation of American Societies for Experimental Biology for the Bureau of Foods, Food and Drug Administration, 1979. Contract # FDA 223-75-2004.

Sheehan DM, Doerge DR. Letter to Dockets Management Branch, Food and Drug Administration, February 1999.

The SCOGS committee’s recommendation of 150 mg of soy protein isolate per day as a “safe dose” is far lower than Solae’s estimate of per capita consumption. We maintain that soy protein at the higher intake levels projected by Solae would present serious safety concerns, with the biggest risk to people who are allergic to soy.

Soy is widely acknowledged as one of the top eight allergens, with one prominent researcher putting soy in the “top six” and another in the “top four.” The increased soy protein in the food supply would not only be found in well-known soy foods such as tofu,

soy milk and veggie burgers – foods that allergy sufferers know enough to avoid -- but also from soy proteins incorporated into the recipes for baked goods, canned, packaged and other processed foods. This “hidden” soy poses a danger to allergy sufferers, who may experience symptoms that range from mild to life threatening, involving, the gastrointestinal, cutaneous and respiratory systems. A recent Swedish study reported four fatalities as the result of soy protein hidden in foods such as hamburgers. Furthermore, allergy experts have warned that the increased use of soy protein in food products is increasing the potential for sensitization.

SOURCES:

FAO Food Allergies Report of the Technical Consultation of the Food and Agricultural Organization of the United Nations, Rome, November 13-14, 1995.

Besler, Matthias Allergen Data Collection: Soybean (*Glycine max*), *Internet Symposium on Food Allergens* 1999, 1, 2, 51-79. www.food-allergens.de

Bousquet J, Bjorksten B et al. Scientific criteria and selection of allergenic foods for labeling. *Allergy*, 1998, 53 (Suppl 47) 3-21.

Burks AW, Brooks JR, Sampson HA. Allergenicity of major component proteins of soybean determined by enzyme-linked immunosorbent assay (ELISA) and immunoblotting in children with atopic dermatitis and positive soy challenges. *J Allergy Clin Immunol*, 1988, 81, 1135-1142.

Burks AW, Williams LW et al. Allergenicity of peanut and soybean extracts altered by chemical or thermal denaturation in patients with atopic dermatitis and positive food challenges. *J. Allergy Clin Immunol*, 1992, 90 (6 pt 1), 889-897.

Sampson HA, McCaskill CM. Food hypersensitivity and atopic dermatitis: evaluation of 113 patients. *J Ped.* 1985, 107, 669. Documented soy protein to be one of the major food antigens, which included milk, peanut, wheat, egg and fish.

Foucard T, Malmheden-Yman I. A study on severe food reactions in Sweden – is soy protein an underestimated cause of food anaphylaxis. *Allergy*, 1999, 53, 3, 261-265.

We are also concerned that a claim that soy protein reduces cancer would encourage many health conscious consumers to eat far more soy protein than Solae's projected average of 4.48 g per day. People at special risk are vegetarians and vegans who choose soy as their main source of protein, individuals trying to prevent or reverse cancer and other diseases, and those at risk for or afflicted with thyroid disease. The Working Group of the British Committee on Toxicology (COT) recently "identified individuals with hypothyroidism as a subgroup of potential concern," noting that a "soy-rich diet may provide sufficient concentrations of phytoestrogens to interfere with thyroxine replacement therapy." Daniel Sheehan, Ph.D. and Daniel Doerge, Ph.D, of the FDA's National Laboratory of Toxicological Research in Arkansas, have warned that "Isoflavones are inhibitors of thyroid peroxidase, which makes T3 and T4. Inhibition can be expected to generate thyroid abnormalities, including goiter and autoimmune thyroiditis. There exists a significant body of animal data that demonstrates goitrogenic and even carcinogenic effects of soy products."

Solae has also not addressed the likelihood that increased genistein in the food supply as a result of increased soy intake would have a cumulative or exponential effect with other xenoestrogens in the environment. Toxicologists at the Centre for Toxicology, The School of Pharmacology at the University of London have stated that "estrogenic agents are able to act together to produce significant effects when combined at concentrations

below their NOECs. . . Hazard assessments that ignore the possibility of joint action of estrogenic chemicals will almost certainly lead to significant underestimations of risk.

Later in this document, we will present a substantial number of studies showing that soy can contribute to, cause and/or accelerate the growth of cancer. Given the number of such studies and the strong warnings of respected scientists, including the FDA's own Drs Sheehan and Doerge, we find it highly disturbing that Solae would put its commercial interests above public health and propose a cancer prevention health claim for soy protein.

SOURCES:

Committee on Toxicology (UK) Draft Report on Phytoestrogens.

<http://www.foodstandards.gov.uk/multimedia/webpage/phytoreportworddocs>

Silva E, Rajapakse N, Kortenkamp A. Something from “nothing” – eight weak estrogenic chemicals combined at concentrations below NOECs produce significant mixture effects. *Environ Sc Technol*, 2002, 36, 8, 1751-1756.

Sheehan DM, Doerge DR. Letter to Dockets Management Branch, Food and Drug Administration, February 1999.

A2

Solae notes geographical differences in cancer morbidity and mortality, and includes the striking fact that the death rate from breast cancer is 4-fold lower and from prostate cancer 18-fold lower in China than in the United States. While soy may be a factor in these reduced rates, other dietary and lifestyle factors are almost certainly involved. Certainly, there is no direct evidence for beneficial cancer-reducing effects of the phytoestrogens in

soy protein foods. More importantly, we contend that if the petitioners attributes decreased rates of breast, prostate and colon cancer in Asia to soy consumption, then the same logic would require them to blame higher rates of cancer of the esophagus, stomach, thyroid, pancreas and liver in Asian countries on consumption of soy. They have not done so.

Solae has also neglected to inform the FDA's examiners that proper use of soy protein for cancer prevention requires sure knowledge of windows of vulnerability – or opportunity – as found in utero, during infancy, before puberty, during puberty, the reproductive years and beyond. Rather, this company proposes an indiscriminate increase in consumption of soy protein for men, women and children with no admission of the fact that a substance that might be helpful in one stage of the life cycle could be harmful in another. Research to date is inconsistent and contradictory, but leaves no doubt that the phytoestrogens in soy protein exert their influence throughout the body in many different ways and that they have the potential to exert adverse as well as beneficial actions. Patricia L Whitten PhD of Emory University explains that “these potential roles fall into three major areas: 1) estrogen agonists whose activational actions could prove beneficial to postmenopausal women but might be harmful to the degree that they contribute to carcinogenesis or other adverse effects. 2) antiestrogens or antiproliferative agents that could help to prevent estrogen-dependent carcinoma by antagonizing estrogen action but could also contribute to infertility by suppressing normal reproductive function and 3) developmental toxins that could disrupt sexual differentiation by altering sex-specific patterns of development but might also provide protection against environmental estrogens by altering steroid response thresholds.” We believe that it is irresponsible of Solae to claim possible benefits of soy protein without warning consumers of possible risks.

SOURCE

Whitten PL, Lewis C et al. Potential Adverse Effects of phytoestrogens. *J Nutr*, 1995, 125, 771S-776S.

B. SCIENTIFIC EVIDENCE

B1

Solae states that “soy protein is a major source of dietary protein worldwide.” It is certainly true that soy protein consumption has been increasing worldwide, but the claim that soy constitutes a “major source of dietary protein” is inaccurate. In any case, high levels of soy consumption is a recent phenomenon, the result of intense marketing efforts by the soy industry and/or giveaways by government and charitable organizations.

Soy foods have been a dietary component in some Asian countries for centuries, not millennia, and are eaten there in small amounts as a condiment, not as a staple.

Furthermore, the types of soy foods eaten traditionally in the countries of Asia are almost entirely whole soy foods prepared by fermentation and precipitation methods, not fractionated soy proteins produced by industrial food processing. This difference is highly significant in that modern processing methods used by the soy industry produce nitrosamines and other carcinogens. A recent study from the University of Illinois at Urbana-Champaign indicates that “highly processed soy may stimulate estrogen-dependent breast cancer.” According to Dr. William Helferich, one of the study’s authors, “Soy has been correlated with low rates of breast cancer in Asian populations, but soy foods in Asia are made from minimally processed soybeans or defatted, toasted soy flour, which is quite different from soy products consumed in the U.S.” We include this important study later in our section on Breast Cancer.

Solae boldly writes that “the totality of publicly available scientific evidence supports the substance/disease relationship that consumption of soy protein-containing foods is related to a lower risk of certain cancers. The evidence is particularly strong in cancer of breast, prostate and gastrointestinal tract.” In fact, we will establish that Solae has not presented “the totality” of publicly available evidence. Nor have scientists reached a consensus regarding soy and cancer. Indeed, many respected researchers believe that the isoflavones in soy protein can contribute to, cause and/or accelerate the growth of cancer.

We also dispute the validity of Solae’s claim that meta-analyses prove a positive relationship between soy consumption and cancer risk. Meta-analysts have been criticized by many in the scientific and statistical communities for making faulty assumptions, indulging in creative accounting and for leaving out studies that contradict or dilute the conclusions desired. Solae has left out many such studies.

Finally, the petitioners further assert that animal studies support their cancer claim and state that there are “39 studies available to date.” This number represents a fraction of the available studies, a selection that Solae has weighed towards positive findings. Later in this response, we will provide a sampling of the many animal studies that suggest soy’s ineffectiveness as a chemoprotective agent and its possible role in carcinogenesis.

B3

B3 1 BREAST CANCER

This section of Solae’s petition “considers the weight of scientific evidence that relates dietary soy protein to the risk of breast cancer in women” and concludes that “the

totality of the publicly available scientific evidence supports the substance/disease relationship that consumption of soy protein-containing foods is associated with a lower risk of breast cancer in women.”

More accurately, this section presents scientific evidence suggesting that soy protein is protective. A more comprehensive review of the studies would reveal that the results are both inconsistent and inconclusive. Solae does include several studies that show no effect between soy intake and breast cancer risk but seems to have chosen them because they were easy to dismiss for a variety of reasons. Most seriously, Solae failed to include any studies that would substantially undermine their premise that soy protein reduces breast cancer risk.

Later in this response we will present a number of well-designed studies that rebut and refute Solae’s position that soy is protective against breast cancer. First, we would like to make a few points about some of the studies cited by Solae.

Nagata et al 2000 shows that soy protein intake is not associated with lowered risk of breast cancer, prostate or lung cancer in Japanese people. Soy protein was associated with a lowered risk of stomach cancer but also with a higher risk of death from colorectal cancer. To its credit, Solae did not omit either this study or this information. The results, however, must not be minimized. This large-scale ecological study resulted in statistically valid conclusions and provides strong evidence of risk colorectal cancer from soy protein consumption. We do not feel it is ethical to dismiss the validity of this study by rolling it into a meta-analysis of all soy-and-cancer prevention studies.

Key et al 1999, a large prospective study of 34, 759 women in Japan, found no significant association between breast cancer risk and consumption of soy foods. Solae dismisses this study because it was carried out in Hiroshima and Nagasaki, cities where women were exposed to high levels of ionizing radiation because of the atomic bomb. The fact that women consuming high levels of soy protein did not enjoy special protection, however, is very significant. Proponents of soy foods often claim that soy foods provide protection against the growing numbers of carcinogens in the environment. The findings of Key et al prove otherwise, and match the results of animal research in which cancer was induced but soy-protein diets failed to confer protection.

Ingram et al 1997 show that high excretion of both equol and enterolactone were associated with a lowering of breast-cancer risk. There were no associations with the parent phytoestrogens daidzein and matairesinol. This suggests that metabolism of these compounds by the gut microflora may be vitally important. If so, soy protein intake alone would not be the most relevant factor in the lowering breast cancer risk. In several studies Satchell and colleagues have found that some women are equol producers and others are not. Given the fact that equol production can be considered a marker of gastrointestinal health, this study might support the role of a healthy gut in cancer prevention. Recent studies – most notably *Journal of the American Medical Association* (February 18, 2004; 291(7):827-35)—have linked levels of breast cancer risk to levels of antibiotic usage. Antibiotics can affect bacteria in the intestine, which may impact the ways in which foods that might prevent cancer are broken down in the body. Antibiotics may also affect the body's immune response and response to inflammation, which could also be related to the development of cancer. Women with frequent infections treated by antibiotics may also be

generally less healthy as those without such infections, and may therefore be more prone to the development of breast cancer. The accompanying *JAMA* editorial noted that the finding is particularly worrisome as exposure to antibiotics is so prevalent, and often not necessary. *JAMA*'s editors raised the question of whether the use of antibiotics is a risk factor for other cancers, and point to a need for further research to address this concern.

Yuan et al 1995. The researchers state their conclusion very clearly. "Our study does not support the hypothesis that high intake of soy protein protects against breast cancer." Women living in Shanghai and Tianjin consumed 3.5 g/d and 2.8g/d, respectively, levels that are approximately one-third of the average intake reported in the Shanghai Breast Cancer Study (Dai et al 2001, Shu et al 2001). Solae comments: "It is likely that the intake is underestimated in the Yuan study as the study is not specifically designed to evaluate the effect of soy foods and soy intake ascertainment is incomplete." In fact, many researchers have found that soy intake in many parts of China is lower than that given in soy industry figures. Accordingly, factors other than soy need to be looked at in connection with China's low breast cancer rate.

Yamamoto et al 2003. Solae points out the lack of significant relationship between soy foods and breast cancer here might be due to a small number of breast cancer cases. The authors of the study state, "possible associations between breast cancer risk and soy foods that were not statistically significant in our study may be detected among larger sample sizes." This is speculation, and cannot properly be used in defence of a soy protein/cancer reduction health claim.

Wu et al 1996 indicate that the risk of breast cancer decreases significantly with increased tofu intake, but that there is a lack of statistical significance in postmenopausal women. Solae comments: "This appears to be solely an effect of the larger number of

premenopausal than postmenopausal women since the magnitudes of effects are very similar.” However, the researchers found “the association was only significant in women born in Asia and not among women of Asian origin born in the US,” suggesting the presence of other dietary and lifestyle factors.

Hakkak R, Korourian S et al. Solae notes that “feeding rats a diet containing 20% ISP for two generations significantly decreases tumour incidence and increases tumour latency period in F2 offspring compared with the controls fed a casein-based diet.” The study, however, indicates that both whey and SPI caused a reduction in tumour number and increased tumour latency in both the F1 and F2 generations compared to controls. Animals receiving whey exhibited a reduction in tumour incidence but only animals in the subsequent generation fed SPI had a reduced tumour incidence.

Solae also omits mention of Hakkak’s finding of a 1-day advance in vaginal opening observed in the animals fed soy protein isolate compared to those fed whey or control. This is evidence of premature sexual maturation and suggests that increased soy in the food supply could put young girls at increased risk for precocious puberty, itself a well-known risk factor for breast cancer.

den Tonkelaar I, Keinan-Boker L et al. Solae states “A high urinary genistein is associated with a lower risk breast cancer in this study population, although results are not statistically significant.” The researchers, conclusion is more definitive. “We were not able to detect the previously reported protective effects of genistein and enterolactone on breast cancer risk in our postmenopausal population of Dutch women. Such an effect may be smaller than expected and/or limited to specific subgroups of the population.”

* * * * *

We could raise many other questions about the validity of the results of the studies chosen by Solae, but the most damaging evidence is found in studies that Solae chose to exclude. We would like to draw attention to a group of studies showing that soy protein causes the proliferation of breast cancer cells. This not only increases a woman's risk of developing breast cancer but poses special dangers to people already afflicted with breast cancer. The latter group includes not only women who have already been diagnosed with breast cancer, but those in the early stages prior to diagnosis.

We are not alone in this concern. The British government's Committee on Toxicology (COT) writes in Chapter 15 -- Phytoestrogens and Cancer of its "Working Draft on Phytoestrogen" that "Short term dietary supplementation has been shown to cause a proliferative response in premenopausal women with breast disease whereas a proliferative effect was not reported in premenopausal women without breast disease. However, phytoestrogen treatment did induce a weak estrogenic effect in these women as shown by modulation of the levels of the oestrogen responsive gene products apolipoprotein D and pS2 in nipple aspirate."

COT further states: "The animal data on breast cancer is conflicting. A number of studies have shown that genistein has a protective effect in animal models of chemically induced cancer. However, similar experiments using tumour implant models showed that genistein stimulated the growth of implanted mammary tumours both by dietary and subcutaneous administration." The full text of this report can be found at

<http://www.foodstandards.gov.uk/multimedia/webpage/phytoreportworddocs>

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The following studies establish that soy protein (and its constituent isoflavones) have the potential to increase breast cancer risk and disease progression. All quotations included are from the original journal articles.

Dees C, Foster JS et al. Dietary estrogens stimulate human breast cells to enter the cell cycle. *Environ Health Perspect*, 1997, 105, 633-636.

“Genistein, a dietary estrogen, inhibits the growth of breast cancer cells at low doses but additional studies have suggested that genistein stimulates proliferation of breast cancer cells. . . Our findings are consistent with a conclusion that dietary estrogens do not act as anti-estrogens, but act like DDT and estradiol to stimulate breast cancer cells to enter the cell cycle. Women should not consume particular foods (soy derived products) to prevent breast cancer.”

Martin PM, Horwitz KB et al. Phytoestrogen interaction with estrogen receptors in human breast cancer cells. *Endocrinol*, 1978, 103, 5, 1860-1867.

“The interactions of phytoestrogens with estrogen receptors were studied in the human breast cancer cell line, MCF-7. The phytoestrogens are also biologically active; they can markedly enhance tumor cell proliferation. In sum, phytoestrogens interact with the estrogen receptors of human breast cancer cells in culture and, therefore, may affect estrogen-mediated events in these cells.”

Allred CD, Ju YH et al. Dietary genistein stimulates growth of estrogen-dependent breast cancer tumors similar to that observed with genistein. *Carcinogenesis*, 2001b, 22, 1667-1673.

“The estrogenic soy isoflavone, genistein, stimulates growth of estrogen-dependent human breast cancer (MCF-7) cells in vivo. Dietary genistein resulted in increased tumor growth, pS2 expression and cellular proliferation similar to that observed with genistein.

The remaining mice were switched to diets free of genistein and genistein. When mice were placed on isoflavone-free diets, tumors regressed over a span of 9 weeks, metabolism of genistein to genistein occurred. . . . In summary, the glycoside genistein, like the aglycone genistein, can stimulate estrogen-dependent breast cancer cell growth in vivo. Removal of genistein or genistein from the diet caused tumors to regress.”

Allred CD, Allred KF, et al. Soy diets containing varying amounts of genistein stimulate growth of estrogen-dependent (MCF-7) tumors in a dose dependent manner. *Cancer Res*, 2001, 61, 13, 5045-5050.

“We have demonstrated that genistein stimulates growth of estrogen-dependent human breast cancer (MCF-7) cells in vivo (C.Y. Hsieh et al, *Cancer Res*, 58, 3833-3838, 1998). The isoflavones are a group of phytoestrogens that are present in high concentrations in soy. Soy protein diets containing varying amounts of genistein increased estrogen-dependent tumor growth in a dose dependent manner . . . Cell proliferation was greatest in tumors of animals given estrogen or dietary genistein (150 and 300 ppm). . . . Here we present new information that soy protein isolates containing increasing concentrations of genistein stimulate the growth of estrogen-dependent breast cancer cells in vivo in a dose-dependent manner.

Allred CD, Allred KF et al. Dietary genistein results in larger MNU-induced, estrogen dependent mammary tumors following ovariectomy of Sprague-Dawley rats. *Carcinogenesis*, 2004, 25, 2, 211-218.

“The data suggest that in an endogenous estrogen environment similar to that of a postmenopausal woman, dietary genistein can stimulate the growth of a mammary carcinogen MNU-induced estrogen-dependent mammary tumours.”

Allred CD, Allred KF et al. Soy processing influences growth of estrogen-dependent breast cancer tumors in mice. *Carcinogenesis*, May 6, 2004.

“Soy-based products consumed in Asian countries are minimally processed whereas in the U.S. many of the soy foods and soy ingredients are highly processed. Soy foods contain complex mixtures of bioactive compounds which may interact with one another. The objective of this study was to evaluate the ability of various soy products containing genistein, the glycoside form of genistein to affect growth of MCF-7 cells transplanted into ovariectomized athymic mice. . . . Tumors in the negative control animals regressed throughout the study while tumors in the soy flour-fed animals remained basically the same size (neither grew nor regressed). In animals consuming soy molasses, Novasoy[®], mixed isoflavones or genistein alone tumor growth was stimulated when compared to animals consuming a control diet devoid of soy. These same dietary treatments resulted in increased cellular proliferation.”

Hsich CY, Santell RC, et al. Estrogenic effects of genistein on the growth of estrogen receptor-positive human breast cancer (MCF-7) cells in vitro and in vivo. *Cancer Res*, 1998, 58, 3833-3838.

“Genistein, found in soy products, is a phytochemical with several biological activities. In the current study, our research focused on the estrogenic and proliferation-inducing activity of genistein. We have demonstrated that genistein enhanced the proliferation of estrogen-dependent human breast cancer (MCF-7) cells in vitro at concentrations as low as 10nM, with a concentration of 100nM achieving proliferative effects similar to those of 1 nM estradiol.”

Ju YH, Doerge DR et al. Dietary genistein negates the inhibitory effects of tamoxifen on growth of estrogen-dependent human breast cancer (MCF-7) cells implanted in athymic mice. *Cancer Res*, 2002, 1, 62, 9, 2474-2477.

“We investigated interactions between the soy isoflavone, genistein, and an antiestrogen, tamoxifen (TAM), on the growth of estrogen (E)-dependent breast cancer (MCF-7) cells. Dietary genistein negated/overwhelmed the inhibitory effect of TAM on MCF-7 tumor growth, lowered E2 level in plasma and increased expression of E-responsive genes (.e.g. pS2, PR, and cyclin D1). Therefore caution is warranted for postmenopausal women consuming dietary genistein while on TAM therapy for E-responsive breast cancer.”

McMichael -Phillips DF, Harding C et al. Effects of soy-protein supplementation on epithelial proliferation in the histologically normal human breast. *Am J Clin Nutr*, 1998, 68 (6 Suppl), 1431S-1435S.

This study examines the effects of dietary soy supplementation on the proliferation rate of premenopausal histologically normal breast epithelium and the expression of progesterone receptor. The proliferation rate of breast lobular epithelium significantly increased after 14d of soy supplementation when both the day of menstrual cycle and the age of patient were accounted for. . . Short-term dietary soy stimulates breast proliferation; further studies are required to determine whether this due to estrogen agonist activity and to examine the long-term effects of soy supplementation on the pituitary gland and breast.”

de Lemos ML. Effects of soy phytoestrogens genistein and daidzein on breast cancer growth. *Ann Pharmacother*, 2001, 35, 9, 1118-1121.

“OBJECTIVE: To determine whether genistein and daidzein, the major phytoestrogens in soy, can stimulate breast cancer growth. . . . CONCLUSIONS: Genistein and daidzein may stimulate existing breast tumor growth and antagonize the effects of

tamoxifen. Women with current or past breast cancer should be aware of the risks of potential tumor growth when taking soy products.”

Wang C, Kurzer MS. Phytoestrogen concentration determines effects on DNA synthesis in human breast cancer cells. *Nutr Cancer*, 1997, 28, 3, 236-247.

“Our data suggest the possibility that, at typical concentrations in humans, phytoestrogens and related flavonoids and lignans may stimulate, rather than inhibit, growth of estrogen-dependent tumours. . . In conclusion, most of the phytoestrogens and related compounds tested in this study showed stimulation of DNA synthesis in estrogen-dependent MCF-7 cells at low concentrations and inhibition of DNA synthesis in MCF-7 and estrogen-independent MDA-MB-231 cells at high concentrations. Although we observed inhibition at high levels, it is extremely important to consider that, at concentrations close to probable levels in humans, DNA synthesis was significantly induced in MCF-7 cells.”

Ju YH, Allred CD et al. Physiological concentrations of dietary genistein dose-dependently stimulate growth of estrogen-dependent human breast cancer (MCF-7) tumors implanted in athymic nude mice. *J Nutr*, 2001, 131, 11, 2957-2962.

“In conclusion, dietary treatment with genistein at physiological concentrations produces blood levels of genistein sufficient to stimulate estrogenic effects, as breast tumor growth, cellular proliferation and pS2 expression in athymic mice in a dose-resonsive manner similar to that seen in vitro.”

* * * * *

Phytoestrogens such as genistein found in soy protein products can cross the placenta, putting unborn children at risk. We present here two studies that show that perinatal exposure could increase the risk of babies developing breast cancer.

Hilakivi-Clark L, Cho E, Clark R. Maternal exposure to genistein during pregnancy increases carcinogen-induced mammary tumorigenesis in female rat offspring. *Oncol Rep*, 1998, 5, 609-616.

“Human and animal data indicate that a high maternal estrogen exposure during pregnancy increases breast cancer risk among daughters. This may reflect an increase in the epithelial structures that are the sites for malignant transformation, i.e. terminal end buds (TEBs), and a reduction in epithelial differentiation in the mammary gland. Some phytoestrogens, such as genistein, which is a major component in soy-based foods, have estrogenic effects on the reproductive system, breast and brain. .. These findings indicate that maternal exposure to physiological doses of genistein mimics the effects of E2 on the mammary gland and reproductive systems in the offspring. Thus our results suggest that genistein acts as an estrogen in utero, and may increase the incidence of mammary tumors if given through a pregnant mother. “

Yang J, Nakagama H et al. Influence of perinatal genistein exposure on the development of MNU-induced mammary carcinoma in female Sprague-Dawley rats. *Cancer Lett*, 2000, 149 (1-2), 171-179.

“Perinatal genistein is an endocrine disrupter and increases multiplicity of MNU-induced mammary carcinoma in rats.”

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Women are at greater risk for breast cancer if they have abnormal cytology in nipple aspirates of breast fluid. (Wrensch MR, Petrakis NL et al. Breast cancer risk in women with abnormal cytology in nipple aspirates of breast fluid. *J Natl Cancer Inst*, 2001, 5, 93, 23, 1791-1798.). The following study indicates that soy proteins increase breast fluid, cause epithelial hyperplasia and contribute to other abnormalities associated with increased risk of breast cancer.

Petrakis NL. Barnes S et al. Stimulatory influence of soy protein isolate on breast cancer secretion in pre-and postmenopausal women. *Cancer Epidemiol Biomarkers Prev*, 1996, 10, 785-794.

“Soy foods have been reported to have protective effects against premenopausal breast cancer in Asian women. No studies have been reported on potential physiological effects of dietary soy consumption on breast gland function. We evaluated the influence of the long-term ingestion of a commercial soy protein isolate on breast secretory activity. We hypothesized that the features of nipple aspirate fluid (NAF) of non-Asian women would be altered so as to resemble those previously found in Asian women. . . . Of potential concern was the cytological detection of epithelial hyperplasia in 7 of 24 women (29.2%) during the months they were consuming soy protein isolate. The findings did not support our a prior hypothesis. Instead, this pilot study indicates that prolonged consumption of soy protein isolate has a stimulatory effect on the premenopausal female breast, characterized by increased secretion of breast fluid, the appearance of hyperplastic epithelial cells and elevated levels of plasma estradiol. These findings are suggestive of an estrogenic stimulus from the isoflavones genistein and daidzein contained in soy protein isolate.”

Hargreaves DF, Potten CS et al. Two-week soy supplementation has an estrogenic effect on normal premenopausal breast. *J. Clin Endocrinol Metab*, 1999, 84, 4017-4024.

“Short term dietary soy has a weak estrogenic response on the breast, as measured by nipple aspirate apolipoprotein D and pS2 expression. No antiestrogenic effect of soy on the breast was detected.”

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B3.2. Prostate Cancer

Solae states that “the totality of the publicly available scientific evidence supports the substance/disease relationship that consumption of soy protein-containing foods is related to a lower risk of prostate cancer in men.” We submit that the British Committee on Toxicity (COT) is correct when it states in its “Working Draft on Phytoestrogens” that “The epidemiological data on soy intake and prostate cancer are inconsistent” and that concentrations used in animal experiments are “very high compared with the likely dietary exposure levels in humans.”

<http://www.foodstandards.gov.uk/multimedia/webpage/phytoreportworddocs>

Solae seems far more confident about the favorable conclusions in the studies it cites than are the researchers themselves, who often qualify their claims with phrases such as “the findings are not conclusive and require further investigation.” Two examples are: “Possible associations between soy bean products, isoflavones and prostate cancer risk should be further investigated.” (Jacobsen, 1998) “More research is needed on these

dietary factors and the subsequent development of prostate cancer before any firm conclusions can be drawn.” (Severson. 1989)

* * * * *

We contend that many dietary factors may be involved in the reduced rates of prostate cancer in Asia. The following studies indicate that soy consumption is linked to reduced incidences of prostate cancer, but suggest that soy is not the only dietary factor. Green tea, nuts, grains, rice, fish and other foods alone or in combination with or without soy might contribute to the reduced cancer risk. Severson, Kolonel and Hebert are three researchers cited by Solae who help make our case. All quotations in this and other sections are for the words of the researchers.

Severson,K, Nomura AM et al. A prospective study of demographics, diet, and prostate cancer among men of Japanese ancestry in Hawaii. *Cancer Res.* 1989, 1, 49, 7, 1857-1860.

“Prostate cancer incidence was prospectively studied among 7999 men of Japanese ancestry who were first examined between 1965 and 1968 and then followed through 1986. During this surveillance period, 174 incident cases of prostate cancer were recorded. Increased consumption of rice and tofu were both associated with a decreased risk of prostate cancer . . . “

Kolonel LN, Hankin JH et al. Vegetables, fruits, legumes and prostate cancer: a multiethnic case-control study. *Cancer Epidemiol Biomarkers Prev.* 2000, 8, 795-804.

“The evidence for a protective effect of vegetables, fruits, and legumes against prostate cancer is weak and inconsistent. We examined the relationship of these food groups and their constituent foods to prostate cancer risk in a multicenter case-control

study of African-American, white, Japanese, and Chinese men. Cases (n = 1619) with histologically confirmed prostate cancer were identified through the population-based tumor registries of Hawaii, San Francisco, and Los Angeles in the United States and British Columbia and Ontario in Canada. Controls (n = 1618) were frequency-matched to cases on ethnicity, age, and region of residence of the case, in a ratio of approximately 1:1. Intakes of yellow-orange and cruciferous vegetables were also inversely related to prostate cancer, especially for advanced cases, among whom the highest quintile OR for yellow-orange vegetables = 0.67 (P for trend = 0.01) and the highest quintile OR for cruciferous vegetables = 0.61 (P for trend = 0.006). Intake of tomatoes and of fruits was not related to risk. Findings were generally consistent across ethnic groups. These results suggest that legumes (not limited to soy products) and certain categories of vegetables may protect against prostate cancer.”

Hebert JR, Hurley TG et al. Nutritional and socioeconomic factors in relation to prostate cancer mortality: a cross-national study. *Natl Cancer Inst.* 1998, 90, 21, 1637-47.

“CONCLUSIONS: The specific food-related results from this study are consistent with previous information and support the current dietary guidelines and hypothesis that grains, cereals, and nuts are protective against prostate cancer. The findings also provide a rationale for future study of soy products in prostate cancer prevention trials.”

Adlercreutz H. Phyto-oestrogens and cancer. *Lancet Oncol.* 2002. 3, 6, 364-373.

“Whether these observed protective effects are caused by the presence of dietary phyto-oestrogens, or whether they are merely indicators of a healthy diet in general, has not been established.”

Sonoda T, Nagata Y, A case-control study of diet and prostate cancer in Japan: possible protective effect of traditional Japanese diet. *Cancer Sci.* 2004, 95, 3, 238-242.

“The age-adjusted incidence of prostate cancer is low in Japan, and it has been suggested that the traditional Japanese diet, which includes many soy products, plays a preventive role against prostate cancer. We performed a case-control study on dietary factors and prostate cancer in order to assess the hypothesis that the traditional Japanese diet reduces the risk of prostate cancer. . . Consumption of fish, all soybean products, tofu (bean curds), and natto (fermented soybeans) was associated with decreased risk. . . . Our results provide support to the hypothesis that the traditional Japanese diet, which is rich in soybean products and fish, might be protective against prostate cancer.”

Zhou JR, Yu L, Zhong Y, Blackburn GL. Zhou Soy phytochemicals and tea bioactive components synergistically inhibit androgen-sensitive human prostate tumors in mice, *J Nutr.* 2003, 133, 2, 516-21.

“Although high doses of single bioactive agents may have potent anticancer effects, the chemopreventive properties of the Asian diet may result from interactions among several components that potentiate the activities of any single constituent. In Asia, where intake of soy products and tea consumption are very high, aggressive prostate cancer is significantly less prevalent in Asian men. The objective of the present study was to identify possible synergistic effects between soy and tea components on prostate tumor progression in a mouse model of orthotopic androgen-sensitive human prostate cancer. . . . The combination of SPC and green tea synergistically inhibited final tumor weight and metastasis and significantly reduced serum concentrations of both testosterone and DHT in vivo. Inhibition of tumor progression was associated with reduced tumor cell proliferation and

tumor angiogenesis. This study suggests that further research is warranted to study the role of soy and tea combination as effective nutritional regimens in prostate cancer prevention.”

* * * * *

We would like to bring to your attention the following group of human and animal studies omitted from Solae’s “thorough review of the literature.” These studies not only show that soy foods are *not* protective against prostate cancer or are less effective than other dietary agents, but also that soy protein – and its constituent isoflavones -- have been linked to *increased* prostate cancer risk. In addition, these dietary compounds have caused undesirable side effects, including changes to the dimorphic brain region and increased IGF-1 levels.

Urban D, Irwin W et al. The effect of isolated soy protein on plasma biomarkers in elderly men with elevated serum prostate specific antigen. *Clin Cancer Res*, 2001, 7, 1782-1789,

This was a randomized, double blind crossover study in which 34 elderly men with elevated PSA received a soy beverage twice daily for six weeks.

“CONCLUSIONS: This study reveals that short-term exposure of elderly men with elevated serum PSA values to soy protein containing isoflavones decreases serum cholesterol but not the serum biomarkers PSA and p105erbB-2.”

Adams KF, Chen C et al. Soy isoflavones do not modulate prostate-specific antigen concentrations in older men in a randomized controlled trial. *Cancer Epidemiol biomarkers Prev*, 2004, 13, 4, 644-648.

"Mortality rates for prostate cancer are low in Asia but high in the West. One explanation is the high level of soy consumption in Asia. Soy isoflavones reduce prostate tumor growth in many, but not all, animal models. Elevated levels of serum prostate-specific antigen (PSA) are a marker of prostate tumor growth. Our objective was to determine whether 12-month soy isoflavone supplementation would alter serum PSA concentrations in healthy, older men. . . . We found no evidence that a 12-month 83 mg/day isoflavone treatment alters serum PSA concentration or velocity in seemingly healthy men aged 50-80 years."

Bylund A, Zhang JX et al. Rye bran and soy protein delay growth and increase apoptosis of human LNCaP prostate adenocarcinoma in nude mice. *Prostate*. 2000, 1, 42, 4, 304-14.

"CONCLUSIONS: Factors in rye bran and soy protein may inhibit prostate cancer growth. The effect is more apparent for rye than for soy. Further studies are needed to identify the effective substances and to explore the mechanism."

Hirayama T. Epidemiology of prostate cancer with special reference to the role of diet. *Natl Cancer Inst Monogr*, 1979, 53, 149-155.

"This was a prospective epidemiologic study of prostate cancer was conducted in Japan. The 10-year follow-up study of 122,261 men aged 40 years and above, who constitute 94.5% of the census population of 29 Health Center Districts, revealed a significantly lower age-standardized death rate for prostate cancer in men who daily ate green and yellow vegetables. This association is consistently observed in each age-group, in each socioeconomic class, and in each prefecture. Selected epidemiologic phenomena, such as the upward trend of the prostate cancer death rate in Japan, intracountry variation of death rate, the significantly lower incidence rate in Japan compared with that of the United

States, and elevated risk in Japanese migrants to Hawaii, appear to be explained by the variation in diet and change in amount of green and yellow vegetables ingested. The possible role of vitamin A is considered as a factor in preventing and inhibiting growth of prostate cancer. Most of the other factors studied appear noncontributory, except for marital status; a higher risk was observed in 'ever married' men.”

The data from this study indicate a significantly increased risk of prostate cancer associated with the consumption of miso.

Solae states that it chose to exclude studies on miso because it is relatively low in soy protein. However, miso does include soy isoflavones. We therefore believe that the results from this large-scale study are relevant. In addition, Dr. Hirayama offers a convincing alternative explanation as to why the Japanese have lower rates of prostate cancer.

Doerge D, Chang H. Inactivation of thyroid peroxidase by soy isoflavones in vitro and in vivo. *J Chromatogr B. Analyt Technol Biomed Life Sci*, 2002, 777 (1-2), 269.

Drs. Doerge and Chang review the evidence in humans and animals for anti-thyroid effects of soy and its principal isoflavones, genistein and daidzein. They note that genistein interferes with estrogen receptors in rat prostate glands which “. . . may have implications for reproductive toxicity and carcinogenesis that warrant further investigation.”

Lephart ED, Adlercreutz H, Lund TD. Dietary soy phytoestrogen effects on brain structure and aromatase in Long-Evans rats. *Neuroreport*. 2001, 16; 12, 16,:3451-3455.

“We found that dietary phytoestrogens: significantly decrease body and prostate weights, do not alter brain aromatase levels and significantly change during adulthood the structure of the sexually dimorphic brain region (i.e. anteroventral periventricular nucleus; AVPV) in male, but not in female rats. Since most commercial animal diets contain

significant concentrations of phytoestrogens their influence on brain structure should be considered.”

Spentzos D, Mantzoros C et al. Minimal effect of a low-fat/high soy diet for asymptomatic, hormonally naive prostate cancer patients. *Clin Cancer Res.* 2003 15, 9, 9, 3282-3287.

“PURPOSE: The effects of a low-fat diet or a low-fat diet with the addition of a soy supplement were investigated in a pilot Phase II study for asymptomatic, hormonally naive prostate cancer patients with rising prostate-specific antigen (PSA) levels. . . CONCLUSIONS: A low-fat diet with the subsequent addition of a soy supplement did not result in a significant decline in PSA levels. The addition of soy protein had a modest effect on TTP. A potentially undesirable effect associated with the administration of soy was an increase in IGF-I serum levels.”

Cohen LA, Zhao Z, Pittman B, Scimeca J. Effect of soy protein isolate and conjugated linoleic acid on the growth of Dunning R-3327-AT-1 rat prostate tumors. *Prostate.* 2003, 54, 3, 169-180.

“BACKGROUND: Epidemiologic and animal model studies suggest that consumption of soy isoflavones may be associated with reduced risk of prostate cancer (PC). In addition, animal model studies suggest that conjugated linoleic acid (CLA), a natural positional isomer of linoleic acid, inhibits tumor growth in various models, including models of PC. RESULTS: The results of this study indicate that neither an isoflavone-rich soy protein isolate (SPI), nor CLA inhibit the in vivo growth and development of prostate tumor cells when administered in the diet either singly or in combination. Moreover, at the highest concentrations SPI and CLA (i.e., 20% SPI, 1% CLA), there was a statistically significant increase in tumors volume over controls. Administration of SPI at 10% in the diet also enhanced tumor growth, whereas at 5%, SPI exerted no measurable effect. CLA administration alone had no

observable effects on AT-1 tumor growth. . . CONCLUSION: These results, in an established rat model, suggest caution in using isoflavone-rich SPI in human studies involving advanced hormone-refractory prostate cancer until further investigation of these effects are completed. “

Probst-Hensch NM, Wang H et al. Determinants of circulating insulin-like growth factor I and insulin-like growth factor binding protein 3 concentrations in a cohort of Singapore men and women. *Cancer Epidemiol Biomarkers Prev.* 2003, 8, 739-746.

“Variation in the circulating concentrations of the insulin-like growth factor (IGF) system has been implicated in the etiology of chronic diseases including cancer (prostate, breast, colon, and lung), heart disease, type 2 diabetes, and osteoporosis. We searched for sociodemographic, anthropometric, reproductive, lifestyle, and dietary determinants of IGF-I and insulin-like growth factor binding protein (IGFBP) -3 serum concentrations . . . Intake of soy was associated positively with IGF-I and molar ratio concentrations, but only in men. The results of this study lend additional support to the hypothesis that circulating IGF-I concentrations increase the risk of prostate, bladder, colorectal, and breast cancer.”

Jenkins DJ, Kendall CW et al. Soy consumption and phytoestrogens: effect on serum prostate specific antigen when blood lipids and oxidized low-density lipoprotein are reduced in hyperlipidemic men. *J Urol.* 2003, 169, 2, 507-511.

”PURPOSE: Herbal remedies high in phytoestrogens have been shown to reduce serum prostate specific antigen (PSA) and have been proposed as a treatment for prostate cancer. Soy proteins used to lower serum cholesterol are rich sources of phytoestrogens. Therefore, we assessed the effect of soy consumption on serum PSA in men who had participated in cholesterol lowering studies. . . MATERIALS AND METHODS: For 3 to 4 weeks 46 healthy middle-aged men with a range of starting PSA values took soy (mean 44 gm. soy

protein daily, 116 mg. isoflavones daily) or control foods, and a subgroup of men took a lower level of soy supplements for 3 months. PSA was measured at the start and end of each treatment. RESULTS: Soy had no significant effect on serum total or free PSA, independent of PSA starting value or isoflavone intake. . . “

Cohen LA, Zhao Z, Pittman B, Scimeca J. Effect of soy protein isolate and conjugated linoleic acid on the growth of Dunning R-3327-AT-1 rat prostate tumors.

Prostate. 2003, 54, 3, 169-180.

“BACKGROUND: Epidemiologic and animal model studies suggest that consumption of soy isoflavones may be associated with reduced risk of prostate cancer (PC). In addition, animal model studies suggest that conjugated linoleic acid (CLA), a natural positional isomer of linoleic acid, inhibits tumor growth in various models, including models of PC. . .

.RESULTS: The results of this study indicate that neither an isoflavone-rich soy protein isolate (SPI), nor CLA inhibit the in vivo growth and development of prostate tumor cells when administered in the diet either singly or in combination. Moreover, at the highest concentrations SPI and CLA (i.e., 20% SPI, 1% CLA), there was a statistically significant increase in tumors volume over controls. Administration of SPI at 10% in the diet also enhanced tumor growth, whereas at 5%, SPI exerted no measurable effect. CLA

administration alone had no observable effects on AT-1 tumor growth. CONCLUSION: These results, in an established rat model, suggest caution in using isoflavone-rich SPI in human studies involving advanced hormone-refractory prostate cancer until further investigation of these effects are completed.”

Santti Developmental estrogenization and prostatic neoplasia. *Prostate*, 1994, 24, 2, 67-78.

“Evidence indicates that estrogen exposure during development may initiate cellular changes in the prostate which would require estrogens and/or androgens later in life for promotion of prostatic hyperplasia or neoplasia. . . The critical time for estrogen action would be during the development of prostatic tissue. We further suggest that estrogen-sensitive cells may remain in the prostate and be more responsive to estrogens alter in life or less responsive to the normal controlling mechanisms of prostate growth” In other words, a male fetus exposed to soy phytoestrogens from his mother’s diet would be more likely to develop prostate cancer later in life.

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Pollard M, Wolter W, Sun L. Diet and the duration of testosterone-dependent prostate cancer in Lobund-Wistar rats. *Cancer Lett.* 2001, 173, 2, 127-131.

In its petition Solae sums this study up as follows: “Providing rats an ISP diet during age 12-24 months, the stage of spontaneous prostate tumor development, significantly reduces tumor incident compared with the controls on a soy meal diet.”

The researchers, however, conclude their abstract with this revealing statement: “Dietary soymeal found in most natural ingredient diets may promote PC tumorigenesis, but only in L-W rats.” L-W rats were developed, in the words of these researchers as “a unique model of spontaneous prostate cancer (PC)” that “shares many of its characteristics with the natural history of PC in man, including (a) inherent predisposition, high production of testosterone and aging risk factors, (b) endogenous tumorigenic mechanisms, and (c) early stage testosterone-dependent and late stage testosterone-independent tumors.”

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Several studies suggest that if soy reduces rates of prostate cancer it might do so only for equol producers. If so, all males in the population would not stand to benefit from soy protein consumption. Also, green tea might be a factor in equol production.

Akaza H, Miyanaga N et al. Comparisons of percent equol producers between prostate cancer patients and controls: case-controlled studies of isoflavones in Japanese, Korean and American residents. *Jpn J Clin Oncol.* 2004, 34, 2, 86-89.

BACKGROUND: Our previous case-control study revealed that the Japanese residents in Japan could be divided into those who are able to degrade daidzein, a soybean isoflavone, to equol and those without this ability, and that the incidence of prostate cancer is higher in the latter group. . . CONCLUSIONS: These results suggest that the ability of producing equol or equol itself is closely related to the lower incidence of prostate cancer.

Miyanaga N, Akaza H et al. Higher consumption of green tea may enhance equol production. *Asian Pac J Cancer Prev.* 2003, 4, 4, 297-301

BACKGROUND: Our previous case-control study revealed that Japanese living in Japan and Koreans living in Korea can be divided into equol producers who have an ability to metabolize daidzein to equol and non-producers, and that the incidence of prostate cancer is higher in the latter group. In the present study, we examined relationships between type of food intake and the capacity for equol production in Japanese subjects. CONCLUSIONS: Our results suggest that higher consumption of soybean and green tea are strongly related to the establishment of a capacity for equol production.

Akaza H, Miyanaga N et al. Is daidzein non-metabolizer a high risk for prostate cancer? A case-controlled study of serum soybean isoflavone concentration. *Jpn J Clin Oncol.* 2002, 32, 8, 296-300

“Equol itself or some unknown factor regulating the metabolism of daidzein is deeply

involved in the biology of prostate cancer. Future studies are urgently needed to compare the incidence of daidzein metabolizers among various countries.”

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Finally, Solae has omitted discussion of the prevailing theories about why soy might be protective against the development of prostate cancer. Prostate cancer is generally thought to be dependent on exposure to male reproductive hormone. If soy confers protection, it is by altering endogenous hormone concentrations – by decreasing testosterone and androgen levels and estrogenizing men. While this might have valid pharmaceutical applications in cancer treatment, it seems inadvisable as a preventative treatment for the entire male population.

B.3.3. Gastro-Intestinal Cancer

In this section Solae states that a “thorough review of these studies reveals that consumption of soy foods is related to a lower incidence of gastro-intestinal cancer in humans.” To reach this conclusion, Solae had to omit numerous studies showing adverse effects.

The British Committee on Toxicology (COT) states that epidemiological studies exploring the relationship between soy consumption and the risk of stomach and colo-rectal cancer have “provided inconsistent results.”

<http://www.foodstandards.gov.uk/multimedia/webpage/phytoreportworddocs>

Solae has found consistency, in part, because it purposely eliminated all studies pertaining to fermented soy products on the grounds that they are not as high in protein as other soy foods. Increased rates of stomach and colorectal cancer have been found among people eating many fermented foods, including miso and other fermented soy products.

Solae has also incorporated all negative findings into its meta-analyses. This had the effect of obscuring the conclusions of **Nagata et al 2000**, an important study which showed that soy protein was associated with a lowered risk of stomach cancer but also with a higher risk of death from colorectal cancer. It hardly seems appropriate to claim benefit for a food that might prevent stomach cancer but put a person at higher risk for colon cancer.

Solae has also claimed benefits for soy protein based on studies in which the authors found their most significant associations with raw vegetables, green vegetables and allium-containing foods such as garlic and onions. We have summarized below important findings from several important studies pertaining to dietary intake and gastrointestinal cancer. The studies by Gao, Ji, Lee, Hoshiyama, Shinchi, Takezaki, Nogoan and Ahn are studies in which the soy protein findings were exaggerated by Solae. Indeed, most provide excellent support for the FDA's health claim for fruits and vegetables preventing cancer, but cannot be used to support a health claim for soy protein.

Gao CM, Takezaki T et al. Protective effect of allium vegetables against both esophageal and stomach cancer: a simultaneous case-referent study of a high-epidemic area in Jiangsu Province, China. *Jpn J Cancer Res.* 1999 Jun;90(6):614-21.

To study the relation between allium vegetable intake and cancer of the esophagus (EC) and stomach (SC) in Yangzhong city, which is one of the highest-risk areas for these cancers in Jiangsu province, China The results showed that frequent intake of allium vegetables (including garlic, onion, Welsh onion and Chinese chives), raw vegetables,

tomatoes and snap beans, and tea consumption were inversely associated with the risk for EC and SC. . . . The main results in the present study suggested that allium vegetables, like raw vegetables, may have an important protecting effect against not only stomach cancer, but also esophageal cancer.

Ji BT, Chow WH et al. Dietary habits and stomach cancer in Shanghai, China. *Int J Cancer*. 1998, 76, 5, 659-64.

“ . . . Risks of stomach cancer were inversely associated with high consumption of several food groups, including fresh vegetables and fruits, poultry, eggs, plant oil, and some nutrients, such as protein, fat, fiber and antioxidant vitamins. By contrast, risks increased with increasing consumption of dietary carbohydrates. . . . Similar increases in risk were associated with frequent intake of noodles and bread in both men . . . and women . . . In addition, elevated risks were associated with frequent consumption of preserved, salty or fried foods, and hot soup/porridge, and with irregular meals, speed eating and binge eating. . . . Our findings add to the evidence that diet plays a major role in stomach cancer risk and suggest the need for further evaluation of risks associated with carbohydrates and starchy foods as well as the mechanisms involved.”

Lee JK, Park BJ et al. Dietary factors and stomach cancer: a case-control study in Korea. *Int J Epidemiol*. 1995, 24, 1, 33-41.

“ . . . An increased risk of stomach cancer was noted among those with high consumption of stewed foods such as soybean paste stew and hot pepper-soybean stew, broiled fish, and those who liked salty food. However, mung bean pancake, tofu (soybean curd), cabbage, spinach, and sesame oil decreased the risk of stomach cancer. Stratified analysis by salt in combined foods, such as stewed foods and pickled vegetables, disclosed salt as being an important risk factor. . . . ”

Takezaki T, Gao CM et al. Comparative study of lifestyles of residents in high and low risk areas for gastric cancer in Jiangsu Province, China; with special reference to allium vegetables. *J Epidemiol.* 1999, 9, 5, 297-305.

“There is a low risk area for gastric cancer in Jiangsu Province, China, where people frequently consume raw allium vegetables. The results of the survey suggest that frequent consumption of allium vegetables, in addition to other anticancer foods, may be a factor in low mortality for gastric cancer.”

Ngoan LT, Mizoue T et al. .Dietary factors and stomach cancer mortality. *Br J Cancer.* 2002;87, 1, :37-42.

“The present study examined the relationship between stomach cancer and the low intake of fresh fruit and vegetables and/or a high intake of pickled, preserved or salted foods and frequent use of cooking oil. During 139,390 person-year of follow-up of over 13,000 subjects, 116 died from stomach cancer. . . . controlling for age, sex, smoking and other dietary factors, a significant decline was found with a high consumption of green and yellow vegetables Reductions of between 40 and 50% were also observed with a high consumption of fresh foods (fruit, cuttle fish, tofu, and potatoes), but these associations were not statistically significant. The risk was significantly increased by the high consumption of processed meat . . . “

Shinchi K, Ishii H et al. .Relationship of cigarette smoking, alcohol use, and dietary habits with Helicobacter pylori infection in Japanese men. *Scand J Gastroenterol.* 1997 32, 7, 651-655. .

“. . . . Unexpectedly, the consumption of tofu (soybean curd) was significantly, negatively related to the infection The seropositivity was unrelated to the consumption of pickled vegetables, soy paste soup, green tea, or garlic. . . . The findings suggest that fresh

vegetables may be protective against *H. pylori* infection. The study does not support either an increased risk of the infection associated with salty foods or a protective effect of green tea or garlic.”

{*H. pylori* is a major risk factor in stomach cancer}

Ahn YO. Diet and stomach cancer in Korea. *Int J Cancer*. 1997; Suppl 10, 7-9.

“An increased risk of stomach cancer was noted among people who frequently consume broiled meats and fishes, salted side dishes (salted/fermented fish products) and salty stewed foods, such as soybean paste thick stew. Frequent consumption of mung bean pancake, tofu, cabbage, spinach and sesame oil decreased the risk. In a recent cohort study in Seoul, green vegetables and soybean foods were associated with a decreased risk of stomach cancer. Case-control and cohort studies have reported that ginseng intake decreased the risk of gastric cancer.”

Nomura AM, Hankin JH et al. Case-control study of diet and other risk factors for gastric cancer in Hawaii (United States). *Cancer Causes Control*. 2003, 14, 6, 547-558.

“The consumption of all vegetables, mainly dark green, light green, and yellow vegetables, reduced risk. Many of these vegetables contain beta-carotene, vitamin C, vitamin E or folate, which were also inversely related to gastric cancer risk. When these nutrients were analyzed simultaneously, the inverse association was mainly with beta-carotene. . . . These findings provide additional support that the consumption of dark green and yellow vegetables are protective against adenocarcinoma of the distal stomach.”

Hoshiyama Y, Sasaba T A case-control study of stomach cancer and its relation to diet, cigarettes, and alcohol consumption in Saitama Prefecture, Japan. *Cancer Causes Control*. 1992 3, 5, 441-448.

“ . . . The consumption of raw vegetables was inversely related to the risk of stomach cancer, with a dose-response relation observed consistently in the comparisons with both sets of controls. In the multiple logistic regression, the consumption of raw vegetables showed a protective effect on stomach cancer while cigarette smoking had no significant association, in both sets of controls.

Lee HH, Wu HY, et al. Epidemiologic characteristics and multiple risk factors of stomach cancer in Taiwan *Anticancer Res.* 1990, 10, 4, :875-81

“Comparison of the incidence of stomach cancer among Chinese in different countries showed a much lower incidence among Chinese in the USA than those in southeastern Asia. A hospital-based matched case-control study carried out in Taipei metropolitan areas showed a positive association of stomach cancer with blood type A, chronic gastric diseases, cigarette smoking, alcohol drinking, green tea drinking as well as consumption of salted meat, cured meat, smoked food, fried food and fermented beans. There was also a significant negative association between the disease and the consumption of milk.”

McKeown-Eyssen, GE, Bright-See E. Dietary factors in colon cancer: international relationships. *Nutr Cancer*, 1984, 6, 160-170.

This cross-cultural study of 38 countries found no association between soybean intake and risk of colon cancer.

Chyou PH, Nomura AM et al. A case-cohort study of diet and stomach cancer. *Cancer Res.* 1990, 50, 23, 7501-7504.

“ . . . We found that the consumption of all types of vegetables was protective against stomach cancer. . . . Similar but weaker protective effects from consumption of green and cruciferous vegetables were also observed. In addition, an inverse association between

stomach cancer risk and intake of fruits was noted . . . but this inverse trend was weakened after the effect of cigarette smoking was taken into account. There were no other dietary factors significantly associated with the risk of gastric cancer

You WC, Blot WJ et al. Diet and high risk of stomach cancer in Shandong, China. *Cancer Res.* 1988; 48, 12, 3518-23.

“ . . . A case-control investigation involving interviews with 564 stomach cancer patients and 1131 population-based controls was conducted to evaluate reasons for the exceptionally high rates of stomach cancer in Linqu, a rural county in Shandong Province in northeast China. Daily consumption of sour pancakes, a fermented indigenous staple, was associated with a 30% increase in risk. . . . risks tended to decrease in proportion to increasing consumption of fresh vegetables and fruits. This protective effect was more pronounced for vegetables, with those in the highest quartile of intake at less than one-half the risk of those in the lowest. Stomach cancer risks also declined with increasing dietary intake of carotene, vitamin C, and calcium, but not retinol. “

Galanis DJ, Kolonel LN et al. Intakes of selected foods and beverages and the incidence of gastric cancer among the Japanese residents of Hawaii: a prospective study. *Int J Epidemiol.* 1998, 27, 2, 173-180

“ The combined intake of fresh fruit and raw vegetables was inversely associated with the risk of gastric cancer in the total cohort, and among the men no significant relationships were found between gastric cancer incidence and the intake of pickled vegetables, miso soup, dried or salted fish, or processed meats among either gender. . . .”

Hu JF, Lin YY et al. Diet and cancer of the colon and rectum: a case-control study in China. *Int J Epidemiol,* 1991, 20, 362-367.

. . . Vegetables, particularly green vegetables, chives and celery, have a strong protective effect against colorectal cancer. Reduced consumption of meat, eggs, bean products and grain was associated with increasing risk for cancer of the rectum. Alcohol intake was found to be an important risk factor for developing colon cancer and male rectal cancer. . . “

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Solae omitted several key studies that link soy protein to the development of intestinal cancers or that document precancerous damage caused by soy protein.

McIntosh GH, Regester GO et al. Dairy proteins protect against dimethylhydrazine-induced intestinal cancers in rats. *J Nutr*, 1995, 125, 809-816.

“ . . . The tumor data indicated that dietary whey protein and casein were more protective against the development of intestinal cancers in rats than were the red meat and soybean diets. No statistically significant difference was observed between the effects of casein and the effects of whey protein. In addition, no significant difference in tumor incidence or burden could be measured between the animals fed the red meat diet and those fed the soybean protein diet. . . . Our data also suggest that, like meat, soybean may not be an optimal source of protein for the gastrointestinal tract,

Govers MJ, Lapre JA et al. Dietary soybean protein compared with casein damages colonic epithelium and stimulates colonic epithelial proliferation in rats. *J Nutr* 1993, 123, 1709-1713.

“ . . . epithelial cell damage and proliferation of colonic epithelium (measured as in vivo incorporation of tritiated thymidine into DNA) were greater in rats fed soybean protein. The stimulation of colonic proliferation by soybean protein is consistent with the observed

increase in luminal cytolytic activity and epithelial cell damage. We conclude that the stimulatory effect of soybean protein on endogenous magnesium excretion is due to a soybean protein-specific damage of colonic epithelial cells, which results in a compensatory epithelial cell hyperproliferation. “

{Cell proliferation has been identified as an early biomarker of colon cancer risk.}

Davies MJ, Bowey EA et al. Effects of soy or rye supplementation of high-fat diets on colon tumour develop in azoxymethane-treated rats. *Carcinogenesis*, 1999, 20, 927-931.

“... Demonstrated that soy (250 mg isoflavones/kg diet) did not protect against experimentally induced colon cancer in rats. Indeed those given isoflavones had increased numbers of small ACF, thought to be markers for the disease, at 12 weeks. However a diet containing 30% rye bran significantly reduced the number of colon tumors. Although there was no change in the total number of ACF at 12 weeks, with the rye diet, the total number of large ACF was reduced. . . These results suggest that soy isoflavones have no effect on the frequency of colonic tumours in this model while rye bran supplementation decreases the frequency of colon cancer. This effect is due not to a decrease in early lesions but in their progression to larger multi-crypt ACF. The study also supports the hypothesis that larger ACF are more predictive of subsequent tumorigenicity.”

Soybeans also contain antinutrients known as lectins that bind to the villi and crypt cells of the small intestine. Lectin binding contributes to cell death, a shortening of the villi, a diminished capacity for digestion and absorption, cell proliferation in the crypt cells, interference with hormone and growth factor signaling and unfavorable population shifts among the microbial flora. All these factors contribute towards intestinal cancers.

The following studies are relevant:

Jindal S, Soni GL, Singh R. Biochemical and histopathological studies in albino rats fed on soyabean lectin. *Nutr Rep Inter*, 1984, 29, 95-106.

Torres-Pinedo R. Lectins and the intestine. *J Pediatr Gastroenterol Nutr*, 1983, 2, 588-594.

Ament ME, Rubin CE. Soy protein – another cause of the flat intestinal lesion. *Gastroenterol*, 1972, 62, 2, 227-234.

Poley JR, Klein AW. Scanning electron microscopy of soy protein-induced damage of small bowel mucosa in infants. *J. Pediatr Gastroenterol Nutr*, 1983, 2, 2, 271-287

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Finally, Solae claims that soy protein is a high-quality, complete protein, containing all the essential amino acids. The sulfur containing amino acid methionine, however, is so underrepresented in soy protein that it must be added to soy infant formula and to soy-based animal feeds. This deficiency makes soy protein a questionable food for colon cancer prevention. As the following studies indicate, methionine has been shown to be prevent colon cancer.

Fuchs CS, Willett WC et al. The influence of folate and multivitamin use on the familial risk of colon cancer in women. *Cancer Epidemiol Biomarkers Prev*. 2002 Mar;11(3):227-34.

Low intake of folate and methionine and heavy alcohol consumption have been associated with an increased overall risk of colon cancer, possibly related to their role in methylation pathways. . . . Our results suggest that higher intake of folate and methionine, regular use of multivitamins containing folate, and avoidance of moderate to heavy alcohol consumption may diminish the excess risk of colon cancer associated with a family history of the disease.

Giovannucci E, Stampfer MJ et al. ,Folate, methionine, and alcohol intake and risk of colorectal adenoma. *J Nutr.* 1993 Oct;123(10):1709-13J.

“ . . . The apparent protective effect of fresh fruits and vegetables, the major folate sources, on colorectal cancer incidence suggests that a methyl-deficient diet contributes to occurrence of this malignancy. Low dietary folate and methionine and high intake of alcohol may reduce levels of S-adenosylmethionine, which is required for DNA methylation. . . .CONCLUSIONS: Folate, alcohol, and methionine could influence methyl group availability, and a methyl-deficient diet may be linked to early stages of colorectal neoplasia. A dietary pattern that increases methyl availability could reduce incidence of colorectal cancer. . . . “

APPENDIX III: SCIENTIFIC EVIDENCE – OTHER CANCERS

Solae provides summaries of a number of studies that “reflect a trend that consumption of soyfoods is related to a lower risk of cancerous diseases. However, the number of studies is limited and findings are not consistent in certain types of cancers.”

We would agree that the studies are inconsistent and sometimes contradictory. However,we do not agree that the number of studies is limited; in fact, there are a large number of studies related to thyroid and pancreatic cancers as well as two studies that implicate soy in the development of childhood leukemia.

The American Cancer Society reports that overall thyroid cancer incidence across all ages and races is now increasing at 1.4 percent per year and that incidences rose 42.1 percent between 1975 and 1996, with the largest increases among women. Thyroid carcinoma is one of the most common cancers among US children and adolescents, with approximately 75 percent occurring to adolescents between the ages of 15 and 19. The National Cancer Institute (NCI) comments

that “the preponderance of thyroid cancer in females suggest that hormonal factors may mediate disease occurrence.” “Hormonal factors” could include the phytoestrogens in soy protein products.

There is also substantial body of evidence proving that the antinutrients known as protease inhibitors (or trypsin inhibitors) in soy causes pancreatic hyperplasia, a precursor to pancreatic cancer. It may not be coincidental that pancreatic cancer recently moved up to fourth place as a cause of cancer deaths in men and women in the United States as consumption of soyfoods in this country has increased. In the 1970s and 1980s, several researchers studying protease-inhibitor damage on the pancreas noted that pancreatic cancer had then moved up to fifth place and wondered whether there might be a soybean-protease inhibitor connection. The fact that this ongoing rise has occurred along with a rise in the human consumption of soybeans does not prove cause and effect. However, looking at the increase in pancreatic cancer cases alongside pertinent animal studies is suggestive -- and sobering. No one appreciates the safety issues better than Irvin E. Liener, Ph.D, a leading expert on plant toxins and antinutrients. In 1998, he warned that “Soybean trypsin inhibitors do in fact pose a potential risk to humans when soy protein is incorporated into the diet.” (Liener IE. Letter to Dockets Management Branch, Food and Drug Administration, December 31, 1998).

Finally, Solae fails to open a discussion about soy protein’s link to immune system suppression, a possibility that further undermines any assertion that soy protein affords protection against cancer.

The following studies support our position that the claim that soy protein prevents cancer cannot be justified.

Divi RL, Chang HC, Doerge DR. Anti-thyroid isoflavones from soybean: isolation, characterization, and mechanisms of action. *Biochem Pharmacol.* 1997. 10, 1087-96.

"The soybean has been implicated in diet-induced goiter by many studies. The extensive consumption of soy products in infant formulas and in vegetarian diets makes it essential to define the goitrogenic potential. In this report, it was observed that an acidic methanolic extract of soybeans contains compounds that inhibit thyroid peroxidase- (TPO) catalyzed reactions essential to thyroid hormone synthesis. . . . Because inhibition of thyroid hormone synthesis can induce goiter and thyroid neoplasia in rodents, delineation of anti-thyroid mechanisms for soy isoflavones may be important for extrapolating goitrogenic hazards identified in chronic rodent bioassays to humans consuming soy products."

Divi RL, Doerge DR Inhibition of thyroid peroxidase by dietary flavonoids. *Chem Res Toxicol.* 1996, 9, 1, 16-23.

"Flavonoids are widely distributed in plant-derived foods and possess a variety of biological activities including antithyroid effects in experimental animals and humans. . . . These inhibitory mechanisms for flavonoids are consistent with the antithyroid effects observed in experimental animals and, further, predict differences in hazards for antithyroid effects in humans consuming dietary flavonoids. In vivo, suicide substrate inhibition, which could be reversed only by de novo protein synthesis, would be long-lasting. However, the effects of reversible binding inhibitors and alternate substrates would be temporary due to attenuation by metabolism and excretion. The central role of hormonal regulation in growth and proliferation of thyroid tissue suggests that chronic consumption of flavonoids, especially suicide substrates, could play a role in the etiology of thyroid cancer."

Sheehan DM. Herbal medicines, phytoestrogens and toxicity: risk:benefit considerations. *Proc Soc Exp Biol Med.* 1998, 217, 3, 379-85.

“There are several suggested health benefits of phytoestrogens, particularly those found in soy products. Herbal medicines are also widely thought to confer health benefits. Additionally, drugs are prescribed to improve human health, but unlike phytoestrogens and herbal medicines, toxicities are defined in experimental animals and monitored in humans before and after marketing. Knowledge of toxicity is crucial to decrease the risk:benefit ratio; this knowledge defines appropriate conditions for use and strategies for development of safer products. However, our awareness of the toxicity of herbal medicines and phytoestrogen-containing foods is dramatically limited compared to drugs. Some aspects of the toxicity of herbal medicines are briefly reviewed; it is concluded that virtually all of our knowledge is derived from human exposures leading to acute toxicities. Importantly, detection of toxicity is sporadic, and little information is available from prior animal experimentation. Additionally, well-organized monitoring of human populations (as occurs for drugs) is virtually nonexistent. Important toxicities with long latencies are particularly difficult to associate with a causative agent during or even after large scale exposures, as exemplified by tobacco smoking and lung cancer; estrogen replacement therapy and endometrial cancer; diethylstilbestrol and reproductive tract cancers; and fetal alcohol exposure and birth defects. These considerations suggest that much closer study in experimental animals and human populations exposed to phytoestrogen-containing products, and particularly soy-based foods, is necessary. Among human exposures, infant soy formula exposure appears to provide the highest of all phytoestrogen doses, and this occurs during development, often the most sensitive life-stage for induction of toxicity. Large, carefully controlled studies in this exposed infant population are a high priority.”

Newbold RR, Banks EP et al. Uterine adenocarcinoma in mice treated neonatally with genistein. *Cancer Res.* 2001 Jun 1;61(11):4325-8.

“The developing fetus is uniquely sensitive to perturbation with estrogenic chemicals. The carcinogenic effect of prenatal exposure to diethylstilbestrol (DES) is the classic example. Because phytoestrogen use in nutritional and pharmaceutical applications for infants and children is increasing, we investigated the carcinogenic potential of genistein, a naturally occurring plant estrogen in soy, in an experimental animal model previously reported to result in a high incidence of uterine adenocarcinoma after neonatal DES exposure. Outbred female CD-1 mice were treated on days 1-5 with equivalent estrogenic doses of DES (0.001 mg/kg/day) or genistein (50 mg/kg/day). At 18 months, the incidence of uterine adenocarcinoma was 35% for genistein and 31% for DES. These data suggest that genistein is carcinogenic if exposure occurs during critical periods of differentiation. Thus, the use of soy-based infant formulas in the absence of medical necessity and the marketing of soy products designed to appeal to children should be closely examined.”

Doerge DR, Sheehan DM. Goitrogenic and estrogenic activity of soy isoflavones. *Environ Health Perspect*, 2002, 110, suppl 3, 349-353.

“Soy is known to produce estrogenic isoflavones. Here we briefly review the evidence for binding of isoflavones to the estrogen receptor, in vivo estrogenicity and developmental toxicity, and estrogen developmental carcinogenesis in rats. . . Although safety testing of natural products, including soy products, is not required, the possibility that widely consumed soy products may cause harm in the human population via either or both estrogenic and goitrogenic activities is of concern.”

Whitten PL, Lewis C et al. Potential Adverse Effects of phytoestrogens. *J Nutr*, 1995, 125, 771S-776S.

“Evaluation of the potential benefits and risks offered by naturally occurring plant estrogens requires investigation of their potency and sites of action when consumed at natural dietary concentrations. . . . These findings illustrate the broad range of actions of these natural estrogens and the variability in potency across endpoints. This variability argues for the importance of fully characterizing each phytoestrogen in terms of its sites of action, balance of agonistic and antagonistic properties, natural potency, and short-term and long-term effects.”

‘ **Strauss L, Santti R et al.** Dietary phytoestrogens and their role in hormonally dependent disease. *Toxicol Lett*, 1998, 28, 102-103, 349-354.

“Epidemiological studies suggest that diets rich in phytoestrogens (plant estrogens), particularly soy and unrefined grain products, may be associated with low risk of breast and prostate cancer. It has also been proposed that dietary phytoestrogens could play a role in the prevention of other estrogen-related conditions, namely cardiovascular disease, menopausal symptoms and post-menopausal osteoporosis. However, there is no direct evidence for the beneficial effects of phytoestrogens in humans. All information is based on consumption of phytoestrogen-rich diets, and the causal relationship and the mechanisms of phytoestrogen action in humans still remain to be demonstrated. In addition, the possible adverse effects of phytoestrogens have not been evaluated. It is plausible that phytoestrogens, as any exogenous hormonally active agent, might also cause adverse effects in the endocrine system, i.e. act as endocrine disrupters.”

Whitten PL, Patisaul HB. Cross-species and interassay comparisons of phytoestrogen actions. *Envir Health Perspect*, 2001, 109, Suppl 1, 5-20.

“In vivo data show that phytoestrogens have a wide range of biologic effects doses and plasma concentrations seen with normal human diets. Significant in vivo responses have

been observed in animal and human tests for bone, breast, ovary, pituitary, vasculature, prostate and serum lipids. . Steroidogenesis and hypothalamic-pituitary-gonadal axis appear to be important loci of phytoestrogen actions, but these inferences must be tentative because good dose-response data are not available for many end-points.”

Anderson D, Dobrzynska MM, Basaran N. Effect of various genotoxins and reproductive toxins in human lymphocytes and sperm in the Comet assay. *Teratog Carcinog Mutagen.* 1997;17(1):29-43.

“There have been conflicting reports as to whether the mean sperm count in some men has diminished over the last 50 years. The downward trend has been suggested to coincide with an increase in exposure to estrogen-like compounds. These estrogenic substances are ubiquitous in the environment. We have examined the effect of such substances (diethylstilbestrol, beta-estradiol, daidzein, genestein, and nonylphenyl) in the single cell gel electrophoresis assay (Comet assay) in human sperm and compared responses with those from human peripheral lymphocytes in the same donor and in peripheral lymphocytes from a female donor. In addition, effects from the estrogens have been compared to those from known reprotoxins and genotoxins. These include lead sulfate, nitrate and acetate, dibromochloropropane, ethylene glycol monoethyl ether, 1,2-epoxybutene, and 1,2,3,4-diepoxybutane. All compounds produced positive responses, but ethylene glycol monoethyl ether only produced positive responses in sperm cells in the male and not in peripheral lymphocytes, and similarly the phytoestrogens (genistein, daidzein) were less responsive in the peripheral lymphocytes in the male than in the sperm. This may be due to greater sensitivity of sperm cells because of their lack of repair. However, since damage was generally seen over a similar dose range, a one-to-one ratio of somatic and germ cell damage was observed and has implications for man for risk assessment purposes.”

Yellayi S, Naaz A et al. The phytoestrogen genistein induces thymic and immune changes: a human health concern? *Proc Natl Acad Sci U S A.* 2002 99, 11, 7616-7621. "Use of soy-based infant formulas and soy/isoflavone supplements has aroused concern because of potential estrogenic effects of the soy isoflavones genistein and daidzein. Here we show that s.c. genistein injections in ovariectomized adult mice produced dose-responsive decreases in thymic weight of up to 80%. Genistein's thymic effects occurred through both estrogen receptor (ER) and non-ER-mediated mechanisms, as the genistein effects on thymus were only partially blocked by the ER antagonist ICI 182,780. Genistein decreased thymocyte numbers up to 86% and doubled apoptosis, indicating that the mechanism of the genistein effect on loss of thymocytes is caused in part by increased apoptosis. Genistein injection caused decreases in relative percentages of thymic CD4(+)CD8(-) and double-positive CD4(+)CD8(+) thymocytes, providing evidence that genistein may affect early thymocyte maturation and the maturation of the CD4(+)CD8(-) helper T cell lineage. Decreases in the relative percentages of CD4(+)CD8(-) thymocytes were accompanied by decreases in relative percentages of splenic CD4(+)CD8(-) cells and a systemic lymphocytopenia. In addition, genistein produced suppression of humoral immunity. Genistein injected at 8 mg/kg per day produced serum genistein levels comparable to those reported in soy-fed human infants, and this dose caused significant thymic and immune changes in mice. Critically, dietary genistein at concentrations that produced serum genistein levels substantially less than those in soy-fed infants produced marked thymic atrophy. These results raise the possibility that serum genistein concentrations found in soy-fed infants may be capable of producing thymic and immune abnormalities, as suggested by previous reports of immune impairments in soy-fed human infants."

The following studies offer a good cross section of the evidence that soy protein stresses the pancreas and may contribute to or cause cancer.

Rackis JJ, Gumbmann MR, Liener IE. The USDA Trypsin Inhibitor Study, I. Background, objectives and procedural details. *Qual Plant Foods Hum Nutr*, 1985, 35, 213-242.

Liener IE, Nitsan Z et al. The USDA Trypsin inhibitor study, II. Timed release biochemical changes in the pancreas of rats. *Qual Plant Foods Hum Nutr*, 1985, 35, 243-257.

Spangler WL, Gumbmann MR et al. The USDA Trypsin Inhibitor Study, III. Sequential development of pancreatic pathology in rats. *Qual Plant Foods Hum Nutr*, 1985, 35, 359-274.

Gumbmann MR, Spangler WI et al. The USDA Trypsin Inhibitor Study, IV. The chronic effects of soy flour and soy protein isolate on the pancreas in rats after two years. *Qual Plant Foods Hum Nutr*, 1985, 35, 275-314.

Roebuck BD. Trypsin Inhibitors: potential concern for humans? *J. Nutr*, 1987, 117, 398-400.

Myers BA, Hathcock J et al. Effects of dietary soya bean trypsin inhibitor concentrate on initiation and growth of putative preneoplastic lesions in the pancreas of the rat. *Food Chem Toxic*, 1991, 29, 7, 437-443.

Liener IE. Letter to the editor: Soybean protease inhibitors and pancreatic carcinogenesis, *J. Nutr*, 1996, 126, 582-583.

Studies implicating soy and leukemia are as follows:

Strick R, Strissel PL et al. Dietary bioflavonoids induce cleavage in the MLL gene and may contribute to infant leukemia. *Proc Natl Acad Sci USA*, 2000, 25, 97, 9, 4790-4795.

“Chromosomal translocations involving the MLL gene occur in about 80% of infant leukemia. In the search for possible agents inducing infant leukemia, we identified bioflavonoids, natural substances in food as well as in dietary supplements, that cause site-specific DNA cleavage in the MLL breakpoint cluster region (BCR) in vivo. The MLL BCR DNA cleavage was shown in primary progenitor hematopoietic cells from healthy newborns and adults as well as in cell lines; it colocalized with the MLL BCR cleavage site induced by chemotherapeutic agents, such as etoposide (VP16) and doxorubicin (Dox). Both in vivo and additional in vitro experiments demonstrated topoisomerase II (topo II) as the target of bioflavonoids similar to VP16 and Dox. Based on 20 bioflavonoids tested, we identified a common structure essential for topo II-induced DNA cleavage. Reversibility experiments demonstrated a religation of the bioflavonoid as well as the VP16-induced MLL cleavage site. Our observations support a two-stage model of cellular processing of topo II inhibitors: The first and reversible stage of topo II-induced DNA cleavage results in DNA repair, but also rarely in chromosome translocations; whereas the second, nonreversible stage leads to cell death because of an accumulation of DNA damage. These results suggest that maternal ingestion of bioflavonoids may induce MLL breaks and potentially translocations in utero leading to infant and early childhood leukemia.”

Editorial -- Infantile Leukemia and soybeans – a hypothesis *Leukemia*, 1999, 13, 317-320.

“Recent molecular-genetic studies have revealed that in the majority of patients with secondary leukemia induced by topoisomerase II (topo II) inhibitors and also with infantile acute leukemia (IAL), the breakpoints are clustered within scaffold attachment regions (SARS) of 3’-MLL-bcr near exon 9. Genistein, abundant

in soybeans, is reported to be a potent nonintercalative topo II inhibitor. It interferes with the break-reseal reaction of topo II by stabilizing a cleavable complex, which in the presence of detergents, results in DNA strand breaks. The present study revealed that genistein induced chromatid-type aberrations in which chromatid exchanges are often observed. Genistein seems to act in a manner very similar to that of VP-16, although the latter is reported to produce both chromatid- and-chromosome-type aberrations. In view of this pharmacological similarity between genistein and VP-16, and also the similarity of breakpoint clustering regions within the MLL gene in reported cases with secondary leukemia and IAL, genistein may be largely responsible for the development of IAL.”

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IN CONCLUSION: We have provided abundant scientific evidence indicating that consumption of soy protein/soy isoflavones can contribute to various types of cancer. Allowance of a claim that soy prevents cancer would be false and misleading and would constitute a betrayal of public trust.

