Etiology of Adolescent Pregnancies In Honduras

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ABSTRACT

The United Nations and Population Fund (UNFPA), has declared in its latest report, that adolescent pregnancies are a huge challenge of great proportions that deserve to have articulated answers on all levels. In Honduras, during 2006 to 2012, at a national level, the percentage of adolescent pregnancies rose 2.5 percent. The teen pregnancy percentage is 2006 was 21.5% and it rose to 24% in 2012. There has also been an increase in pregnancies from girls under 15 years old. Which imply a much bigger risk dying for her and the baby and represent a real obstacle for her well-being and full development with direct consequences on the following generation.

There are several hypothesizes to why the percentage of teen pregnancies are rising. The lack of a proper sexual education is most likely the biggest obstacle of students to make smart choices regarding their health. Also in increase number of sexual abuse also contributes to the increase of teen pregnancies, and this number remains undefined because not all victims report this abuse. There is also another fault in the education system. Lots of children and teenagers dropout of school for diverse reasons. It is mainly because parents cannot afford them in school anymore, therefore having a bigger risk of making a life mistake, especially when the child drops out so young.

Adolescent pregnancy has been a main contributor to child and maternal mortality, which adds on to a vicious cycle of ill-health and poverty. This paper explores the pregnancy of adolescents in Honduras, the reasons why it occurs and to analyze possible feasible policies that can be implemented to help reduce this percentage. The objective of this thesis is to explore the different possible causes of this social issue in the country and search for feasible policies that can be implemented. The chosen methodology for this paper is System Dynamics. Which implied having to build a model that intends to replicate the problematic behavior. The policies include increasing the number of exposure of sexual education per year to secondary students and to include primary students as well in these sexual educational talks. The sooner students of all ages are exposed to sexual education, the sooner they'll know of the dangers and consequences of becoming a teenage mother and/or father and sexually transmitted diseases (STDs). The exposure to sexual education should not only be limited to teenagers attending school, but to those who do not attend school. Considering, those that do not attend school have a higher risk of getting pregnant.

Key Words: Teen Pregnancy, Sexual Education, System Dynamics, model, simulation, policy design, Honduras.

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1. INTRODUCTION

According to the latest, "State of the World Population" report, published by the United Nations Population Fund (UNFPA), teen pregnancy is a great challenge of huge proportions that requires an articulated response from all levels of society.

In 2006, according to the World Health Organization (WHO), between 14 and 15 million adolescent girls aged 15-19 give birth every year, accounting for 10% of births worldwide1. In Latin America and Caribbean area, governments have failed to win the battle to reduce the percentage of teenagers becoming pregnant during the last decade. The reasons for such a defeat are poverty, inequality and the low quality of the education system, all this according to a report done by the World Bank presented in Guatemala. A study called, "Adolescent pregnancy and opportunities in Latin America and the Caribbean: On teenage fertility decisions, poverty and economic achievement"[2], position the region in third place with the largest teenage fertility rate in the world, only surpassed by Sub-Saharan Africa and South Asia.

Honduras today holds second place through all Latin America with the most teen pregnancies, only surpassed by Nicaragua. According to the UNFPA, Honduras has a teenage fertility rate of 108 live births per 1000 women between the ages 15-19, only surpassed by Nicaragua with 109 live births per 1000 women. The lack of better opportunities and sexual education, help in a negative way, teenagers make poor life choices. The causes for this problem and its possible solutions will be described in further chapters.

The lack of a good education system and a proper justice system that inspires confidence in the population are of the few factors that contribute to the rise in teen pregnancies.

This first chapter explains the definition of teen pregnancy, its multiple causes and the preventive actions that should be taken.

1.1 Teen Pregnancy

The second cause of death for teenage girls between the ages 15-19 are complications during pregnancy and childbirth worldwide. Every year, around 3 million girls of 15 – 19 year olds, undergo unsafe abortions. Adolescent pregnancy remains up to the day, as a main contributor to child and maternal mortality, feeding to a vicious cycle of ill-health and poverty. The World Health Organization reported that, between 14 and 15 million adolescent girls aged 15-19 give birth every year, accounting for 10% of births worldwide.

In the National Demographic and Health Survey (ENDESA) conducted in 2005, 21.5% of teenagers between the ages 15-19 got pregnant. Later in 2012, ENDESA conducted another survey and demonstrated an increase of 2.5% in teen pregnancies.

1.2 Causes of teen pregnancy

There are several components that contribute to the rise of adolescent pregnancies in Honduras. They are as follow:

- National level: The economic recession and unemployment push adolescent girls to other unsuitable options for economic satisfaction. Poverty is both a cause and a consequence of adolescent pregnancy and childbearing. Most pregnancies come from low-income families.
- Culture and Society: Honduras is a predominantly catholic and evangelic society, and along with it, come myths, prejudices, stigmas, and taboos, especially when it comes to sexual relationships.
- Education: The low quality of education and teen dropouts, condemn the young population to ignorance on all matters. The higher education an adolescent gets, the less chances she'll have of getting pregnant.
- Family: Due to the social myths and taboos, parents don't dare discuss sexual relationships with their teenage girls and boys, therefore creating a poor relationship between parents and children. Also sexual abuse in the home worsen the situation.
- Individual level: The lack of use of contraceptives due to any particular reason, either by lack of education or by choice, condemn teenagers to making such a mistake.

The lack of correct information, cultural barriers, social taboos and religious beliefs continue to be the main barriers that parents use as an excuse to avoid talking about sexual relations with their teenage children.

1.3 Prevention of teen pregnancy

Poverty and the lack of opportunities are directly associated with adolescent pregnancy and early maternity. These factors can turn into obstacles for young ladies to take advantage of their few development opportunities. Adolescents represent the present and the future of Honduras. Investing in this sector of the population today is the best opportunity the Honduran society has for a better tomorrow.

These are some protective factor that can help prevent teen pregnancies:

- National level: The increase in opportunities, generation of wealth for all sectors of society and the establishment of the rights of adolescents should help prevent teen pregnancies.
- Culture and society: The less prejudice and stigmas a society has, it would help teenagers have better relationships with their community.
- Education: Sexual education should be an obligation in the school system. Sexual education will not prevent teenagers from having sexual experiences but should help them make an educated decision regarding their health. Also the higher education a child has, the less chances this girl will have of getting pregnant.
- Family: Once the stigmas and prejudices in society are not so marked and strong in the household, parents can actually discuss serious topics with their children that will help them make smart choices in the future.
- Individual: It is very person’s responsibility to take care of oneself. Especially in regards to one’s health.

2. BACKGROUND

Not many studies have been made in Honduras about adolescent pregnancies. And in the past, the government has never shown interest, therefore a study on this particular topic has never been done either. Only nongovernmental organizations such as UNICEF and the United Nations Population Fund (UNPF) have done a few studies on teen pregnancy in Latin America, and these where the main source material for this investigation. In the following exposition, the current situation of teen pregnancies in Honduras is presented.

2.1 Adolescent pregnancies in Honduras

In Honduras, the percentage of adolescent pregnancies between the ages of 15-19 years old, increased between the periods 2005-2006 and 2011-2012, placing Honduras in the second place in Central America. The 24% national average pregnancy rate, was calculated in the latest ENDESA. (ENDESA 2011-2012)

Although this is an issue registered nationwide, its distribution is uneven. Teen pregnancies are concentrated mostly in 7 out of the 18 departments in the country: Colón, Comayagua, Copán, Cortes, Francisco Morazán, Olancho and Yoro. These 7 departments constitute 49% of teen pregnancies in the country.

Figure 1. Map of where most pregnancies in Honduras take place 2006-2012

2.2 Abortions in Honduras

According to the Poder Judicial de Honduras (Judicial Courts of Honduras). (2014) Código Penal de Honduras, Decreto 144–83, Chapter II, Aborto[12], Abortions are illegal in the country under all circumstances. Even if it meant saving the life of the mother or a pregnancy due to sexual abuse, abortions are not allowed. According to UNICEF, 12% of teenagers undergo unsafe abortions in clandestine clinics around the country. These abortions could be highly dangerous for teenagers or any woman in fact, due to its lack of hygiene. This abortion percentage is still unofficial data because no one knows for sure how many abortions clinics are operating without permit of the authorities.

2.3 Responsibility on Adolescent Pregnancies in Honduras

2.3.1 SECRETARY OF HEALTH

Through the Secretary of Health, there should be a focus on preventing teen pregnancies through its health services nationwide. Such services include prevention of future pregnancies and the promotion of the use of contraceptives after birth. Currently, there are only two hospitals in Honduras that provide services specifically to adolescents. One is located in the nation's capital, Tegucigalpa, called the Hospital Escuela (School Hospital in English), and the Hospital Leonardo Martinez Valenzuela (HLMV), which has its own Adolescent services department, first in the country, located in the industrial capital of San Pedro Sula. It is important to mention, that several adolescents accompanied by their mother or partner, sometimes travel up to 2 hours to get the quality service this hospital provides. This department founder Dr. Mirna Thiebaud is one of the few people in the country with the knowledge and depth in the topic. Today, the Adolescent Department in the HLMV is being led by Dr. Mark Gromm. However, the current government, led by the president Juan Orlando Hernandez, is contributing with 33 small clinics across the country with one main focus: Teen pregnancy prevention and protection against sexually transmitted diseases. The main challenge is to provide the same quality service in these small clinics like the Leonardo Martinez Hospital provides for adolescents today.

2.3.2 SECRETARY OF EDUCATION

As a product of the commitments acquired by the Honduran government in the fulfilment of the Millennium Development Goals, it is imperative to focus on the quality of the education given in public schools and prevent dropouts that would hurt a child's opportunity for a better future. According to recent reports, a virtual platform has been created for teachers around the country to access and receive sexual education with the goal that they'll be teaching it in the classrooms. In this platform, there are guides such as "Taking Care of my Health and my Life" in order to be developed with secondary students. However, experience shows that this virtual platform is currently unavailable. Once a year sexually education talk is not enough for students to actually retain useful information. More sexual talks are needed during the school year and with all of the grades in school.

2.3.3 OTHER GOVERNMENT SECTORS

An initiative started by President Porfirio Lobo and still active in the current government of Juan Orlando Hernandez, there is a social project protecting around 270,000 of the most vulnerable families across the country through the program called "Better Life Program". This program is destined to improve the quality of life of these families, like, the improvement of housing conditions, money transfers that require families to give their children under 5 years old proper medical attention, and keep these children in school until the 9th grade.

Other programs are executed destined to help the young sector of the population get a job, with the program "Con Chamba Vivís Mejor" ("With Work you live better", in English). This program has required the help of the private sector. These efforts are supported by diverse Secretaries of State.

2.3.4 INTERNATIONAL COOPERATION AGENCIES

In Honduras there has always been a tradition of cooperation between the government and international agencies oriented to strengthen programs destined to children and adolescents. Nongovernmental organizations such as UNICEF and USAID are a few that contribute greatly with children and adolescents.

2.3.5 FAMILY CIRCLE

The family circle should be a teenager's true comfort zone, however, in an age where hormones are all over the place, conflict between teenagers and parents is more than normal. The family circle is surely influenced by culture, religion and therefore stigmas and taboos against sexually relationships and contraception. If there is an open relationship between a teenager and his or her parents especially when it comes to delicate topics such as these, teenagers will have a better chance of making a smart decision when it comes to taking care of themselves.

2.3.6 SELF-RESPONSIBILITY

Every person is in charge of themselves. It is one's responsibility to take care of one's self both physically and mentally. Therefore, if sexual education is given, the teenager in question should be able to make an educated decision about sexual intercourse and means of protection. No one can make these decisions for others, it is ones responsibility alone to look after oneself.

2.4 System Dynamics Approach

System Dynamics has been used before to approach other similar topics to teenage pregnancies such as epidemics. For example, HIV/AIDS in Botswana and Uganda, R. Howell, O. Wesselink, E. Pruyt (2013) is an example of the use of System Dynamics to build a model for policy design.

Sterman's aging chain (2000) has been invaluable to this investigation. However the aging chain can also be seen in use by Butler and Mat (2000), by which they apply the aging chain to model the population using different age groups. The model used by Butler and Mat (2000) has been greatly adapted for this investigation and modelling the population sector.

3. PROBLEM DEFINITION

Honduras a country located in the heart of Central America is one of the countries with the highest teenage fertility rates in Latin America. Despite that in recent years this fertility rate has had a slow decline, the percentage of adolescents getting pregnant has been growing. In 2006, 21.5% of teenagers between the ages of 15 to 19 where getting pregnant. That percentage rose up to 24% in 2012.

This research aims to answer why the percentage of teenagers become pregnant from 2006 to 2012. In order to accomplish this, the research process goes as follows: Before looking for viable policy solutions to help alleviate the issue, replicating the problematic behavior is essential. The percentage of teenage girls becoming pregnant from 2006 to 2012 is the reference mode for this research.

3.1 Reference Mode

The graph on figure 2 represents the reference mode used for this paper. The reference mode is the problem represented in a time graph that shows its development for a period of time, in this case years, from 2006 to 2012. The reference mode in this paper is the number of live births per woman occurring per year in Honduras.

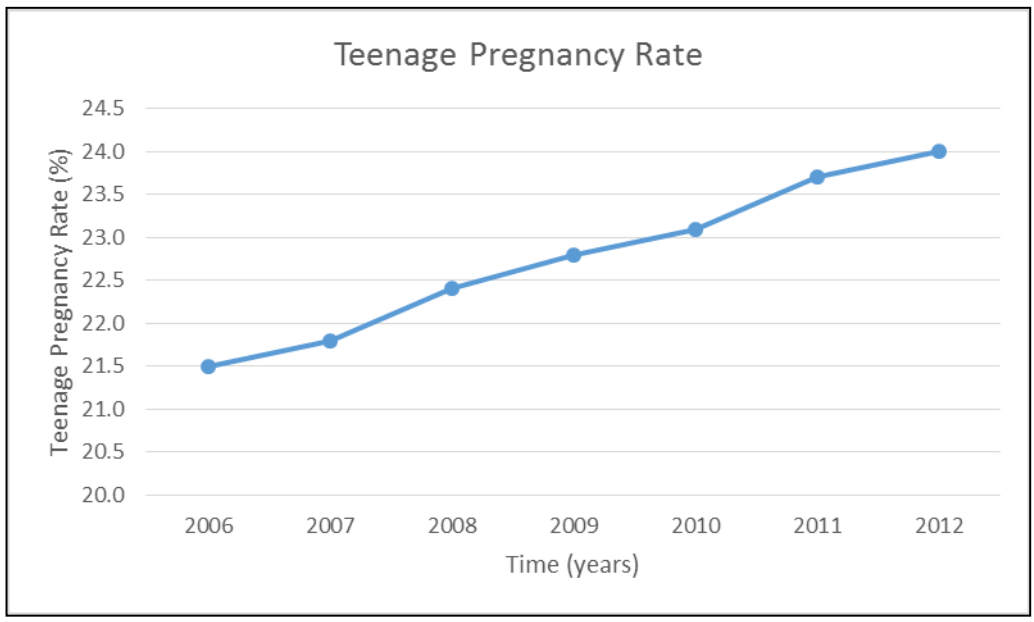

Figure 2. Reference Mode: Teenage Pregnancy Rate

4. DYNAMIC HYPOTHESIS

For this particular problem there are so many hypothesis that can explain why there has been an increase in the percentage of teen pregnancies in Honduras. However, several of them where unable to be modeled, however regardless of, deserve to be mentioned because they constitute a great deal to the problem at hand.

What is causing the percentage of teen pregnancies to rise?

H1. The lack of a proper sexual education increases this percentage.

According to interviews conducted at local hospitals, sexual education talks are only given once a year to secondary students around the country. One sexual talk a year is no where enough for a student to remember such information that should be valuable for them to know. Also, only secondary students are involved in such activity, which I consider it to be a mistake. Children from primary should also be allowed to attend these educational talks. The sooner they learn about the topic, the more informed they'll be when the time comes to make a decision that regards their own health.

H2. The increase of dropouts in school increase the percentage of teen pregnancies.

This particular topic is severally linked to education. If a child drops out at the age of 8, he or she has no proper knowledge of sexual education or anything else. Therefore, when the time comes to make a responsible decision concerning their lives, they might not know what to do.

H3. The increase in sexual abuse also increases the percentage of teen pregnancies.

According to the latest studies, 50% of pregnancies are due to abuse. This is a massive number of girls who are by the force entering a world of motherhood. Not because they asked for it, but because it was forced upon them, sometimes intentionally other times by accident. There could be many more sexual abuses that the authorities don't know of, because victims might be afraid to tell the authorities.

Other hypothesis include, the lack of job opportunities. In this particular case, some teenagers feel that they are better off being a mother, who's maintained by a husband than going out and finding a job. Now days, finding a job in Honduras is particularly

hard, especially a good paying job. Most workers today, are sub employed, meaning they get paid below the minimum wage.

Another important hypothesis is the way culture and religion influence the population. Honduras being a religious country, condemns sexual relationships before marriage. Not many teenagers are married, therefore a prejudice is bestowed upon them and their families. These stigmas and taboos on sexual relationships are bad for the parent-children relationship. These negative ideas established deep in the conscious of parents, doesn't allow them to have an open relationship with their children and discuss such important matters as contraceptives. Because of this, teenagers are generally afraid of asking their parents for advice on the matter, and end up asking other people who might be just as clueless as they are, their friends.

4.1 Model Assumptions

This model has been designed and therefore simulated under a few assumptions. There are six different sectors in the model, and therefore requied different assumptions. The Time for this model is measured in years, from 2006 to 2012. The percentage of adolescents becoming pregnant is the respective reference mode used for this paper. All assumptions have been grouped according to their sector.

4.1.1 POPULATION SECTOR

Honduras is a small country located in the heart of Central America. Today, Honduras holds a population of almost 8 million people. The population model is divided into 6 age groups. The following figure shows these age groups and their population. The initial crude birth rate is 28.24 per 1000 people.

Variable Name	Population	
	Male	Female
Infants 0-4	536636	517845
Young Children 5-9	509688	457461
Young Teenagers 10-14	485132	447814
Teenagers 15-19	393535	390907
Adults 20-64	1613105	1726068
Elderly 65+	131494	157336
Total Population	3,669,590	3697431

Figure 3: Aging Chain Population Totals (INE 2006)

Other assumptions created in the population model are:
The Percentage of Adult Women getting pregnant which is of: 38%
And it was also under the assumption that the reproductive lifetime of an adult female is: 35 years.

4.1.2 TEENAGE PREGNANCY SECTOR

Perhaps the Teenage Pregnancy Sector is the sector with the most amount of assumptions. This sector is divided into 5 stocks, and are shown in the following table.

Variable Name	Population
Sexually Active Teens	152,453
Pregnant Teens	182,087
Teen failed Pregnancy	3,933
Women Lactating Period	28,680
Fertile Teen Mother	23518

Figure 4: Teenage Pregnancy Sector Stocks

Other assumptions in the model is the Abortion of 12%, reported by UNICEF. The reason why it's an assumption, is because there isn't an official number on abortions because it is illegal in the country. Therefore many girls go to clandestine clinics to get abortions done in unhygienic environments. Also the recovery time for an abortion, according to some literature, it might take up to 1 month to fully recover from the procedure, however it could also depend on each individual case, so this number was chosen as an average time for recovery. The percentage of fertile teens becoming pregnant a second time is another assumption of a 59%. According to the latest ENDESA 2012, 59% of teen mothers want a second child in a near future.

4.1.3 EDUCATION SECTOR

The education sector does not hold many assumptions. One of the assumptions is the graduation rate, which is the difference of the dropout rates of both male and females: 77%.

The initial values for all stocks are not necessarily assumptions because these were provided by the Ministry of Education.

4.1.5 JOB SECTOR AND SEXUAL ABUSE SECTOR

These two sectors hold no assumptions what so ever. The data was provided by the National Institute of Statistics and the National Police.

5. MODEL DESCRIPTION

In this chapter, every section of the model is described in detail. The model built has 6 sectors. The first sector is the Population Sector. The second sector is the Teenage Pregnancy Sector, following the Education Sector, Sexual Education Sector, Sexual Abuse Sector and Job Sector. These sectors are ones that influence the increase or decrease in teenage pregnancy. However, other important factors were not included due to its difficulty to model. Such sector is the family sector and culture sector. These two factors play a very important role in how teenagers make decisions.

An entire picture of the model can be seen in the Appendix of this paper.

5.1 Testing the Model

In order to build confidence in a model, a series of tests must be made. Sterman (2000) suggests that making these tests, helps create confidence to the model. One important idea Sterman has stated is that all models are wrong, but it doesn’t mean they are useless (2002). Therefore, the model still can be used.

5.1.1 BOUNDARY OF THE MODEL

5.1.2 STRUCTURE ASSESSMENT

In the overall, the model reproduces values that are quite consistent with real life values.

5.1.6 SYSTEM IMPROVEMENT TEST

The main goal of any model is to understand the causes of its behavior and try to solve it. Some policies were added in order to alleviate the situation.

5.2 Population Sector

The population sector in the model shows the dynamics in the population growth, in this case, the important population growth to portray is women, although in the model, both men and women are shown. The structure of the population sector is divided into six age groups: Infants 0-4, Young Children 5-9, Young Teenagers 10-14, Teenagers 15-19, Adults 20-64 and the Elderly 65+. Each of these stocks go through a Maturation time before passing on to the next stock. The stock of interest in this model is the Teenagers of 15-19 years old, considering this is the sector of the population getting pregnant the most.

In order to make this study as real as possible, all variables such as death rates and migration rates have been included. The average life expectancy in Honduras is 70 years represented in the variable of the same name: Average life expectancy. The elders in the last stock will stay in this stock until they have reached 70 and make their exit through the death rate.

The behavior of the population sector is generated by the different balancing and reinforcing loops. It is important to mention that the population sector is inspired in John Sterman’s aging chain (2000).

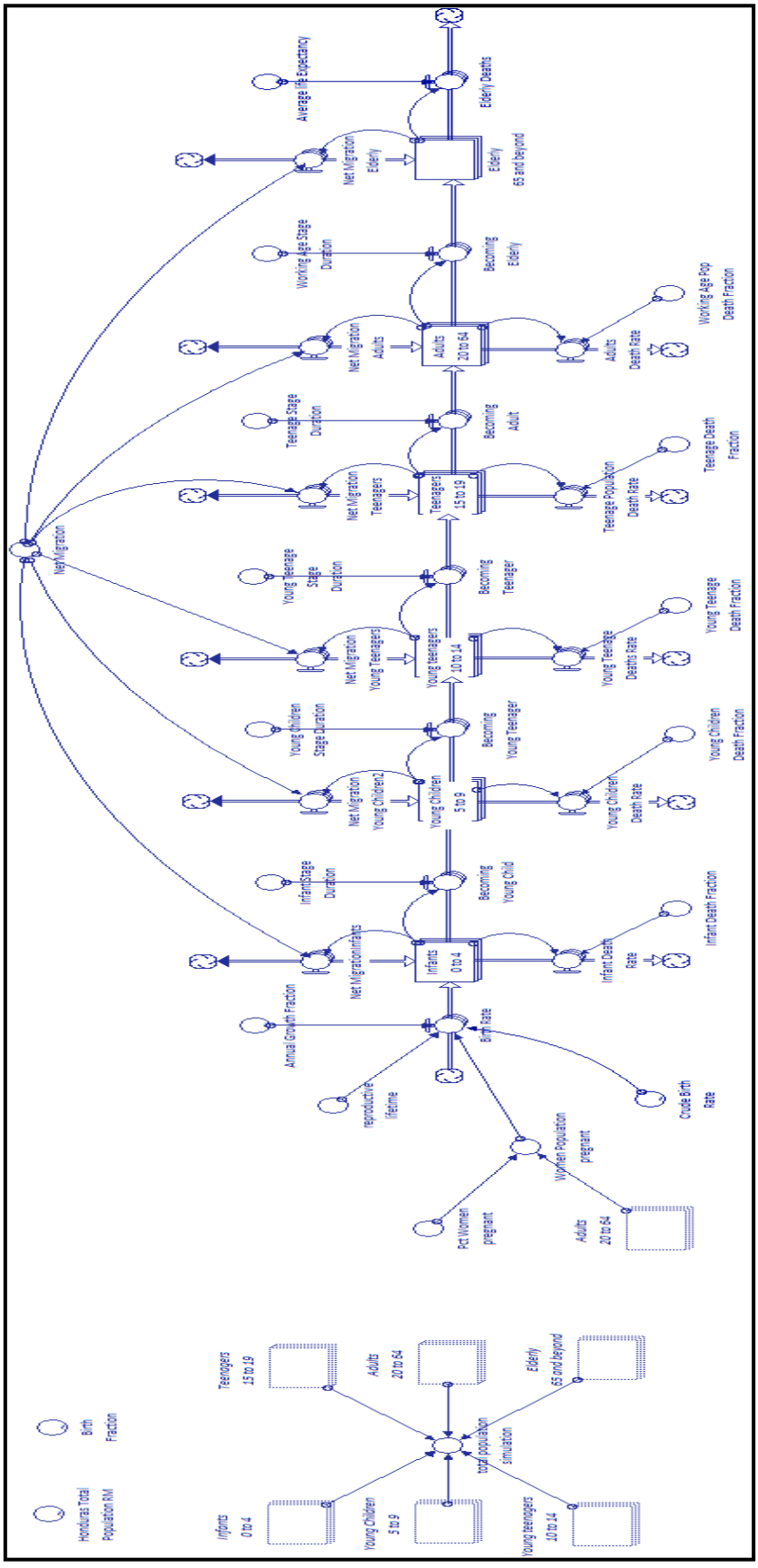

Figure 5: Population Model

The following graph shows the different age groups of girls/women and all with some differences in their behavior over time. The youngest age groups: Infants, Young Children, and Young Teenagers show a slight decline. However, the rest of the age groups, Teenagers, Adults and the Elderly have a slow steady growth.

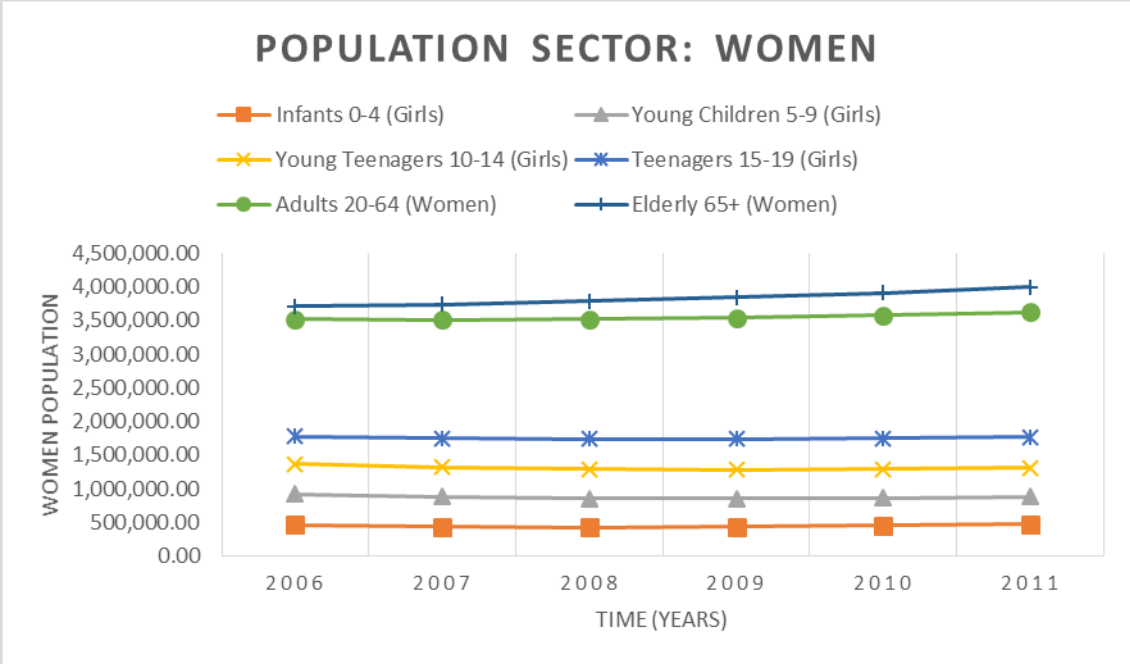

Figure 6: Population Sector by Age Groups of Women

The population as a whole is increasing over time, however its annual growth rate is declining from a 2.5 in 2006 to 1.84 in 2012.

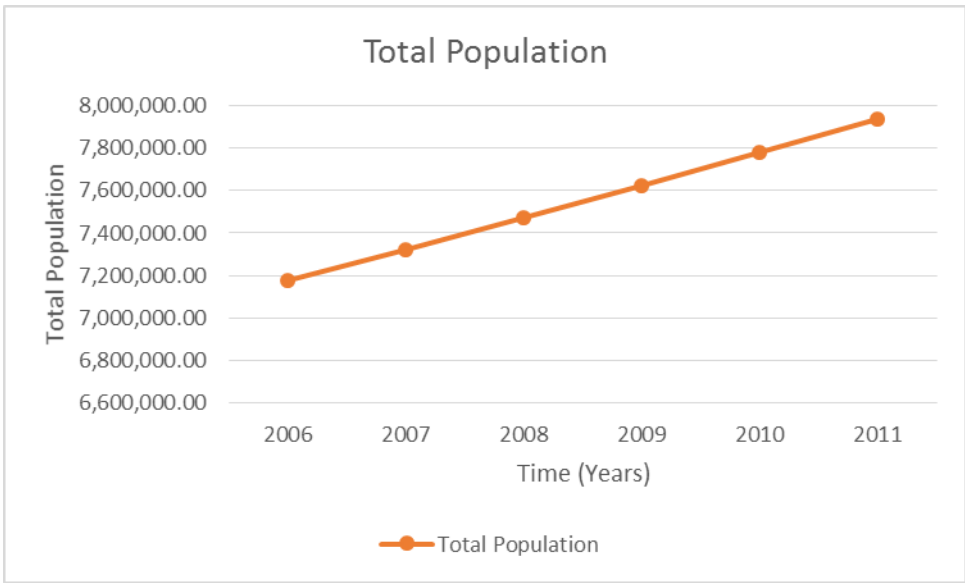

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Figure 7: Total Population Behavior

5.3 Teenage Fertility Sector

The teenage fertility model starts off with determining the sexually active teens between the ages of 15-19, which is the selected focus group. The teenagers from 15-19 stock is multiplied by the percentage of sexually active teens, making into the inflow and the first stock of the model, Sexually Active Teens. The pregnancy rate equation goes as follows: Sexually Active teens times the teenage pregnancy rate, which is a percentage, divided by the mean age of birth or labor. These girls then fall onto the pregnant teens stocks and could go through three ways. A girl might decide to have an abortion. Therefore, the pregnant teen stock is multiplied by the abortion fraction divided by a period of time to which it is still "acceptable" to perform an abortion. Then this teenager must recover from the procedure which could take a month, and then goes back to the sexually active stock.

Another way this could go down as is if the adolescent dies due to complications in her pregnancy. According to information 20% of teenagers die due to complications in birth. But if all goes well and the teenager makes it through all the 9 months of pregnancy then she goes into a lactating period. After this period is done, she is back to being fertile and could possibly become pregnant again.

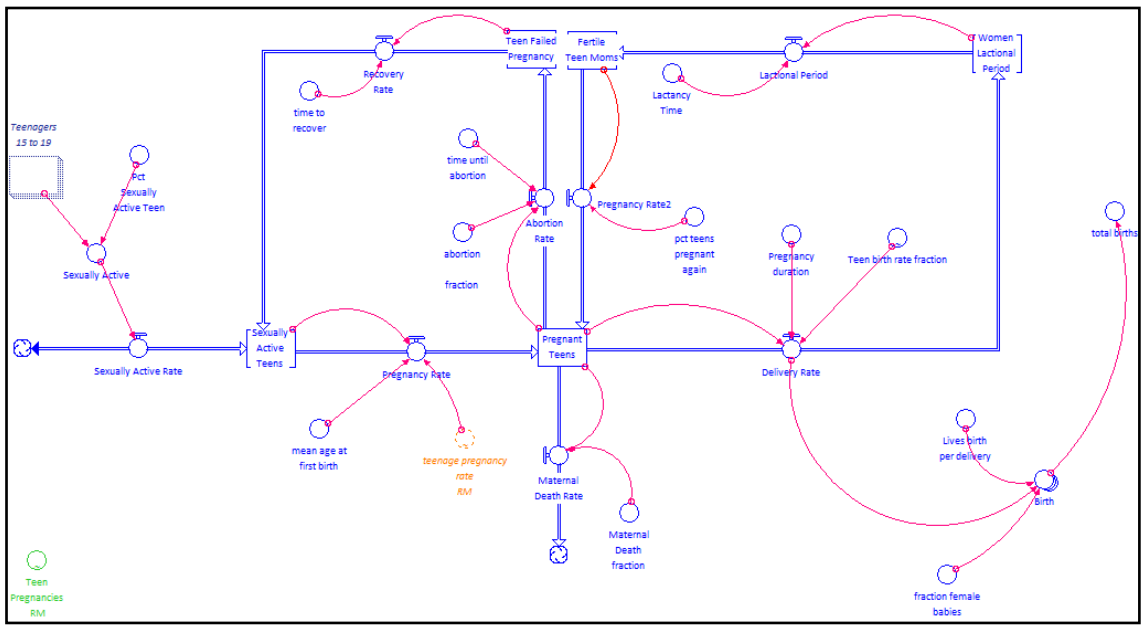

Figure 8: Teenage Fertility Model

Figure 9 demonstrates the original data collected on teen pregnancies in Honduras nationwide, and the simulated data given by the model. It is important to mention, that the live births in this fertility model, also feed into the population model previously explained.

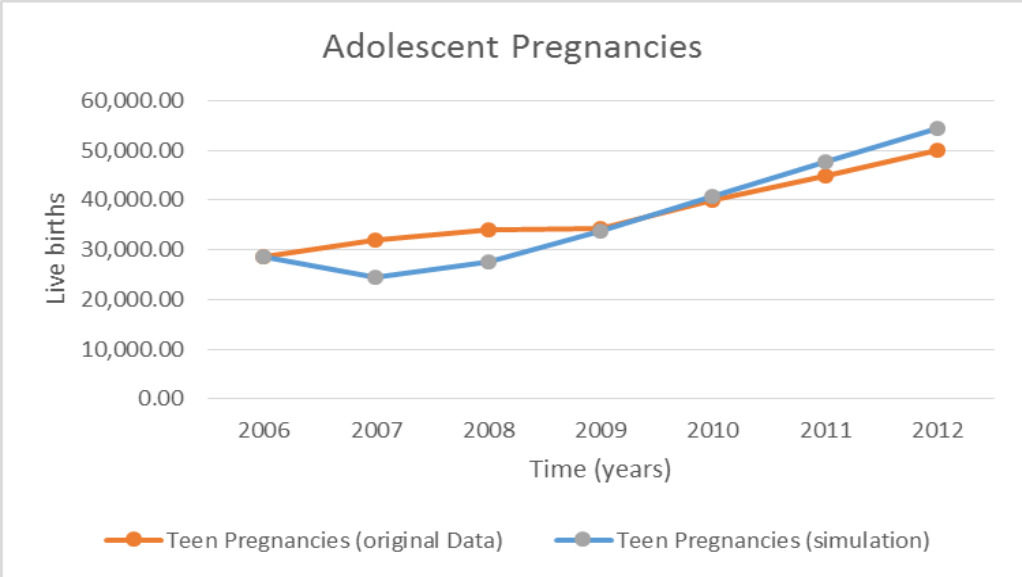

Figure 9: Adolescent Pregnancies (original data and simulation)

5.4 Education Sector

The education sector like the aging chain is very easy to follow. It starts of with the enrollment rate of the young children between the ages 5-9, when they start the first grade. For every stock of grades, there are dropouts, and their reasons far from situation to situation. But the dynamics goes as follows, once a child passes the third grade, it passes on to the next grade and so on until it might reach university level or might dropout at any given point during the stage.

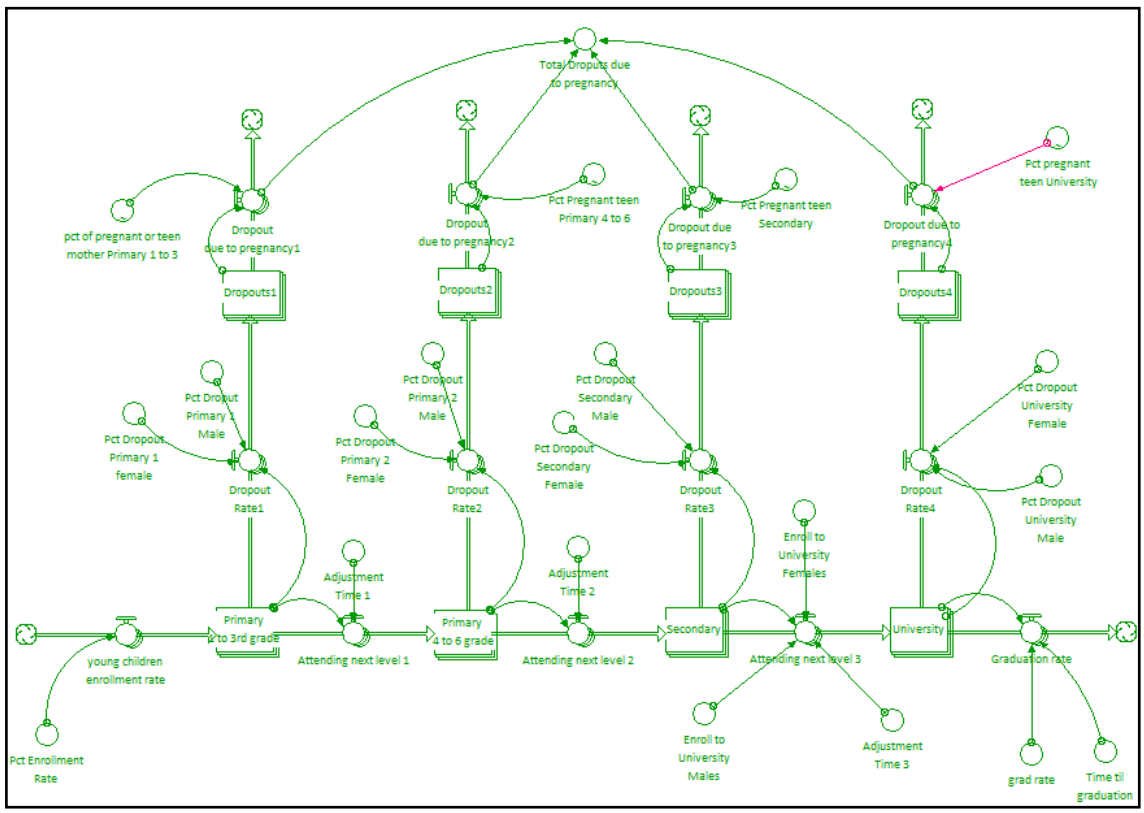

Figure 8: Education Sector

Since the main focus of this paper is teenage girls and teen pregnancies, there is also a percentage of dropout rate due to this unfortunate situation, which could stall these girls' chances for a proper educational development. In the following graph, Figure 11, the teen dropouts are portrayed by educational level. As it shows, the higher education to you have, the less chances you have of getting pregnant. However, the lower education you have, the higher chances you have of getting pregnant due to the lack of knowledge on the subject.

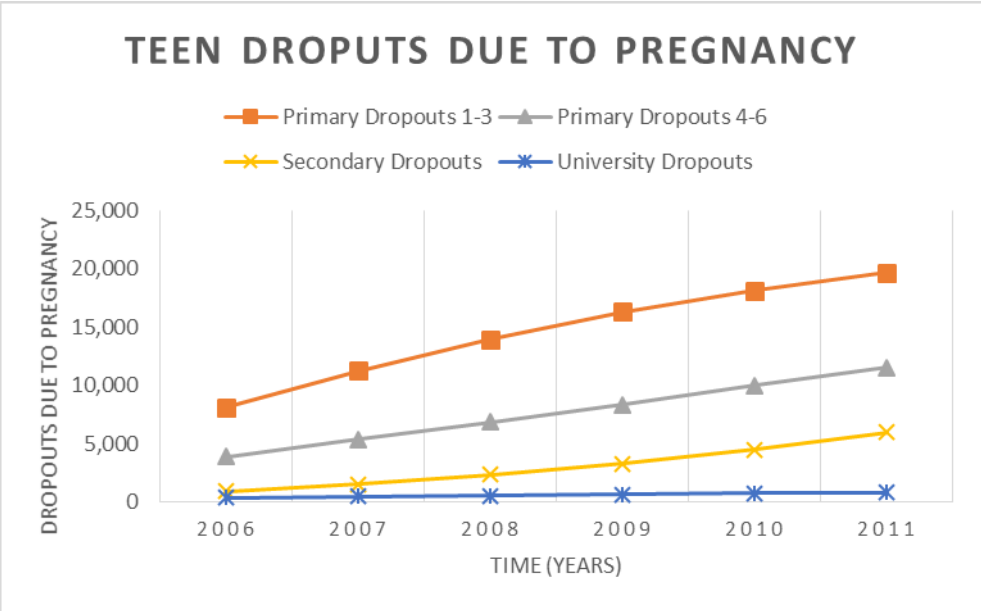

Figure 9: Teen dropouts due to pregnancy

5.5 Sexual Education Sector

The sexual education sector relies a lot on the number of attendance. One would assume that because these sexual education talks are given on school grounds, all students would be present, but they're not. According the Secretary of Education 85.9% of children attend school every day. Other child might skip school, or be at home sick, or any other reason possible.

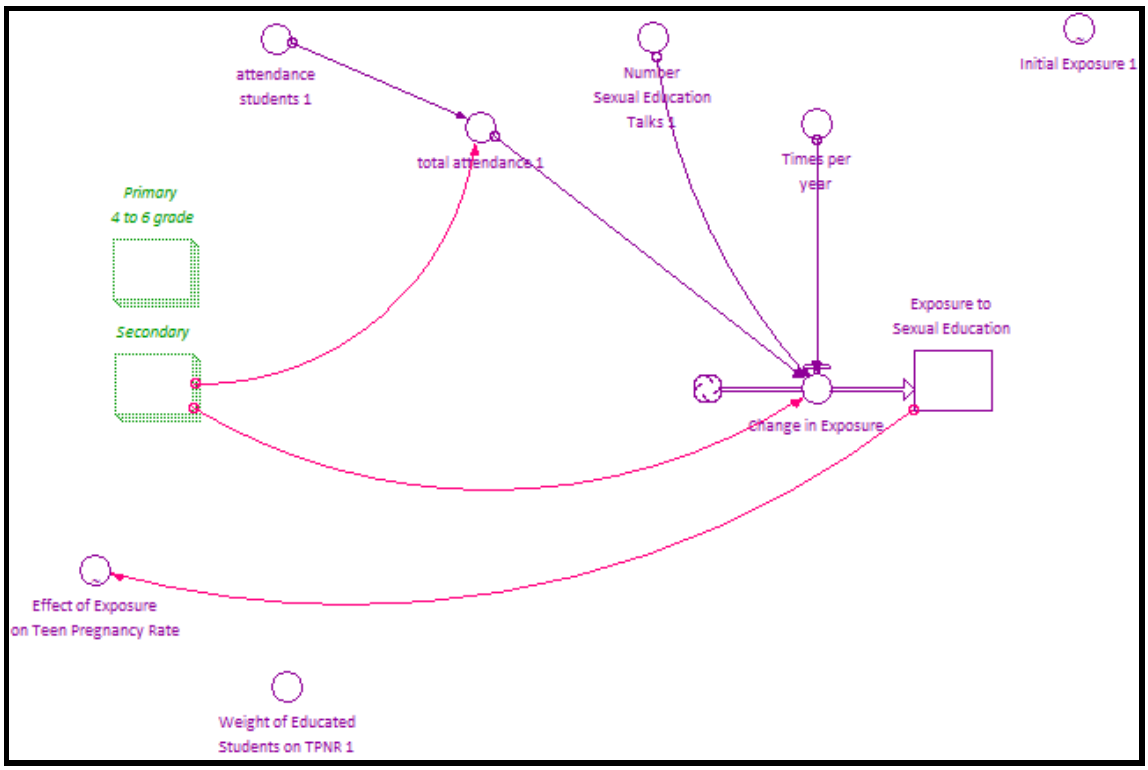

Figure 10: Sexual Education Model

5.6 Sexual Abuse Sector

The Sexual abuse sector is small in size but huge in meaning. Every year in Honduras hundreds of girls suffer from sexual abuse, but very few report them to the authorities. According to Doctor Mark Gromm, leader of the Department of Adolescent Health Care at the Leonardo Martinez Valenzuela Hospital, he states that around 98% of sexual abuse cases happen within the home. Making that extra hard from a minor to denounce the aggressor to the authorities.

First off, teenagers between the ages 15-19 get raped every year, this percentage is multiplied. These girls become sexually abused teens, which can either become pregnant or not. According to the Children Prosecution Office, 50% of girls that suffer a sexual abuse end up pregnant by their aggressor.

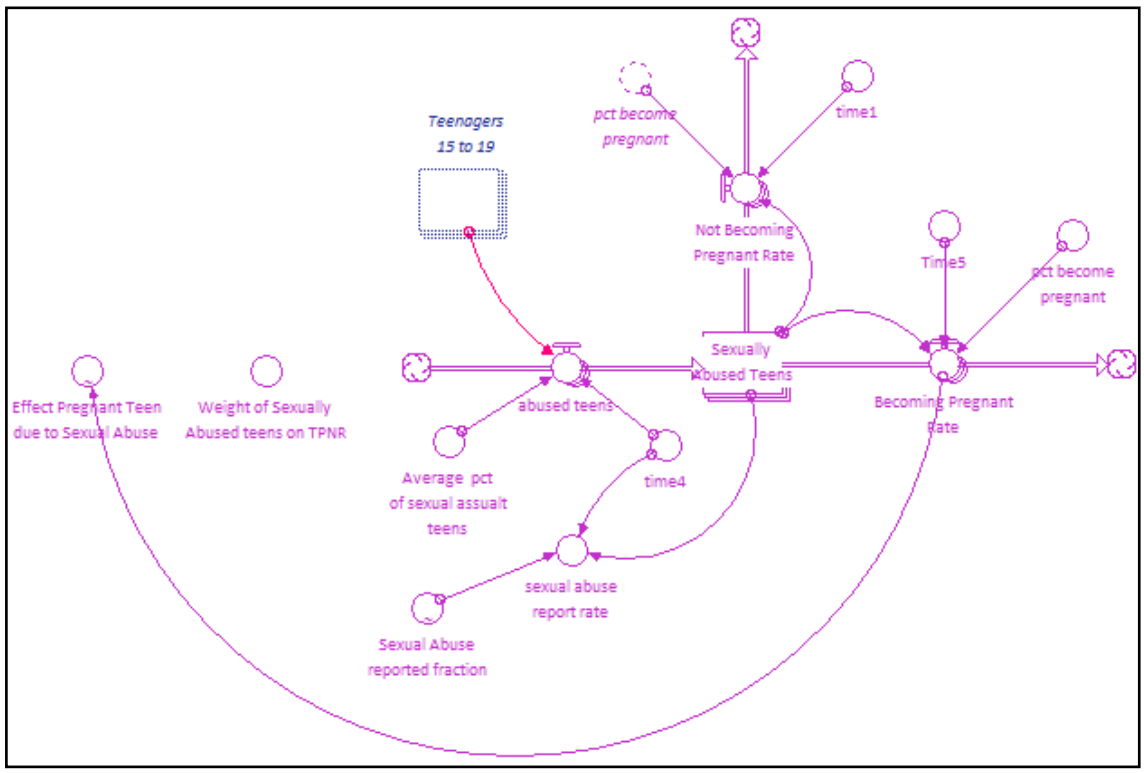

Figure 11: Sexually Abuse Model

In the graph below, this sector of the model demonstrates how many girls get pregnant a year due to sexual assault. This number keeps growing every year. At the Leonardo Martinez Hospital, counseling is offered for girls who have suffered such an abuse.

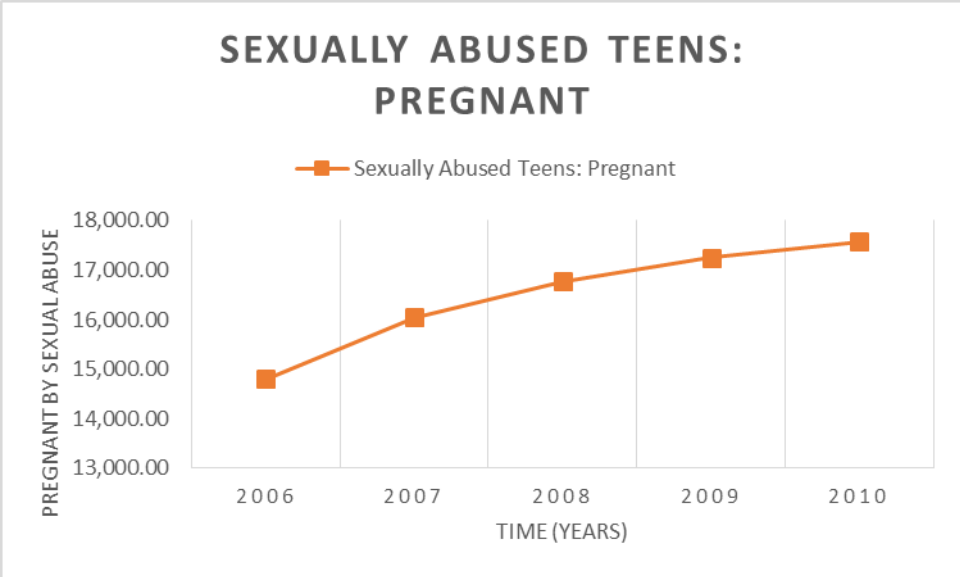

Figure 12: Sexually Abused Teens: Pregnant

6. ANALYSIS

The purpose of this section is to test out individual hypothesis in order to explain and replicated the problematic behavior.

6.1 Testing the Dynamics Hypothesis

They dynamics hypothesis described in this section seek to explain the causes for the behavior of teenagers and how that affects the % of teen pregnancies in Honduras. Several runs had to be made in order to explore the effects of each individual hypothesis.

6.2 Test H1.

The first hypothesis was based on if sexual education would have an effect on teen pregnancy rate. The run demonstrates that if sexual education is implemented properly to the teenagers, these numbers can be able to go down.

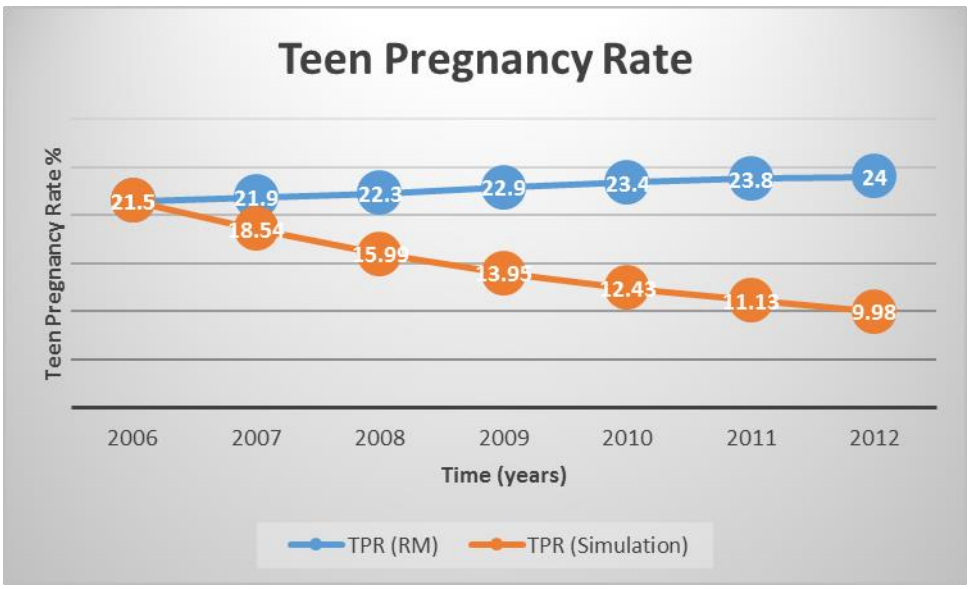

Figure 13: Teen Pregnancy Rate H1.

6.3 Test H2: Effect of sexual abuse on teen pregnancies

Hypothesis 3 questioned the effect of pregnancies caused by sexual abuse on the Teenage Pregnancy Rate. It it shows, sexual abuse is really one of the main causes for teen pregnancy, and policy makers should be able to give effective solutions to this delicate problem.

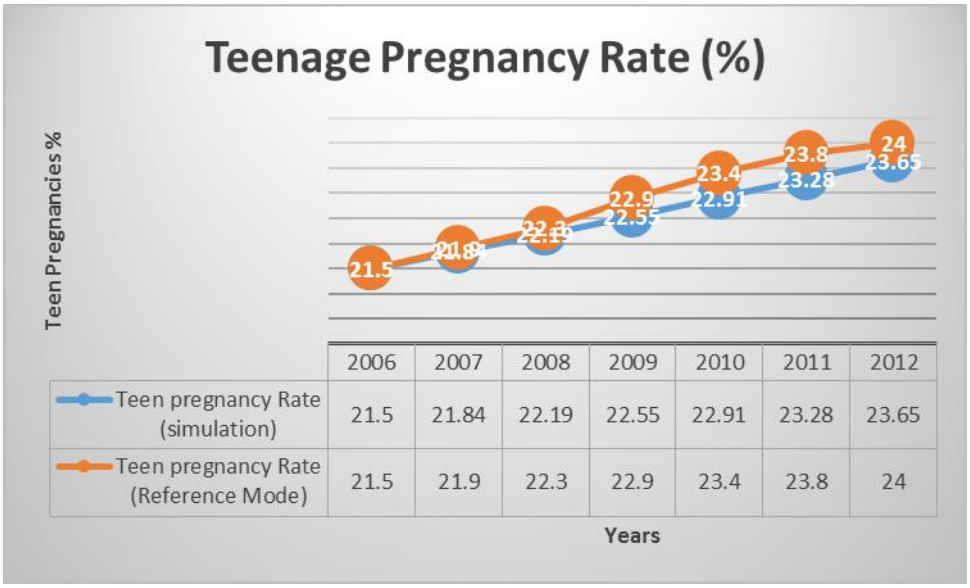

Figure14: Teen Pregnancy Rate (%) H2

6.4 H3. Job Security holds a special influence on teenagers, because they are afraid of the lack good job opportunities.

In this particular case, the lack of job opportunities creates a negative effect on teen pregnancies. Many teenage girls rather be mothers and be maintained by a man, than looking for opportunities in the job market.

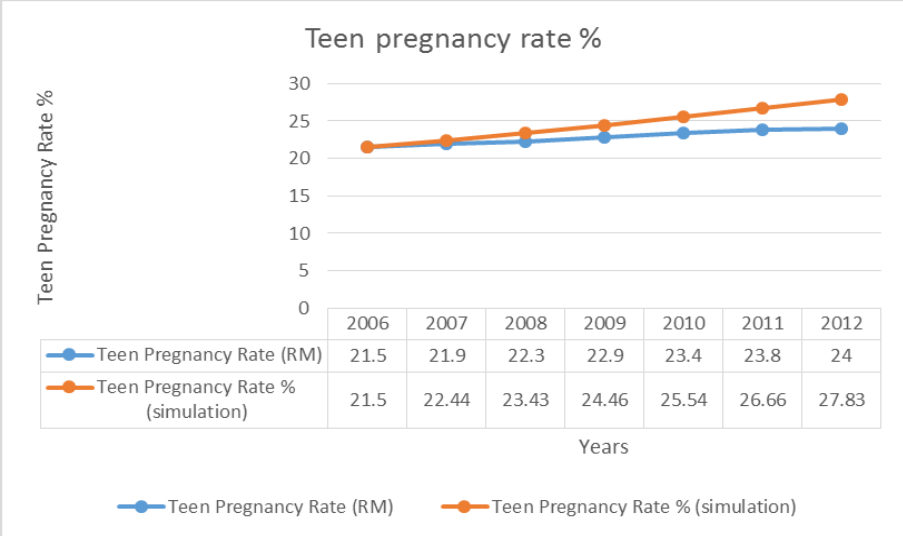

Figure 15: Teen Pregnancy Rate. H3

6.5 Reference Mode Replication

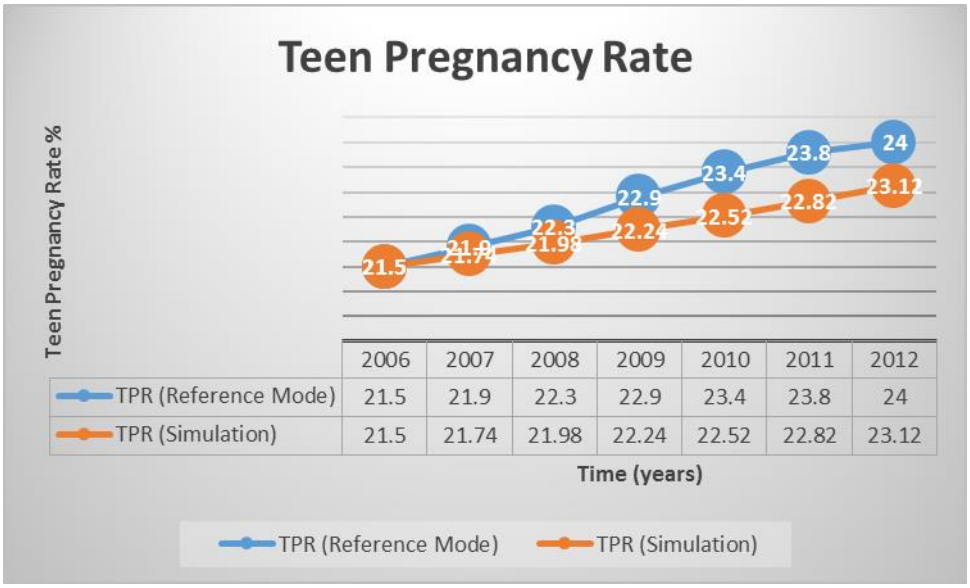

Figure 16: Teen Pregnancy Rate. Replicate Behavior

6.6 Summary

7. POLICY ANALYSIS

For every problem, as creators of change, we must come up policies that can positively reduce teen pregnancies in the future. There are a few policies that will be describe that could help reduce teen pregnancies in the future.

7.1 Problem

The problem with teen pregnancies is that it could take years up until some real change is noticeable. There are different causes, as we've seen before that cause both negative and positive effects on teen pregnancies. But more needs to be done inorder to reduce these numbers that seem to be climbing every year.

7.2 Policy assumptions

The time horizon for the policies would start in 2013 and end up in 2017, giving it a 5 year period to analyze and see if there are any results. The policies suggested should be tested both separetly and apart to have a clear view of each effect.

7.3 Policy 1

It's been establish several times how important education is for the youth. When the family circle has failed to educate their kids on contraceptives and sexual relationships, schools have to take command and teach teenagers all they need to know, to make educated life decisions regarding sex. Therefore, it is suggested that not only secondary kids are involved in these educational courses but Primary kids too. It can be debated by parents that these children are too small to learn such things, but when teaching them about contraceptives at that age, and have that same information repeated again next year, will help these kids fully remember what they are being taught.

8. IMPLEMENTATION

In this section, the policies that have been suggested are discussed in regards to their implementation. It is important in this topic to consider socio-cultural aspects. Some of the policies might not have the consent or agreement of parents, for example.

8.1 Implementing Policy 1

The heads of the family, the parents might think that children in primary are too small to learn about contraceptives. However, the younger they learn about such things, and have that repeated year after year until they graduate, will help them make better life choices when it comes to sexual relationships. The purpose of this is not to demonize sexual relationships, but to encourage teenagers that if they decide to have sex that they know of the possible consequences and what ways there are to prevents pregnancies and sexually transmitted diseases. It would even be great if parents were encouraged to take a sex education course, so they might take an active part in the formation of their children through educating them.

9. CONCLUSION

This investigation presented a problem of the rise in the percentage in teen pregnancies in Honduras. There have been different studies explaining the main causes of such an event. The model that was build and presented in this paper intented to reproduce the problematic behavior happening in real life. The model was found to be useful, however, I consider that more could have been done to make a more extact portrayal of the problem and its causes. Despite this, policies where suggested in order to help control the problem.

I consider System Dynamics a really helpful tool that helped explore the causes for adolescent pregnancies. There are a few factors that are considered important and influence the teenage pregnancy rate:

- Quality of Education
- Sexual Abuse
- Contraceptives
- Job opportunities

For this particular topic, there is no other better way of helping then education. Without education these children won't know how to make the right choices for themselves. Without the proper education on the topic, teenagers will continue making the same mistakes without giving much thought to the future. Having a child at such a young age, is definitely a challenge for the new mother, but with a good supporting system, it is possible for this mother and her child to have a better life.

It is important to note, that there are several factors not included in this paper that could have made a serious impact on the issue. However, the purpose of this paper is not to solve the problem, but it definitely is a start and create something bigger and better that can help solve this pregnancy issue. It might not disappear completely, but it can be reduced over time but there must be a bigger involvement from the government and civil society.

10. REFERENCES

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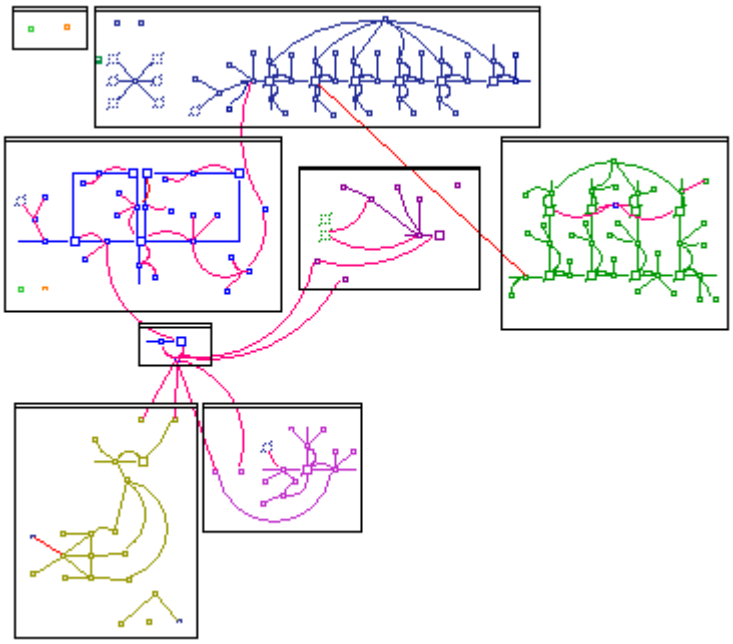
11. APPENDIX

The appendix includes material that has not been included in the main report presented. It is important to state, that these can help in the understanding to the material presented. The appendix section will show a full image of the model created, the formulas used and pictures from the research field.

11.1 Appendix A

Appendix A presents a full image of the model created for this paper.



11.2 Appendix B

Appendix B shows all the equations for the model.

Adults_20_to_64[Male](t) = Adults_20_to_64[Male](t - dt) +
(Becoming_Adult[Gender] + Net_Migration_Adults[Gender] -
Adults_Death_Rate[Gender] - Becoming_Elderly[Gender]) * dt

INIT Adults_20_to_64[Male] = 1613105

Adults_20_to_64[Female](t) = Adults_20_to_64[Female](t - dt) +
(Becoming_Adult[Gender] + Net_Migration_Adults[Gender] -
Adults_Death_Rate[Gender] - Becoming_Elderly[Gender]) * dt

INIT Adults_20_to_64[Female] = 1726068

INFLOWS:
Becoming_Adult[Gender] = Teenagers_15_to_19/Teenage_Stage_Duration
Net_Migration_Adults[Gender] = Adults_20_to_64*Net_Migration

OUTFLOWS:
Adults_Death_Rate[Gender] = (Adults_20_to_64*Working_Age_Pop_Death_Fraction)
Becoming_Elderly[Gender] = Adults_20_to_64/Working_Age_Stage_Duration
Dropouts1[Male](t) = Dropouts1[Male](t - dt) + (Dropout_Rate1[Gender] -
Dropout_due_to_pregnancy1[Gender]) * dt

INIT Dropouts1[Male] = 15542

Dropouts1[Female](t) = Dropouts1[Female](t - dt) + (Dropout_Rate1[Gender] -
Dropout_due_to_pregnancy1[Female]) * dt

INIT Dropouts1[Female] = 12040

INFLOWS:

Dropout_Rate1[Male] = Primary_1_to_3rd_grade[Male]*Pct_Droput_Primary_1_Male
Dropout_Rate1[Female] =
Primary_1_to_3rd_grade[Female]*Pct_Dropout_Primary_1_female

OUTFLOWS:

Dropout_due_to_pregnancy1[Male] = 0

Dropout_due_to_pregnancy1[Female] =
Dropouts1[Female]*pct_of_pregnant_or_teen_mother_Primary_1_to_3
Dropouts2[Male](t) = Dropouts2[Male](t - dt) + (Dropout_Rate2[Gender] -
Dropout_due_to_pregnancy2[Gender]) * dt

INIT Dropouts2[Male] = 9194

Dropouts2[Female](t) = Dropouts2[Female](t - dt) + (Dropout_Rate2[Gender] -
Dropout_due_to_pregnancy2[Female]) * dt

INIT Dropouts2[Female] = 8076

INFLOWS:

Dropout_Rate2[Male] =
Primary___4_to_6_grade[Male]*Pct_Dropout_Primary_2_Male
Dropout_Rate2[Female] =
Primary___4_to_6_grade[Female]*Pct_Dropout_Primary_2_Female

OUTFLOWS:
Dropout_due_to_pregnancy2[Male] = 0

Dropout_due_to_pregnancy2[Female] =
Dropouts2[Female]*Pct_Pregnant_teen__Primary_4_to_6
Dropouts3[Male](t) = Dropouts3[Male](t - dt) + (Dropout_Rate3[Gender] -
Dropout_due_to_pregnancy3[Gender]) * dt

INIT Dropouts3[Male] = 6035

Dropouts3[Female](t) = Dropouts3[Female](t - dt) + (Dropout_Rate3[Gender] -
Dropout_due_to_pregnancy3[Female]) * dt
INIT Dropouts3[Female] = 4035

INFLOWS:
Dropout_Rate3[Male] = Secondary[Male]*Pct_Dropout_Secondary_Male
Dropout_Rate3[Female] = Secondary[Female]*Pct_Dropout_Secondary_Female

OUTFLOWS:
Dropout_due_to_pregnancy3[Male] = 0
Dropout_due_to_pregnancy3[Female] =
Dropouts3[Female]*Pct_Pregnant_teen_Secondary
Dropouts4[Male](t) = Dropouts4[Male](t - dt) + (Dropout_Rate4[Gender] -
Dropout_due_to_pregnancy4[Gender]) * dt
INIT Dropouts4[Male] = 6419
Dropouts4[Female](t) = Dropouts4[Female](t - dt) + (Dropout_Rate4[Female] -
Dropout_due_to_pregnancy4[Female]) * dt
INIT Dropouts4[Female] = 10372

INFLOWS:
Dropout_Rate4[Male] = University[Male]*Pct_Dropout_University_Male
Dropout_Rate4[Female] = University[Female]*Pct_Dropout_University_Female

OUTFLOWS:
Dropout_due_to_pregnancy4[Male] = 0
Dropout_due_to_pregnancy4[Female] =
Dropouts4[Female]*Pct_pregnant__teen_University
Elderly__65_and_beyond[Male](t) = Elderly__65_and_beyond[Male](t - dt) +
(Becoming_Elderly[Gender] + Net_Migration_Elderly[Gender] -
Elderly_Deaths[Gender]) * dt
INIT Elderly__65_and_beyond[Male] = 131494
Elderly__65_and_beyond[Female](t) = Elderly__65_and_beyond[Female](t - dt) +
(Becoming_Elderly[Gender] + Net_Migration_Elderly[Gender] -
Elderly_Deaths[Gender]) * dt
INIT Elderly__65_and_beyond[Female] = 157336

INFLOWS:
Becoming_Elderly[Gender] = Adults_20_to_64/Working_Age_Stage_Duration
Net_Migration_Elderly[Gender] = Elderly__65_and_beyond*Net_Migration
OUTFLOWS:
Elderly_Deaths[Gender] = Elderly__65_and_beyond/Average_life_Expectancy
Exposure_to__Sexual_Education(t) = Exposure_to__Sexual_Education(t - dt) +
(Change_in_Exposure) * dt

INIT Exposure_to__Sexual_Education = 0

INFLOWS:
Change_in_Exposure =
(((total_attendance_1*Number_Sexual_Education__Talks_1)/(total_attendance_1/Seco
ndary[Female]+Secondary[Male]))/Times_per_year)
Fertile_Teen_Moms(t) = Fertile_Teen_Moms(t - dt) + (Lactional_Period -
Pregnancy_Rate2) * dt
INIT Fertile_Teen_Moms = 23518

INFLOWS:
Lactional_Period = Women_Lactional_Period/Lactancy_Time
OUTFLOWS:
Pregnancy_Rate2 = Fertile_Teen_Moms*pct_teens_pregnant_again
Infants_0_to_4[Male](t) = Infants_0_to_4[Male](t - dt) + (Birth_Rate[Gender] +
Net_MigrationInfants[Gender] - Becoming_Young_Child[Gender] -
Infant_Death_Rate[Gender]) * dt
INIT Infants_0_to_4[Male] = 536636
Infants_0_to_4[Female](t) = Infants_0_to_4[Female](t - dt) + (Birth_Rate[Gender] +
Net_MigrationInfants[Gender] - Becoming_Young_Child[Gender] -
Infant_Death_Rate[Gender]) * dt
INIT Infants_0_to_4[Female] = 517845

INFLOWS:
Birth_Rate[Gender] =
(total_births+(((Women_Population_pregnant*Crude_Birth_Rate)/1000)/reproductive_
lifetime))*Annual_Growth_Fraction
Net_MigrationInfants[Gender] = Infants_0_to_4*Net_Migration
OUTFLOWS:
Becoming_Young_Child[Gender] = Infants_0_to_4/Infant_Stage__Duration
Infant_Death_Rate[Gender] = (Infants_0_to_4*Infant_Death_Fraction)/1000
perceived_job__security(t) = perceived_job__security(t - dt) +
(Change_in_Job_Security) * dt
INIT perceived_job__security = Job_Security

INFLOWS:
Change_in_Job_Security = (Job_Security-
perceived_job__security)/Adjustment_time_to_job_security
Pregnant_Teens(t) = Pregnant_Teens(t - dt) + (Pregnancy_Rate + Pregnancy_Rate2 -
Abortion_Rate - Delivery_Rate - Maternal_Death_Rate) * dt
INIT Pregnant_Teens = 182087

INFLOWS:
Pregnancy_Rate =
((Sexually_Active_Teens*Teen_Pregnancy_Rate)/mean_age_at__first_birth)
Pregnancy_Rate2 = Fertile_Teen_Moms*pct_teens_pregnant_again

OUTFLOWS:
Abortion_Rate = (Pregnant_Teens*abortion__fraction)/time_until_abortion

Delivery_Rate =
((Pregnant_Teens*Teen_birth_rate_fraction)/Pregnancy_duration)/1000

Maternal_Death_Rate = (Pregnant_Teens*Maternal_Death_fraction)/1000

Primary_1_to_3rd_grade[Male](t) = Primary_1_to_3rd_grade[Male](t - dt) +
(young_children_enrollment_rate[Gender] - Attending_next_level_1[Gender] -
Dropout_Rate1[Gender]) * dt

INIT Primary_1_to_3rd_grade[Male] = 370052

Primary_1_to_3rd_grade[Female](t) = Primary_1_to_3rd_grade[Female](t - dt) +
(young_children_enrollment_rate[Gender] - Attending_next_level_1[Gender] -
Dropout_Rate1[Gender]) * dt

INIT Primary_1_to_3rd_grade[Female] = 344003

INFLOWS:
young_children_enrollment_rate[Gender] =
Young_Children_5_to_9*Pct_Enrollment_Rate

OUTFLOWS:
Attending_next_level_1[Gender] = Primary_1_to_3rd_grade/Adjustment_Time_1
Dropout_Rate1[Male] = Primary_1_to_3rd_grade[Male]*Pct_Droput_Primary_1_Male

Dropout_Rate1[Female] =
Primary_1_to_3rd_grade[Female]*Pct_Dropout_Primary_1_female
Primary___4_to_6_grade[Male](t) = Primary___4_to_6_grade[Male](t - dt) +
(Attending_next_level_1[Gender] - Attending_next_level_2[Gender] -
Dropout_Rate2[Gender]) * dt
INIT Primary___4_to_6_grade[Male] = 287284
Primary___4_to_6_grade[Female](t) = Primary___4_to_6_grade[Female](t - dt) +
(Attending_next_level_1[Gender] - Attending_next_level_2[Gender] -
Dropout_Rate2[Gender]) * dt
INIT Primary___4_to_6_grade[Female] = 288440
INFLOWS:
Attending_next_level_1[Gender] = Primary_1_to_3rd_grade/Adjustment_Time_1
OUTFLOWS:
Attending_next_level_2[Gender] = Primary___4_to_6_grade/Adjustment_Time_2
Dropout_Rate2[Male] =
Primary___4_to_6_grade[Male]*Pct_Dropout_Primary_2_Male
Dropout_Rate2[Female] =
Primary___4_to_6_grade[Female]*Pct_Dropout_Primary_2_Female
Secondary[Male](t) = Secondary[Male](t - dt) + (Attending_next_level_2[Gender] -
Attending_next_level_3[Gender] - Dropout_Rate3[Gender]) * dt
INIT Secondary[Male] = 177502
Secondary[Female](t) = Secondary[Female](t - dt) + (Attending_next_level_2[Gender]
- Attending_next_level_3[Female] - Dropout_Rate3[Gender]) * dt
INIT Secondary[Female] = 201765
INFLOWS:
Attending_next_level_2[Gender] = Primary___4_to_6_grade/Adjustment_Time_2
OUTFLOWS:
Attending_next_level_3[Male] =
(Secondary[Male]*Enroll_to_University_Males)/Adjustment_Time_3
Attending_next_level_3[Female] =
(Secondary[Female]*Enroll_to_University_Females)/Adjustment_Time_3
Dropout_Rate3[Male] = Secondary[Male]*Pct_Dropout_Secondary_Male
Dropout_Rate3[Female] = Secondary[Female]*Pct_Dropout_Secondary_Female
Sexually_Active_Teens(t) = Sexually_Active_Teens(t - dt) + (Recovery_Rate +
Sexually_Active_Rate - Pregnancy_Rate) * dt
INIT Sexually_Active_Teens = 152453
INFLOWS:
Recovery_Rate = Teen_Failed_Pregnancy/time_to__recover
Sexually_Active_Rate = Sexually_Active

OUTFLOWS:
Pregnancy_Rate =
((Sexually_Active_Teens*Teen_Pregnancy_Rate)/mean_age_at__first_birth)
Sexually__Abused_Teens[Male](t) = Sexually__Abused_Teens[Male](t - dt) +
(abused_teens[Gender] - Becoming_Pregnant_Rate[Gender] -
Not_Becoming__Pregnant_Rate[Gender]) * dt
INIT Sexually__Abused_Teens[Male] = 0
Sexually__Abused_Teens[Female](t) = Sexually__Abused_Teens[Female](t - dt) +
(abused_teens[Gender] - Becoming_Pregnant_Rate[Female] -
Not_Becoming__Pregnant_Rate[Gender]) * dt
INIT Sexually__Abused_Teens[Female] = 14340
INFLOWS:
abused_teens[Gender] =
(Teenagers_15_to_19*Average__pct__of_sexual_assualt_teens)/time4
OUTFLOWS:
Becoming_Pregnant_Rate[Gender] =
(Sexually__Abused_Teens*pct_become_pregnant)/Time5
Not_Becoming__Pregnant_Rate[Gender] = (Sexually__Abused_Teens*(1-
pct_become_pregnant))/time1
Teenagers_15_to_19[Male](t) = Teenagers_15_to_19[Male](t - dt) +
(Becoming_Teenager[Gender] + Net_Migration_Teenagers[Gender] -
Becoming_Adult[Gender] - Teenage_Population_Death_Rate[Gender]) * dt
INIT Teenagers_15_to_19[Male] = 393535
Teenagers_15_to_19[Female](t) = Teenagers_15_to_19[Female](t - dt) +
(Becoming_Teenager[Gender] + Net_Migration_Teenagers[Gender] -
Becoming_Adult[Gender] - Teenage_Population_Death_Rate[Gender]) * dt
INIT Teenagers_15_to_19[Female] = 390907
INFLOWS:
Becoming_Teenager[Gender] =
Young_teenagers_10_to_14/Young_Teenage_Stage_Duration
Net_Migration_Teenagers[Gender] = Teenagers_15_to_19*Net_Migration
OUTFLOWS:
Becoming_Adult[Gender] = Teenagers_15_to_19/Teenage_Stage_Duration
Teenage_Population_Death_Rate[Gender] =
(Teenagers_15_to_19*Teenage_Death_Fraction)
Teen_Failed_Pregnancy(t) = Teen_Failed_Pregnancy(t - dt) + (Abortion_Rate -
Recovery_Rate) * dt
INIT Teen_Failed_Pregnancy = 3933
INFLOWS:

Abortion_Rate = (Pregnant_Teens*abortion__fraction)/time_until_abortion
OUTFLOWS:
Recovery_Rate = Teen_Failed_Pregnancy/time_to__recover
Teen_Pregnancy_Rate(t) = Teen_Pregnancy_Rate(t - dt) + (change_in_TPNR) * dt
INIT Teen_Pregnancy_Rate = teenage_pregnancy_rate_RM
INFLOWS:
change_in_TPNR = TPR
University[Male](t) = University[Male](t - dt) + (Attending_next_level_3[Gender] - Graduation_rate[Gender] - Dropout_Rate4[Gender]) * dt
INIT University[Male] = 58357
University[Female](t) = University[Female](t - dt) + (Attending_next_level_3[Female] - Graduation_rate[Female] - Dropout_Rate4[Female]) * dt
INIT University[Female] = 86429
INFLOWS:
Attending_next_level_3[Male] = (Secondary[Male]*Enroll_to_University_Males)/Adjustment_Time_3
Attending_next_level_3[Female] = (Secondary[Female]*Enroll_to_University_Females)/Adjustment_Time_3
OUTFLOWS:
Graduation_rate[Gender] = (University*grad_rate)/Time_til_graduation
Dropout_Rate4[Male] = University[Male]*Pct_Dropout_University_Male
Dropout_Rate4[Female] = University[Female]*Pct_Dropout_University_Female
Women_Lactional_Period(t) = Women_Lactional_Period(t - dt) + (Delivery_Rate - Lactional_Period) * dt
INIT Women_Lactional_Period = 28680
INFLOWS:
Delivery_Rate = ((Pregnant_Teens*Teen_birth_rate_fraction)/Pregnancy_duration)/1000
OUTFLOWS:
Lactional_Period = Women_Lactional_Period/Lactancy_Time
Young_Children_5_to_9[Male](t) = Young_Children_5_to_9[Male](t - dt) + (Becoming_Young_Child[Gender] + Net_Migration_Young_Children2[Gender] - Becoming_Young_Teenager[Gender] - Young_Children_Death_Rate[Gender]) * dt
INIT Young_Children_5_to_9[Male] = 509688
Young_Children_5_to_9[Female](t) = Young_Children_5_to_9[Female](t - dt) + (Becoming_Young_Child[Gender] + Net_Migration_Young_Children2[Gender] - Becoming_Young_Teenager[Gender] - Young_Children_Death_Rate[Gender]) * dt
INIT Young_Children_5_to_9[Female] = 457461
INFLOWS:

Becoming_Young_Child[Gender] = Infants_0_to_4/Infant_Stage__Duration
Net_Migration_Young_Children2[Gender] = Young_Children_5_to_9*Net_Migration
OUTFLOWS:
Becoming_Young_Teenager[Gender] =
Young_Children_5_to_9/Young_Children_Stage_Duration
Young_Children_Death_Rate[Gender] =
(Young_Children_5_to_9*Young_Children_Death_Fraction)/1000
Young_teenagers_10_to_14[Male](t) = Young_teenagers_10_to_14[Male](t - dt) +
(Net_Migration_Young_Teenagers[Gender] + Becoming_Young_Teenager[Gender] -
Young_Teenage_Deaths_Rate[Gender] - Becoming_Teenager[Gender]) * dt
INIT Young_teenagers_10_to_14[Male] = 485132
Young_teenagers_10_to_14[Female](t) = Young_teenagers_10_to_14[Female](t - dt) +
(Net_Migration_Young_Teenagers[Gender] + Becoming_Young_Teenager[Gender] -
Young_Teenage_Deaths_Rate[Gender] - Becoming_Teenager[Gender]) * dt
INIT Young_teenagers_10_to_14[Female] = 447814
INFLOWS:
Net_Migration_Young_Teenagers[Gender] =
Young_teenagers_10_to_14*Net_Migration
Becoming_Young_Teenager[Gender] =
Young_Children_5_to_9/Young_Children_Stage_Duration
OUTFLOWS:
Young_Teenage_Deaths_Rate[Gender] =
(Young_teenagers_10_to_14*Young_Teenage_Death_Fraction)
Becoming_Teenager[Gender] =
Young_teenagers_10_to_14/Young_Teenage_Stage_Duration
abortion__fraction = 0.12
Adjustment_Time_1 = 3
Adjustment_Time_2 = 3
Adjustment_Time_3 = 5
Adjustment_time_to_job_security = 1
Annual_Growth_Fraction = GRAPH(TIME)
(2000, 2.52), (2001, 2.43), (2002, 2.34), (2003, 2.32), (2004, 2.24), (2005, 2.16), (2006, 2.16), (2007, 2.09), (2008, 2.02), (2009, 1.96), (2010, 1.94), (2011, 1.89), (2012, 1.84)
attendance_students_1 = 0.859
Average_life_Expectancy = GRAPH(TIME)
(2006, 70.0), (2007, 71.0), (2008, 71.0), (2009, 71.0), (2010, 71.0), (2011, 71.0), (2012, 72.0)
Average__pct__of_sexual_assualt_teens = 0.077
Birth[Male] = Delivery_Rate*(1-fraction_female_babies)*Lives_birth_per_delivery

Birth[Female] = Delivery_Rate*fraction_female_babies*Lives_birth_per_delivery
Birth_Fraction = GRAPH(TIME)
(2006, 3.40), (2007, 3.30), (2008, 3.30), (2009, 3.20), (2010, 3.20), (2011, 3.10), (2012, 3.10)
Crude_Birth_Rate = GRAPH(TIME)
(2006, 28.2), (2007, 27.6), (2008, 26.9), (2009, 26.3), (2010, 25.6), (2011, 25.1), (2012, 24.7)
EAP = total_population_simulation*Pct_Economic_Active_Population
Effect_of_Exposure_on_Teen_Pregnancy_Rate =
GRAPH(Exposure_to__Sexual_Education)
(1.00, 0.211), (1.90, 0.211), (2.80, 0.211), (3.70, 0.209), (4.60, 0.191), (5.50, 0.168), (6.40, 0.163), (7.30, 0.158), (8.20, 0.156), (9.10, 0.156), (10.0, 0.156)
Effect_of_Normal_Employed_People_on_Job_Security =
GRAPH(Normal_Employed_Pop)
(0.00, 0.797), (0.1, 0.787), (0.2, 0.724), (0.3, 0.632), (0.4, 0.387), (0.5, 0.267), (0.6, 0.19), (0.7, 0.13), (0.8, 0.0889), (0.9, 0.0857), (1.00, 0.0857)
Effect_of_Perceived_Job_Security_on_Teen_Pregnancy_Rate =
GRAPH(perceived_job__security)
(0.00, 0.214), (0.1, 0.215), (0.2, 0.21), (0.3, 0.195), (0.4, 0.184), (0.5, 0.16), (0.6, 0.15), (0.7, 0.15), (0.8, 0.148), (0.9, 0.151), (1.00, 0.156)
Effect_of_Subemployment_on_Job_Security = GRAPH(Total_Sumemployed_EAP)
(0.00, 1.66), (0.2, 1.57), (0.4, 1.43), (0.6, 1.21), (0.8, 0.909), (1.00, 0.776), (1.20, 0.58), (1.40, 0.35), (1.60, 0.196), (1.80, 0.133), (2.00, 0.133)
Effect_of_Unemployment_on_Job_Security = GRAPH(Unemployed_EAP)
(0.00, 0.0222), (0.1, 0.0952), (0.2, 0.143), (0.3, 0.235), (0.4, 0.276), (0.5, 0.343), (0.6, 0.444), (0.7, 0.533), (0.8, 0.644), (0.9, 0.79), (1.00, 0.876)
Effect_Pregnant_Teen_due_to_Sexual_Abuse =
GRAPH(Becoming_Pregnant_Rate[Female])
(0.00, 0.216), (0.2, 0.214), (0.4, 0.21), (0.6, 0.204), (0.8, 0.174), (1.00, 0.165), (1.20, 0.162), (1.40, 0.161), (1.60, 0.16), (1.80, 0.159), (2.00, 0.159)
Enroll_to_University_Females = 0.5969
Enroll_to_University_Males = 0.4031
fraction_female_babies = 0.49
grad_rate = 0.77
Honduras_Total_Population_RM = GRAPH(TIME)
(2006, 7e+006), (2007, 7.2e+006), (2008, 7.3e+006), (2009, 7.5e+006), (2010, 7.6e+006), (2011, 7.8e+006), (2012, 7.9e+006)
Infant_Death_Fraction = 23
Infant_Stage__Duration = 5

Initial_Exposure_1 = GRAPH(TIME)
(2006, 1.00), (2007, 1.00), (2008, 1.00), (2009, 1.00), (2010, 1.00), (2011, 1.00), (2012, 1.00)
Job_Security = -Effect_of_Unemployment_on_Job_Security*Effect_of_Normal_Employed_People_on_Job_Security*-Effect_of_Subemployment_on_Job_Security
Lactancy_Time = 10/12
Lives_birth_per_delivery = 1
Maternal_Death_fraction = 100
mean_age_at__first_birth = 18
Net_Migration = -1.15/1000
Normal_Employed_Pop = EAP-(Total_Sumemployed_EAP+Unemployed_EAP)
Number_Sexual_Education__Talks_1 = 1
pct_become_pregnant = 0.5
Pct_Dropout_Primary_1_female = 0.035
Pct_Dropout_Primary_2_Female = 0.028
Pct_Dropout_Primary_2_Male = 0.032
Pct_Dropout_Secondary_Female = 0.02
Pct_Dropout_Secondary_Male = 0.034
Pct_Dropout_University_Female = 0.12
Pct_Dropout_University_Male = 0.11
Pct_Droput_Primary_1_Male = 0.042
Pct_Economic_Active_Population = GRAPH(TIME)
(0.00, 0.56), (0.2, 0.543), (0.4, 0.55), (0.6, 0.55), (0.8, 0.543), (1.00, 0.526), (1.20, 0.495), (1.40, 0.46), (1.60, 0.45), (1.80, 0.433), (2.00, 0.426)
Pct_Enrollment_Rate = 0.542
pct_of_pregnant_or_teen_mother_Primary_1_to_3 = GRAPH(TIME)
(2006, 0.421), (2007, 0.422), (2008, 0.428), (2009, 0.432), (2010, 0.444), (2011, 0.457), (2012, 0.476)
Pct_Pregnant_teen_Secondary = GRAPH(TIME)
(2006, 0.108), (2007, 0.116), (2008, 0.121), (2009, 0.128), (2010, 0.136), (2011, 0.145), (2012, 0.159)
Pct_Pregnant_teen__Primary_4_to_6 = GRAPH(TIME)
(2006, 0.294), (2007, 0.297), (2008, 0.303), (2009, 0.31), (2010, 0.319), (2011, 0.339), (2012, 0.36)
Pct_pregnant__teen_University = GRAPH(TIME)
(2006, 0.0215), (2007, 0.0176), (2008, 0.0145), (2009, 0.0124), (2010, 0.0113), (2011, 0.0103), (2012, 0.00864)
Pct_Subemployment = 0.525

pct_teens_pregnant_again = 0.59
Pct_Teens_pregnant_RM = GRAPH(TIME)
(2006, 16.0), (2007, 16.8), (2008, 17.3), (2009, 18.7), (2010, 19.5), (2011, 20.3), (2012, 22.0), (2013, 23.0), (2014, 24.0)
Pct_Unemployed = GRAPH(TIME)
(2006, 0.035), (2007, 0.031), (2008, 0.03), (2009, 0.031)
Pct_Women_pregnant = 0.38
Pct__Sexually_Active_Teen = 0.39
Population_below_poverty_line = GRAPH(TIME)
(2006, 66.8), (2007, 65.2), (2008, 63.1), (2009, 64.4), (2010, 65.4), (2011, 65.2), (2012, 69.3), (2013, 68.5)
Poverty = GRAPH(TIME)
(2006, 0.668), (2007, 0.652), (2008, 0.631), (2009, 0.644), (2010, 0.654), (2011, 0.652), (2012, 0.693)
Pregnancy_duration = 9/12
reproductive_lifetime = 35
Sexually_Active = Teenagers_15_to_19[Female]*Pct__Sexually_Active_Teen
Sexual_Abuse_reported_fraction = GRAPH(TIME)
(2006, 0.423), (2007, 0.48), (2008, 0.491), (2009, 0.526), (2010, 0.497)
sexual_abuse_report_rate =
(Sexually__Abused_Teens[Female]*Sexual_Abuse_reported_fraction)/time4
Teenage_Death_Fraction = 5.28/1000
teenage_pregnancy_rate_RM = GRAPH(TIME)
(2006, 21.5), (2007, 21.9), (2008, 22.3), (2009, 22.9), (2010, 23.4), (2011, 23.8), (2012, 24.0)
Teenage_Stage_Duration = 6
Teen_birth_rate_fraction = GRAPH(TIME)
(2006, 107), (2007, 106), (2008, 104), (2009, 103), (2010, 103), (2011, 102), (2012, 101)
Teen_Pregnancies__RM = GRAPH(TIME)
(2006, 28680), (2007, 32059), (2008, 34048), (2009, 34363), (2010, 39840), (2011, 44780), (2012, 50000)
time1 = 1
time4 = 1
Time5 = 1
Times_per_year = 1
Time_til_graduation = 4
time_to__recover = 1/12
time_until_abortion = 1.5/12

total_attendance_1 = (Secondary[Male]+Secondary[Female])*attendance_students_1
total_births = Birth[Male]+Birth[Female]
Total_Dropouts =
SUM(Dropouts2[Female]+Dropouts3[Female]+Dropouts4[Female]+Dropouts1[Female])
Total_Droputs_due_to_pregnancy =
sum(Dropout_due_to_pregnancy1[Female]+Dropout_due_to_pregnancy2[Female]+Dropout_due_to_pregnancy3[Female]+Dropout_due_to_pregnancy4[Female])
total_population_simulation =
Elderly__65_and_beyond[Male]+Elderly__65_and_beyond[Female]+Adults_20_to_64[Male]+Adults_20_to_64[Female]+Teenagers_15_to_19[Male]+Teenagers_15_to_19[Female]+Infants_0_to_4[Male]+Infants_0_to_4[Female]+Young_teenagers_10_to_14[Male]+Young_teenagers_10_to_14[Female]+Young_Children_5_to_9[Male]+Young_Children_5_to_9[Female]
Total_Sumemployed_EAP = (EAP*Pct_Subemployment)
Total__Population_Below_Poverty = total_population_simulation*Poverty
TPR =
(Teen_Pregnancy_Rate*(Effect_Pregnant_Teen_due_to_Sexual_Abuse*Weight_of_Sexually_Abused_teens_on_TPNR)+(Effect_of_Perceived_Job_Security_on_Teen_Pregnancy_Rate*Weight_of_Perceived_Job_Security_on_TPNR))-
(Effect_of_Exposure_on_Teen_Pregnancy_Rate*Weight_of_Educated_Students_on_TPNR_1)
Unemployed_EAP = EAP-(EAP*Pct_Unemployed)
Weight_of_Educated_Students_on_TPNR_1 = 0.7
Weight_of_Perceived_Job_Security_on_TPNR = 0.2
Weight_of_Sexually_Abused_teens_on_TPNR = 0.1
Women_Population_pregnant = Adults_20_to_64[Female]*(Pct_Women_pregnant)
Working_Age_Pop_Death_Fraction = 5.28/1000
Working_Age_Stage_Duration = 44
Young_Children_Death_Fraction = 25.82
Young_Children_Stage_Duration = 5
Young_Teenage_Death_Fraction = 5.28/1000
Young_Teenage_Stage_Duration = 5

11.3 Appendix C

This section illustrates pictures from the field of research done in Hospital Leonardo Martinez and Centro de Salud Calpules.

This picture was taken at the Center for Adolescent Health care at the Leonardo Martinez Hospital in the center of San Pedro Sula. This center is exclusive for teenagers.

Facilities of the Leonardo Martinez Hospital.

This is the Health Center Calpules, located in the poor suburbs of San Pedro Sula.

In the Calpules Health Center, doctors maintain patient files on physical form. No computers are used because the health center is located in a dangerous part of the city, therefore they fear their equipment might be stolen.

When available, hospitals and health centers give out free condoms for whomever wants some.

UNICEF's support in Honduran hospitals and other programs has always been important and valued in the country. This photo was taken at the Hospital Regional de Tela, located around an hour drive from San Pedro Sula.

These billboards can usually be spotted in any public hospital in the country. Hospitals try to show people the diverse family planning methods available. And other billboards aimed especially towards adolescents; these are about them thinking of their life projects. What do they want to be, what do they want to do.