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Thesis title

FACTORS ASSOCIATED WITH TEENAGE PREGNANCY IN EASTERN PROVINCE. ANALYSIS OF RDHS 2014-2015

Dissertation submitted in partial fulfillment of Master of Public health in college of medicine and health sciences, school of public health

By **Seleman NTAWUYIRUSHINTEGE**
2150556

Supervisors: **Ass. Prof. Manassé NZAYIRAMBAHO**
Co-Supervisor: **Dr. Francine BIRUNGI**

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DECLARATION

I, Seleman NTAWUYIRUSHINTEGE, hereby declare that the thesis has been written by me without any external unauthorized help, that it has been neither presented to any institution for evaluation nor previously published in its entirety or in parts. Any parts, words or ideas, of the thesis, however limited, which are quoted from or based on other sources, have been acknowledged as such without exception.

CERTIFICATE

This to certify that this research work entitled “factors associated with teenage pregnancy in eastern province. Analysis of RDHS 2014-2015" is an original work, proposed and conducted by Seleman NTAWUYIRUSHINTEGE under my supervision in partial fulfillment of the requirements for the Master of Public Health degree at the University of Rwanda college of medicien and health scineces school of public health.

Ass. Prof. Manassé NZAYIRAMBAHO

Signature:.....Date:...../...../2016

ABSTRACT

Background

This study aimed to determine factors associated with teenage pregnancy in Eastern province of Rwanda between 2010 and 2015. By the teenage pregnancy the research considers the women aged 15-19 years and they were pregnant or had given birth during the teenage, as per Rwanda Demographic and Health Survey (RDHS) 2015.

Methodology

This is secondary analysis of data collected from a cross-sectional study. Univariate analysis was used to compute and describe teenage group in eastern province. Bivariate analysis and logistic regression was used to determine factors associated with teenage pregnancy in eastern province of Rwanda.

Results

There is a marked economic and educational gradient for women who have a first birth in adolescence in eastern province. Teenage pregnancy was highly in girls or women in poor category and in primary schools. If in poor category the young girls (15-19years) are 83% at 95% CI(1.086-3.074) more likely to be pregnant compared to rich ones. While respondents with no education and in primary school level are at around 3 times at risk compared to the ones in secondary and high level of education. The final modal is significant with p-value=0.0001 and the following variables remained significant: age of the respondent, wealth index, education, have radio and television, the frequency to read news paper or magazine and if the young girls can get condoms.

Conclusion

A special focus should be given to eastern province during the implementation of the intervention to tackle the increase in teenage pregnancy prevalence. A close follow up is needed in primary school and on community level (families). This will at the same time reduce teenage pregnancies but also reduce possibility of school drop-outs, teenage deaths, HIV Aids and other Sexually Transmitted Infections (STIs), long-lasting poor situation, etc.

As per the predicted limitation, additional researches especially the qualitative ones are recommended to be able to assess additional factors that may lead to have such increase in country and eastern province in particular.

RESUME

Cette étude visait à déterminer les facteurs associés à la grossesse chez les adolescentes dans la province orientale du Rwanda entre 2010 et 2015. Par la grossesse chez les adolescentes, la recherche estime que les femmes âgées de 15-19 ans et ils étaient enceintes ou avaient donné naissance au cours de l'adolescence, selon l' enquête démographique sur la santé au Rwanda en2015.

Ceci est une analyse secondaire des données recueillies à partir d'une étude transversale. L'analyse un-variée a été utilisé pour calculer et décrire un groupe d'adolescent dans la province orientale. Analyse multi varie et la régression logistique a été utilisée pour déterminer les facteurs associés à la grossesse chez les adolescentes dans la province orientale du Rwanda.

Il existe un gradient économique et éducatif marqué pour les femmes qui ont une première naissance à l'adolescence dans la province orientale. Grossesse chez les adolescentes était hautement chez les filles ou les femmes dans les catégories des pauvres et dans les écoles primaires. Dans les catégories des pauvres, les jeunes filles (15-19years) sont à 83%: 95% CI (1,086 - 3,074) plus susceptibles d'être enceintes par rapport aux riches. Bien que les répondants au niveau de l'école primaire et dans la catégorie des pauvres sont environ à 3 fois à risque par rapport à ceux du niveau secondaire et supérieur de l'enseignement et a ceux dans les catégories des riches .

Une attention particulière devrait être accordée à la province orientale au cours de la mise en œuvre de l'intervention pour lutter contre l'augmentation de la prévalence chez les adolescentes de la grossesse. Un suivi étroit est nécessaire à l'école primaire et au niveau de la communauté (familles). Ce sera en même temps réduire les grossesses chez les adolescentes, mais aussi réduire la possibilité d'abandons scolaires, les décès chez les adolescentes, la prévenance du VIH et autres infections sexuellement transmissibles (IST), de longue durée situation déplorable, etc.
Selon la limitation prévue, des recherches supplémentaires en particulier ceux qualitatifs sont recommandés pour être en mesure d'évaluer les facteurs supplémentaires qui peuvent conduire à avoir une telle augmentation dans le pays et dans la province orientale en particulier.

DEDICATION

This thesis is dedicated

To Almighty God

To my beloved family

To my lecturers and colleagues

for being supportive during my academic struggle.

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First and foremost, I would like to thank God for keeping me healthy during the tenure of graduate studies and providing life up today.

I would like to express my extreme gratitude to my supervisors Ass. Prof. Manassé NZAYIRAMBAHO and Dr. Francine BIRUNGI who sacrificed their time to carefully read my work and give continuous advice and professional guidance, ideas and necessary reaction to finally make this work a success.

I am greatly indebted to entire staff of the school of public health especially the academic department members.

May GOD bless you all

ACRONYMS

BDHS: BURUNDI Demographic Health Survey

C.I.: Confidence Interval

DHS: Demographic Health Survey

EAC: East African Community

HIV: Human immunodeficiency virus

KDHS: KENYA Demographic Health Survey

MDGs: Millennium Development Goals

MINEDUC: Ministry of Education

MPH: Master of Public Health

NISR: National Institute of Statistics

OR: Odd Ratio

RDHS: RWANDA Demographic Health Survey

SACCO: Savings And Credit Cooperatives

STIs: Sexually Transmitted Infections

TDHS: TANZANIA Demographic Health Survey

TV: Television

UBS: Uganda Bureau of Statistics

UDHS: UGANGA Demographic Health Survey

UN: United Nations

UNICEF: United Nations for the Children

USA: United States of America

WHO: World Health Organization

GBD: Global Burden of Disease

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CHAPTER I. INTRODUCTION

I.1 Background

Teenage pregnancies continue to be a public health problem globally. They pose public health concerns due to their short and longer term health and social consequences. Evidences show an association between teenage pregnancies and higher maternal morbidity and mortality (WHO, 2016). Childbearing adolescents face many health risk (such as school deaths, drop-outs, sexually transmitted infections (STIs), long-lasting poor situation, etc.) (1).

Globally, it is estimated that 16 million women 15–19 years old give birth each year (2). Those teenage births make the reduction of maternal and child mortality more challenging due to complications such during the pregnancy and in delivering(3). In addition to that, those teenagers who get pregnant are more likely to commit unsafe abortions; around three millions unsafe abortions that occur are done by girls aged 15-19 years annually and are associated with complications such including deaths (3).

In addition to that, teenage pregnancies have economic and social consequences to girls, families and communities in general (4). Many children from teenager mothers drop out from schools and without education, job opportunities are unsecure which compromise their future well-being (5). Moreover, with their low social economic status, such teenagers are not able to take care of their children. This impact their children and are likely to have poor nutrition, poor health, poor education, making the poverty cycle hard to break(1,6).

Teenage pregnancies occur in all countries including developed countries (7). It's estimated that in United States (U.S), in 2014, 249,078 babies were born to women aged 15–19 years, which is 24.2 birth rate per 1,000 women aged 15–19 years with variation with age, racial and ethnic group, and region of the country (8).

Although there has been a decrease of teenage pregnancies proportions of 9% compared to 2013, the teenage childbirth rate in the U.S remains higher than that of other developed

countries (7). It's argued that delay and reduction of sexual activity and the increase use of contraceptives among teens are the hypothetical contributing factors to that reduction(7).

As in developed country, teenage pregnancies are also most prevalent in developing countries where 95% of all teenage pregnancies occur in low- and middle-income countries and most of those pregnancies are unplanned and unwanted (7). Lack of sex education in most of developing countries is considered as an underlying factor contributing to increase of teenage pregnancies. Moreover, low use of contraceptive among teenagers as well as girls' inability to refuse, resist to sex or negotiate protected sex are among other factors contributing to teenage pregnancies (1)

In general, sub-Saharan region continues to be among the top in having high prevalence of teenage pregnancies where according to Edilberto & Liang (9), in 2010, 28% of adolescent mothers were found in sub-Saharan Africa with 15% in West and Central Africa, and 13% in Eastern and Southern Africa (10). Furthermore, in 2013, 16% of all births in sub-Saharan Africa were from adolescent girls aged 15 to 19 and half of the countries with increasing rate of teen pregnancies are in sub-Saharan Africa (9).

As most of the other African countries, teenage pregnancies are prevalent in East African Countries (EAC) and their prevalence varies between countries (11). According to the recent DHS reports in each country, the proportion of teenagers who have begun childbearing is high in Tanzania (26.7%) (TDHS 2016)(12), Uganda with (23.8%) (UDHS2011)(13) followed by Kenya (18.1%) (KDHS 2014)(14) and Burundi with 10.5% (BDHS 2010) (15). In most of those EAC, poverty and lack of education/literacy are among the factors that are associated with teenage pregnancies as well as religion and urban/rural residence. Moreover, evidences show that there has been little progress in reducing teenage pregnancies and inequalities are remarkable especially among the poorest people (11).

Despite existing social and cultural preventive measures of unwanted pregnancies in societies, Rwanda as other countries face the burden of teenage pregnancies although it still low compared to other most African countries. However, according the recent RDHS data (16), teenage pregnancies are increasing in Rwanda with their associated consequences including

but not limited to school dropout, pregnancies complications including death for the teen mother (17)

In order to address the teenage problem in Rwanda; with a joint action of different ministries (MIGEPROF, MOH and MINEDUC) in collaboration with the civil society organizations, there has been different interventions including youths' mobilization and campaigns with more focus in schools (18). Moreover, different projects have been initiated targeting to empower young girls with emphasis to improve communication and safe space(19).

I.2 Problem Statement

According to RDHS 2015, after decreasing from 11 percent in 1992 to 7 percent in 2000 and 4 percent in 2005, the proportion of young women who have begun childbearing has shown slight increase from 6 percent in 2010 to 7 percent in 2014-15 and 7.9 in urban and 7.1 in rural area. Childbearing varies from a low of 5 percent in North to a high of 11 percent in East.

On one hand, teen mothers are less likely to complete school and more likely poverty and single parenthood, young adolescents (particularly those under age 15) experience a maternal death rate 2.5 times greater than that of mothers aged 20-24. Other common problems among adolescent mothers include poor weight gain, pregnancy-induced hypertension, anemia, sexually transmitted diseases (STDs), and cephalopelvic disproportion(17).

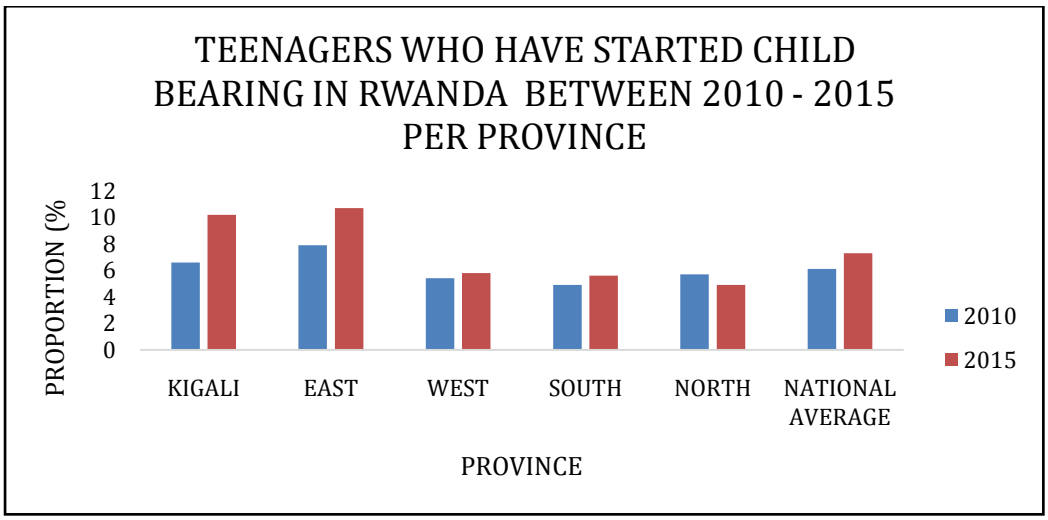
On the other hand, children born to teen mothers suffer from higher rates of low birth weight and related health problems. In addition, low birth weight doubles the chances that a child will later be diagnosed as having dyslexia, hyperactivity, or another disability, abuse and poor school performance(17).

Despite different interventions and efforts, teenage pregnancies are on rise in Rwanda. According to RDHS 2014-2015, teen pregnancies have increased from 6% in 2010 to 7.3% in 2015. In the same period, prevalence of teen pregnancies has more increased from 7.9% to 10.7% in the Eastern province and particularly in Gatsibo district where it has increased from 5.2% to 15.8% (20). Early childbearing occurs more frequently among young women in poor

categories, in no education and primary level than among those with a secondary education or higher(16). If the prevalence of pregnancy among teenage is known in Rwanda in general and Eastern province in particular, factors associated with remain unknown to our knowledge thus far. This study aim is to determine factors associated with childbearing among women age between 15-19 years in Eastern province.

The bellow graphs shows the evolution of teenage pregnancies from 1992 and the situation per each province in Rwanda in 2010 and 2015.

Figure 1: Teenagers who have started child bearing 2010 - 2015 per province



Source:(16,21)

I.4. Use of results

From the factors significantly associated with teenage pregnancy that were identified in this study at the final model of multivariate analysis, the findings and recommendations of this study may be of importance to different levels and stakeholders including MoH, Local government institutions, parents or guardians, schools, authorities at Province, District Sector, Cell and Umudugudu levels. The results will be used to better design and focus interventions aiming at reducing teenage pregnancies in Eastern Province.

I.5 Research Question

To better understand the problem of teenage pregnancies in Eastern Province, a secondary data analysis of Rwanda DHS 2015 was carried out and tried to respond to the following research questions:

- What are background characteristics of teenage pregnancy and motherhood between 15-19 years?
- What are the factors associated with teenage pregnancy in Eastern Province?

I.6 Research Objectives

I.6.1 General objective

The general objective of this study is to get a better understanding of the problem of teenage pregnancies in Eastern Province in order to plan and act accordingly to tackle the increase in its prevalence.

I.6.2. Specific objectives

- Describe background characteristics of teenage women aged 15-19 who got pregnancy.
- Determine factors associated with teenage pregnancy in eastern province

CHAP II: LITTERATURE REVIEW

This chapter reports the literature related to teenage pregnancy as a dependent variable and the selected independent variables. It also provides literature about prevalence of teenage pregnancies among adolescents from other studies.

II.1 Definition of key concepts

II.1.1 Teenage or adolescent

The World Health Organization (WHO) defines adolescents as those people between 10 and 19 years of age (WHO, 2016)(22). In this project, a teenage will be considered as a person aged from 15-19 as it's the age group that has been used during the DHS data collection but also female is considered to be reproductive from 15 years of age.

II.1.2 Pregnancy

It's a period from conception to the time of the birth of the baby. The period is normally 42 weeks or 9 months(23).
According to MedicineNet.com, Pregnancy is defined as the state of carrying a developing embryo or fetus within the female body. This condition can be indicated by positive results on an over-the-counter urine test, and confirmed through a blood test, ultrasound, detection of fetal heartbeat, or an X-ray.

II.1.3 Women of reproductive age

This is related to the period in which a woman is able to conceive. In general, women aged from 15-49 are considered as women of reproductive age in most of the countries including Rwanda(24).

II.1.4 Teenage pregnancy:

This is related to the situation in which a teenage girl within the age of 15-19 get pregnant. In some situations, this may also include those teenage girls from 13 years (1). However, in this project, the teenage pregnancies are limited to those aged from 15-19 years old.

II.1.5 Child bearing

This is related to the to the process of conceiving, being pregnant with, and giving birth to children (25). In this project, childbearing and pregnancy will be used interchangeably to mean a female who has ever had pregnancy or who has had a child (16).

II.1.6 Determinants of adolescent childbearing

Some studies have identified risk factors of teenage pregnancies. A study that used DHS data of eleven African countries has found that community levels of poverty and unemployment were associated with teenage pregnancies while there was no association with the head of the household's age(26). A study conducted in Ghana among adolescent girls showed association between access to social, economic and cultural capitals and high competence to prevent or deal with pregnancy(27). Another reference is made on the studies conducted in Nigeria the same as other publications on Rwanda confirmed an association between teenage pregnancy with age of the respondent, wealth category, religion, type of residency, education level, knowledge of ovulatory cycle and access to information (10,23,28). Reference to those existing evidences as well as the experience from the field, fooling factors are retrained in our conceptual framework.

Factors influencing fertility can be classified into two groups: (1) proximate variables and (2) "background" variables (26). While the proximate variables consist of biological and behavioral factors, which have direct influence on fertility, the background variables comprised of socioeconomic and environmental factors, which affects fertility only indirectly by modifying the proximate variables.

II.1.7 Effects of teenage pregnancy

Early pregnancy has many consequences that can be grouped into individual and social consequences. At individual level, Evidence suggests that due to their physiological immaturity, teenage mothers have an increased risk of premature labor and complications during and after delivery, leading to high morbidity and mortality for themselves, and their children are more likely to be low birth weight and to die before the age of one (29). Early

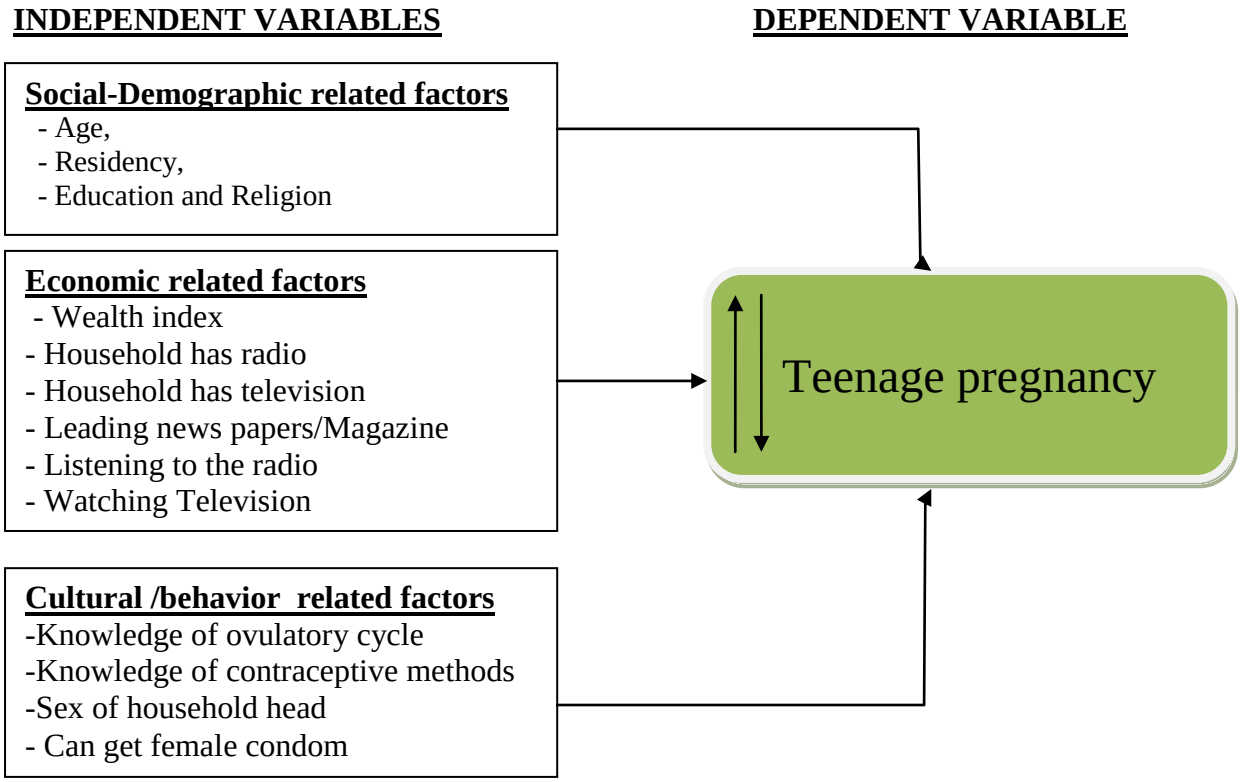
pregnancy leads also at social-economic consequences such us school drop-outs, teenage deaths, HIV Aids and other Sexually Transmitted Infections (STIs), long-lasting poor situation, etc.

II.2 Conceptual framework

In accordance to different publications in developed, developing and east African countries including Rwanda, showed and explained teenage pregnancy associated with the following independent variables:

- Social-demographic related factors: Age, Residency, Education and Religion
- Family, culture and behavior related factor: Knowledge of ovulatory cycle, Knowledge of contraceptive methods, Sex of household head and Can get female condom
- Economic related factors: Wealth index, Household has radio, Household has television, frequency of leading news papers/Magazine, frequency of Listening to the radio and watching Television
- One dependent variable which is teenage pregnancy.

Figure 2: Conceptual framework showing key variables



CHAP III: METHODOLOGY

III.1. DHS data collection

Data from 2014-2015 Rwanda Demographic and Health Surveys (RDHS) have been used to analyze, to determine factors associated with teenage pregnancy in eastern province of Rwanda. The National Institute of Statistics of Rwanda and the Ministry of Health implemented the RDHS surveys. ICF International provided technical assistance for the surveys through the USAID-funded MEASURE DHS program. RDHS samples were nationally representative, household-based surveys, designed to provide population and health indicator estimates at the national, urban rural, and district levels. The sampling method used was stratified two-stage cluster sampling. The first stage consisted of selecting clusters from each stratum (district), 492 enumeration areas were selected with probability proportional to the enumeration areas size and with independent selection in each sampling stratum.

The second stage was a systematic sampling of households from each cluster selected. Then selected households were visited and interviewed. The household response rate was 98%; the women's individual response rate was 99%; and the men's individual response rate was 99%.

Women's respondent rates were almost the same in rural and urban areas. However, during analysis, only women's from Eastern province aged less than 25 years were considered and this led to our study population totaling 1,098. The survey field works were completed from November 9th 2014 to April 8th, 2015, data editing was completed on April 2015 while the cleaning and finalizing were completed on May 2015.

III.2 Source of data

For this project, the dataset has been requested from DHS program as required by explaining the objective of the project and approval for download has been granted (attached Appendix). The data set was downloaded and different information extracted from the data set. The following information were extracted:(30)

- Social and demographic characteristics: age, education, religion, income, having radio and television, sex of household head, sex of household head, among others

The data were extracted from the DHS dataset. During the data extraction from the data set, the following criteria were used (30):

This project focused on data from Eastern Province. The Eastern Province is one of 5 provinces in Rwanda and is the largest with 9813.3617 km^2 with Rwamagana as its capital city; the eastern province has seven districts namely Bugesera, Gatsibo, Kayonza, Ngoma, Kirehe, Nyagatare and Rwamagana (31,32).

The inclusion criteria:

- Female who was living in Eastern Province during the DHS 2014-2015 survey
- Teenagers aged 15-19 years who were pregnant or have given birth and responded to the question.
- A female with more than 19 years but become pregnant or mother when she was between 15 to 19 years during DHS 2014-2015 survey.

The exclusion criteria:

- A female living in eastern province during the survey without information about childbearing or pregnancy status.

III.3 Description of the sample

492 enumeration areas selected for the sample were surveyed for the 2014-15 RDHS. A total of 12,793 households were selected, of which 12,717 were occupied at the time of the survey. Among these households, 12,699 completed the Household Questionnaire, yielding a response rate of 99.9 percent. There was little variation in response rates by urban- rural residence. In the 12,699 households surveyed, 13,564 women age 15-49 were identified as being eligible for the individual interview; interviews were completed with 13,497 of these women, yielding a response rate of 99.5 percent (30).

For the purpose of this report a sample was selected by keeping from DHS dataset the eastern province only, selecting females who were pregnant during the same DHS survey and they were between 15-19 years. It was noted that there was a number of women who gave birth at

their first child when they were between 15 to 19 years during the surveyed period and they were added to our sample as part of the teenage pregnancy of the surveyed period and province. The total number of the female in meeting the inclusion categories become 1098 and out of them 127 found to be teenage pregnancy.

III.4 Data collection and instruments development procedures

During RDHS 2014-2015, sampling frame used for the 2014 - 2015 RDHS was the 2012 Rwanda Population and Housing Census (RPHC). The sampling frame consisted of a list natural village or its part as provided by National institute of during 2012 RPHC. The 2014 - 2015 RDHS followed a two-stage sample design: The first stage involved selecting sample points (clusters) consisting of enumeration areas or villages and the second stage involved systematic sampling that of consisted of listing the households within the selected villages. RDHS data collection fieldwork was conducted from November 9, 2014, to April 8, 2015. The data entry, editing, and cleaning was completed by May 15, 2015, and the final survey report was completed in March 2016 (30).

III.5 Ethical considerations

The approval to download the DHS dataset has been obtained (Attached). There was no possibility to identify the study participants and thus not potential risks for participants. I and the mentor had access to the data and do file used for analysis but normally, the dataset is publically available and anyone who needs it for the research purpose can access it. DHS data are collected in line with international ethical guidelines. The data bears no personal identifiers and thus greatly limits the risk of breaking confidentiality. Since this is secondary analysis there will be no direct benefits accruing to participants.

III.6 Data processing

Data were analyzed using STATA version 13 and different analyses were conducted: Descriptive analysis to describe the teenagers according to their social and demographic characteristics including age, marital status, education, sex of household head, religion, residence (rural and urban), and wealth category, access to information, knowledge of the ovulatory cycle and the possibility to get contraceptive methods.

A bivariate analysis using chi- square was conducted to assess association between the independent variables and the outcome variable (Teenage pregnancy) in order to find out significant variables to include in the predicting model. A multivariable analysis was conducted using multiple logistic regression to have a predicting model of significant risk factors for teenage pregnancies in Eastern province but also to ensure control of potential confounders. Thus, risk factors to which interventions are needed to reduce the teenage pregnancies rate were identified.

III.7 Measures

The association was considered statistically significant if p-value is <0.05. Moreover, given the fact that the use of cluster sampling in RDHS has effects on study results, sampling weights were applied during the analysis. Over all p-value during multivariable analysis (adjusted OR and Adjusted CI) were calculated considering variables' categories compared to their reference.

III.8 Study limitations

In addition, as we have used data from DHS which has predetermined variables, we were constrained to use only available variables, while, if it was our own research we should have included other variables and formulated other questions that would illustrate better factors that are in association with teenage pregnancy. The cross-sectional study in this way have always limitations. They can't guarantee the cause-effect relationship; this study analyzed the relationship between selected socioeconomic variables and teenage child bearing in Rwanda. There will be need of follow up studies to complete the knowledge.

CHAP IV: RESULTS

IV.1 Description of the respondents in eastern province of Rwanda 2014-2015

Table 1 below, shows the distribution of teenagers by socio-demographic characteristics during the interview of RDHS 2014-2015. We considered all women who gave birth while they were in their teenage during survey period in Eastern province. Respondents were from 7 districts of eastern province. We also described various factors including age of respondents, wealth index, residence type, religion, education level, sex of household head, respondents had a radio or TV, knowledge of ovulatory cycle, knowledge about contraceptives, possibility to get condoms and access to information.

Table 1, shows the distribution of teenage pregnancies in eastern province. The description indicates no-increase in teenage pregnancies with increase in years however, the table shows a good number of women who were above 19 years during the DHS 2014-2015 survey but they were assessed to have had birth when they were 15-19 years during the surveyed period (current age of respondent minus the age of respondent's fist child). From the sample, 84.7% young girls of eastern province were living in rural parts of the province. 66.1% of the respondents were in no education and primary school categories of education. While the majority of them were protestant and catholic (62.9% and 25.2% respectively). Gatsibo was found to have more teenage pregnancy with around 14.8% out total respondents form district (27 out of 182) followed by Ngoma with 13.4% and Nyagatare with 12.6.

The same as RDHS 2014-2015, Gatsibo from eastern province is on top list of teenage pregnancy per district (30 districts).

Table 1. Description of teenage pregnancy by selected socio-demographic characteristics

	Pregnant adolescent or birth when adolescent				
	No		Yes		Total
	n	%	n	%	n
Respondent's current age					
15	134	97.8	**3**	**2.2**	137
16	125	97.7	**3**	**2.3**	128
17	88	93.6	**6**	**6.4**	94
18	96	84.2	**18**	**15.8**	114
19	59	70.2	**25**	**29.8**	84
20	82	77.4	**24**	**22.6**	106
21	94	77.7	**27**	**22.3**	121
22	100	84.7	**18**	**15.3**	118
23	82	96.5	**3**	**3.5**	85
24	111	100	**0**	**0**	111
Total	971	88.4	**127**	**11.6**	1098
Religionofresp					
Catholic	209	86.7	**32**	**13.3**	241
Protestants	631	88.7	**80**	**11.3**	711
Adventist	89	89	**11**	**11**	100
Muslim	32	88.9	**4**	**11.1**	36
Jehovah W. & Others	9	100	**0**	**0**	9
Total	970	88.4	**127**	**11.6**	1097
Type of place of residence					
urban	151	89.9	**17**	**10.1**	168
rural	820	88.2	**110**	**11.8**	930
Total	971	88.4	**127**	**11.6**	1098
Education level					
Poor	24	85.7	**4**	**14.3**	28
Middle	595	85.2	**103**	**14.8**	698
Rich	352	94.6	**20**	**5.4**	372
Total	971	88.4	**127**	**11.6**	1098
District					
Rwamagana	147	89.6	**17**	**10.4**	164
Nyagatare	132	87.4	**19**	**12.6**	151
Gatsibo	155	85.2	**27**	**14.8**	182
Kayonza	152	91	**15**	**9**	167
Kirehe	115	91.3	**11**	**8.7**	126
Ngoma	155	86.6	**24**	**13.4**	179
Bugesera	115	89.1	**14**	**10.9**	129

Table 1, shows the distribution of teenage pregnancies in eastern province. The description indicates an increase in teenage pregnancies with increase in years. 84.7% young girls of eastern province were living in rural parts of the province. 66.1% of the respondents were in

no education and primary school level of education while there is no difference in distribution of the respondents in eastern province 7 districts.

Table 2. Description of teenage pregnancy by selected economic/ wealth variables

	Pregnant adolescent or birth when adolescent				
	No		Yes		Total
	No	%	n	%	n
Wealth index					
Poor	285	82.8	**59**	**17.2**	344
Middle	217	86.8	**33**	**13.2**	250
Rich	469	93.1	**35**	**6.9**	504
Total	971	88.4	**127**	**11.6**	1098
Household has: radio					
no	335	85.2	**58**	**14.8**	393
yes	592	90	**66**	**10**	658
not a de jure resident	44	93.6	**3**	**6.4**	47
Total	971	88.4	**127**	**11.6**	1098
Household has: television					
no	808	87.2	**119**	**12.8**	927
yes	119	96	**5**	**4**	124
not a de jure resident	44	93.6	**3**	**6.4**	47
Total	971	88.4	**127**	**11.6**	1098
Frequency of reading newspaper or magazine					
not at all	664	86	**108**	**14**	772
less than once a week	216	93.9	**14**	**6.1**	230
at least once a week	89	94.7	**5**	**5.3**	94
Total	969	88.4	**127**	**11.6**	1096
Frequency of listening to radio					
not at all	133	82.6	**28**	**17.4**	161
less than once a week	201	87.4	**29**	**12.6**	230
at least once a week	635	90.1	**70**	**9.9**	705
Total	969	88.4	**127**	**11.6**	1096
Frequency of watching television					
not at all	531	86.1	**86**	**13.9**	617
less than once a week	277	91.4	**26**	**8.6**	303
at least once a week	161	91.5	**15**	**8.5**	176
Total	969	88.4	**127**	**11.6**	1096

Table 2 shows that around 72.5% of our population were in Poor and middle category while only 27.5% were in rich category. A small number of teen girls are reading news and listening radio or watching television.

Table 3. Description of teenage pregnancy by selected family, culture and behavior related factors

	Pregnant adolescent or birth when adolescent				
	No		Yes		Total
	n	%	n	%	n
knowledge of ovulatory cycle					
during her period	39	95.1	**2**	**4.9**	41
after period ended	381	85.6	**64**	**14.4**	445
middle of the cycle	206	90.7	**21**	**9.3**	227
before period begins	120	90.2	**13**	**9.8**	133
at any time	159	88.8	**20**	**11.2**	179
other	3	100	**0**	**0**	3
don't know	63	90	**7**	**10**	70
Total	971	88.4	**127**	**11.6**	1098
knowledge of any method					
knows no method	11	91.7	**1**	**8.3**	12
knows only traditional method	1	100	**0**	**0**	1
knows modern method	959	88.4	**126**	**11.6**	1085
Total	971	88.4	**127**	**11.6**	1098
sex of household head					
male	665	88.3	**88**	**11.7**	753
female	306	88.7	**39**	**11.3**	345
Total	971	88.4	**127**	**11.6**	1098
Can get a condom					
no	312	92.9	**24**	**7.1**	336
yes	564	86	**92**	**14**	656
don't know	9	90	**1**	**10**	10
Total	885	88.3	**117**	**11.7**	1002

Table 3 shows that only 0.2% of young girls are able to know their ovulatory period at any time level , the majority 99.2% (126 out of 127) responded that they know modern methods, 69.2% of the respondents belonged in the household under a male leadership while 21.4% of the young girls in eastern province are still not able to get condom.

Out of 1098 respondents who qualified the inclusion conditions 127 responded that they were pregnant or experienced child-bearing during the surveyed period.

Table 4. Relationship between teenage pregnancies by their socio-economic characteristics

Variables	Odds	95% CI	P value	
Current age Respondent			**0.0001**	**
15	1			
16	1.07	(0.21-5.41)	0.933	
17	3.05	(0.74-12.49)	0.122	
18	8.38	(2.39-29.23)	0.0001	
19	18.93	(5.4965.14)	0.0001	
20	13.07	(3.82-44.78)	0.0001	
21	12.83	(3.78-43.52)	0.0001	
22	8.04	(2.30-28.04)	0.001	
23	1.63	(0.32-8.29)	0.553	
24				
Religion			**0.859**	
Catholic	1			
Protestant	0.83	(0.53-1.28)	0.39	
Adventist	0.84	(0.38-1.67)	0.56	
Muslim	0.82	(0.27-2.46)	0.71	
Jehovah witness & other				
Type of place of residence			**0.517**	
Urban	1			
Rural	1.19	(0.69-2.044)	0.52	
Highest educational level		*	**0.0001**	**
no education	2.93	(0.93-9.27)	0.067	
primary	3.05	(1.85-5.01)	0.001	
secondary & higher	1			
District			**0.541**	
Rwamagana	1.24	(0.34-1.26)	0.21	
Nyagatare	0.82	(0.44-1.55)	0.55	
Gatsibo	1			
Kayonza	0.56	(0.29-1.11)	0.09	
Kirehe	0.54	(0.26-1.15)	0.11	
Ngoma	0.88	(0.49-1.61)	0.69	
Bugesera	0.69	(0.35-1.39)	0.3	

**=*Significant variable*

Table 4 above shows that there was no association between teenage pregnancy (outcome variable) with religion, type of residence and district of residence. However the same table above shows association between teenage pregnancy with age and level of education. Age is statistically associated with teenage pregnancy p-value=0.0001 especially at 18 years old

(pvalue=0.0001 OR: 8.38,CI(2.39-29.23) and 19 years old pvalue=0.0001, 18.93(5.49-65.14). Teenage girls become more and more at risk as their age increases: they are 3 times, 8 times and even at around 19 times more likely at 17, 18 and 19 respectively compared to the girls at 15 years old to become pregnant.

For their level of education, the table shows association with teenage pregnancy in the category of the young girls during their primary school level or no education category. Teen girls with no education and in primary schools are at around 3 and 2.9 time respectively more likely to become pregnant compared to others in rich category.

Table 5 bellow shows that teenage girls in eastern province are around 2.8 and 2 more likely to become pregnant if they belong respectively in poor and middle category compared to others in rich category . Having radio or television were also shown to be associated with teenage pregnancy, for example the teenage girls with no television are at around 3.5 more times to become pregnancy compared to these accessing television. The table 5 bellow shows also that the frequency of leading news, listening to the radio and watching television statistically influences the teenage pregnancy in eastern province (these who are not leading news at around 2.9 times more pregnant than those leading at least once a week, they become 1.9 more times if they are not at all listening to the radio while they are 1.7 more likely in case they are not at all watching television.

Table 5. Relationship between teenage pregnancy and economic related variables

Variables	Odds	95% CI	P value	
Wealth index			**0.0001**	**
Poor	2.77	(1.78-4.32)	0.001	
Middle	2.04	(1.23-3.37)	0.005	
Rich	1			
Household has: radio			**0.035**	**
Yes	1			
No	1.55	(1.06-2.26)	0.022	
not a de jure resident				
Household has: television			**0.002**	**
Yes	1			
No	3.50	(1.40-8.75)	0.007	
not a de jure resident	1.62	(0.37-7.075)	0.519	
Frequency of reading newspaper or magazine			**0.0003**	**
not at all	2.89	(1.15-7.29)	0.024	
less than once a week	1.15	(0.40-3.29)	0.791	
at least once a week	1			
Frequency of listening to radio			**0.032**	**
not at all	1.91	(1.19-3.08)	0.008	
less than once a week	1.31	(0.83-2.08)	0.253	
at least once a week	1			
Frequency of watching television			**0.0212**	**
not at all	1.73	(1.09-2.74)	0.021	
less than once a week	1			
at least once a week	0.99	(0.51-1.93)	0.98	

***=Significant variable*

Table 6 bellow shows that, teenage pregnancy in eastern province was not associated with knowledge of ovulatory cycle, knowledge of contraceptive methods, sex of household head. However, it was proven to be associated with the possibility that a young girl can get a condom.

Table 6. Relationship between teenage pregnancy and family, culture and behavior related factors

Variables	Odds	95% CI	P value	
knowledge of ovulatory cycle			**0.1945**	
during her period	0.41	(0.09-1.81)	0.24	
after period ended	1.33	(0.78-2.28)	0.28	
middle of the cycle	0.81	(0.42-1.54)	0.52	
before period begins	0.86	(0.41-1.80)	0.69	
at any time	1			
other	0.88	(0.35-2.19)	0.78	
don't know				
knowledge of any method			**0.712**	
knows no method	1			
knows only traditional method				
knows modern method	0.69	(0.08-5.40)	0.725	
Sex of household head			**0.853**	
Male	1			
Female	0.96	(0.65-1.42)	0.85	
Can get a condom			**0.004**	**
No	0.47	(0.29-0.75)	0.002	
Yes	1			
don't know	0.68	(0.08-5.43)	0.71	

***=Significant variable*

In general, after performing a bivariate analysis and considering unadjusted OR and unadjusted 95%CI, we found that out of 15 independent variables selected based on literature review from previous research publications only 9 variables were identified to be associated with teenage pregnancy in eastern province: Current age of the respondent, highest level of education, wealth index, having radio and television, frequency of leading, listening and watching news and then possibility to access condoms. These 9 variables qualified to be used in a multivariate analysis in order to evaluate the overall/ full modal and also to report the adjusted OR and CI.

Table 7. Multivariate analysis of factors associated with teenage pregnancy

	Pregnant adolescent or birth when adolescent		
	Full Modal	Final Modal	
	Unadjusted OR (CI 95%)	Adjusted OR (CI 95%)	Pvalue
Age			
15-19		0.99(0.92-1.07)	0.85
Wealth index			
Poor	2.77(1.78-4.32)	1.83(1.08-3.07)	0.023
Middle	2.04(1.23-3.37)	1.90(1.07-3.38)	0.028
Rich	1		
highest educational level			
no education	2.93(0.93-9.27)		
Primary	3.05(1.85-5.01)	2.34(1.33-4.11)	0.003
Secondary & High	1		
Frequency of reading newspaper or magazine			
not at all	2.89(1.15-7.29)	2.45(0.93-6.46)	0.049
less than once a week	1.15(0.40-3.29)		
at least once a week	1		
Can get a condom			
No	0.47(0.29-0.75)	2.41(1.47- 3.95)	0.001
Yes	1		
don't know	0.68(0.08-5.43)		
Household has: radio			
Yes	1		
No	3.50(1.40-8.75)		
Household has: television			
Yes	1		
No	1.62(0.37-7.075)		
Frequency of listening to radio			
not at all	1.91(1.19-3.08)		
less than once a week	1.31(0.83-2.08)		
at least once a week	1		
Frequency of watching television			
not at all	1.73(1.09-2.74)		
less than once a week	1		
at least once a week	0.99(0.51-1.93)		

Table 7 shows a multivariable analysis of our full modal the adjusted OR and CI determined our final modal composed fist of all by Wealth index (Poor category: pvalue=0.023, OR=1.83 CI(1.08-3.07) and middle category: pvalue= 0.028, OR=1.90 and CI(1.07-3.38).

Secondly, the table 7 above shows that teenage pregnancy is high in young girls in primary schools compared to their peers in high level of education: pvalue=0.003, OR=2.34 CI(1.33-4.11).
Thirdly, the table 7 at multivariate analysis shows association between teenage pregnancy and the frequency of news: pvalue=0.049, OR=2.45 CI(0.93-6.46) and lastly the final modal contains the association between teenage pregnancy with possibility to get condom: pvalue=0.001, OR=2.41 CI(1.47- 3.95). Final modal pvalue=0.0001.

4.2 DISCUSSION

Based to the results, it was found that the teenage pregnancy risk increases with poor economic situation and lower education level especially in primary school. The situation in eastern province of Rwanda shows that there is so much to do with poor and primary school teenage age girls. The percentage is the highest (10.7%) in Rwanda compared to other provinces with Gatsibo, Rwamagana and Kayonza all of eastern province in top 3 of all districts (11%, 10.5% and 8.5% respectively). During DHS 2010, eastern province had 7.9% but still on top of all districts comes Ngoma of eastern province with 8.3%. On the other hand the results found that the prevalence is also high in young girls who are not accessing the information (newspapers and magazine) and these who are not able to get condoms.

Contrary from the result from this analysis, a research conducted in Kenya, Uganda and Tanzania showed an association between teenage pregnancy and type of residency (11) and shows that Rwanda have a lower percentage than all east African countries: 7,3 in Rwanda according to DHS 2014-2015 (16) against 11% in Burundi according to DHS 2010 (15), 18,1% in Kenya (DHS2014), 22,8% in Tanzania (DHS 2016) and 23,8 in Uganda (UDHS2016), may be because of the year of legal marriage is 18 years in most of EAC countries while it is 21 years in Rwanda or maybe because of different government intervention (Home grown solutions): Umugoroba wababyeyi, Girinka, VUP, Ubudehe, etc.
The disproportionate variation was found in different wealth categories where percentage of teenage pregnancy in poor category and middle faces around triple more of the risk faced by their peer in rich category and the teenage pregnancy level was constantly high in women in no education and primary education compared to those in secondary and higher education.

Furthermore, Teenage pregnancy prevalence increases in young girls who are not able to lead newspapers and magazine and in those who are not able to get condoms.

Despite government programs include universal access to education nicknamed 12 Year basic education currently. In addition, some economic development and social protection programs aiming at reducing poverty and inequality and increasing economic status may have contributed to the reduction in percentages of poor people and increase in percentages of rich population. Those programs also known as home grown solutions include but not limited to: One cow per family, Kuremera, Girubucuruzi, Ubudehe program (a social protection scheme), increased access to finance with booming microfinance sector including *UMURENGE* SACCO (a savings and Credit Cooperative for every administrative Sector), development of Cooperative schemes. However, the rate of teenage pregnancy is increasing in Rwanda in general (from 6.1% in 2010- to 7.3% in 2015) and in particular the rate increased in eastern province from 7.9 in 2010 to 10.7 in 2015(16,21).

This implies that, although there is a need of general education and sensitization on adolescent reproductive health, there are specific group that needs attentions. The association of teenage pregnancy with poor category and low education level found in this study was consistent with other studies done in some other countries like in EAC countries (Uganda, Kenya, Tanzania and Burundi), Nigeria, in Bangladesh and Ghana (10,26,27).

Contrary to other studies consulted, in our study no education category was found not associated with teenage pregnancy maybe due to the fact that majority of youths are attending schools particularly with the government initiated and funded 12years basic education program.

Young girls, if educated, they are likely to know about the reproductive rights and they are able to negotiate sex with their partners and also if able to access financially their needs they are at list free from temptations that promises them to procure some of the needed materials.

CHAP. V. CONCLUSION AND RECOMMANDATIONS

5.1. Conclusion

Poor economic situation and lack of sex education in most of developing countries are considered as an underlying factor contributing to increase of teenage pregnancies. Moreover, low use of contraceptive among teenagers as well as girls' inability to refuse, resist to sex or negotiate protected sex are among other factors contributing to teenage pregnancies (1)

Although it is the lowest in East Africa, teenage pregnancy in Rwanda continues to increase from 6.1% to 7.3%. To reduce teenage pregnancy requires understanding the most exposed groups and main determinants associated with teenage pregnancy and develop adequate strategies to reduce the phenomena. From our study, it was found that percentage of pregnancy was higher in Eastern province especially the top three districts Gatsibo, Rwamagana and Kayonza. It was also higher in girls in no education and primary education and then in these in poor category. Teenage pregnancy was not associated with religion even if it used to be the case where some communities including Muslim used give their daughters for marriage during their teen age, but so far so good this is positively changing with government enforcement. (27)(11). Teenage pregnancy is confirmed by WHO to undermine MDGs and SDGS especially to achieve the following goals: 1.Ending hunger and extreme Poverty, 2. Achieve universal primary education, 3.Promote Gender Equality and Empower Women, 4. Reduce child mortality (Still births and deaths in the first week of life are 50 per cent higher among babies born to adolescent mothers than among babies born to mothers in their 20s), 5. Improve Maternal Health, 6. Combat HIV/AIDS, Malaria and Other Diseases, etc.

5.2. Recommendations

Even though the interventions should be multiplied to stop the increase in teenage pregnancies national wide, a particular consideration and intervention is recommended to eastern province especially in no educated and primary schools girls and also in lower and middle income households.

Economic development and social protection programs aiming at reducing poverty and inequality and increasing economic status should be continued and monitored in order to continue to reduce the number of Rwandans in poverty. Those programs also known as home

grown solutions includes: One cow per family, Kuremera, Girubucuruzi, Ubudehe program (a social protection scheme), *UMURENGE* SACCO (a savings and Credit Cooperative for every administrative Sector), etc.

Government of Rwanda (MoH, MINEDUC, MINALOC, other partners including private sector (NGOs, religious organizations, etc) should reinforce its programs that lead to universal access to education and make sure there is close follow up in primary school be it on school level (teachers and other school's staff) and on community level (families). This will at the same time reduce teenage pregnancies but also reduce possibility of school drop-outs, teenage deaths, long-lasting poor situation, etc. (6,33).

Efforts should also be put on the quality of reproductive health education and communication, by educating and sensitizing families to communicate with their children on reproductive health and training teachers not only on the reproductive health science, but also on how to effectively deliver the message to adolescent. Initiatives like Icyumba cy'abakobwa per school, youth corners at health centers, etc who are focusing and supporting adolescent girls in their reproductive health should be closely monitored and owned at community, school and local administration level.

Not all teen births are first births, avoiding repeat teen births should continue to be the goals this should be done especially by reducing stigma and menaces faced by teen girls once they become pregnant or give birth in order to help them to continue with their school program, to also prevent them to run away from their home and again to avoid repeat teen births.

Peer to peer groups at school would help the youth girls to discuss and share the experience in connection with parents awareness rising via Abajyanama b'ubuzima, umugoroba w'ababyeyi and possibly to initiate umugoroba w'urubyiruko especially during school vacations.

As per the predicted limitation, additional researches especially the qualitative ones are recommended to be able to assess additional factors that may lead to have such increase in country and Eastern Province. These researches would be able to show if the is a different in cultural acts between the provinces, if any other factor that is special or different in East parts. The research would also focus on the highlighted groups (poor young girls in Primarily schools).

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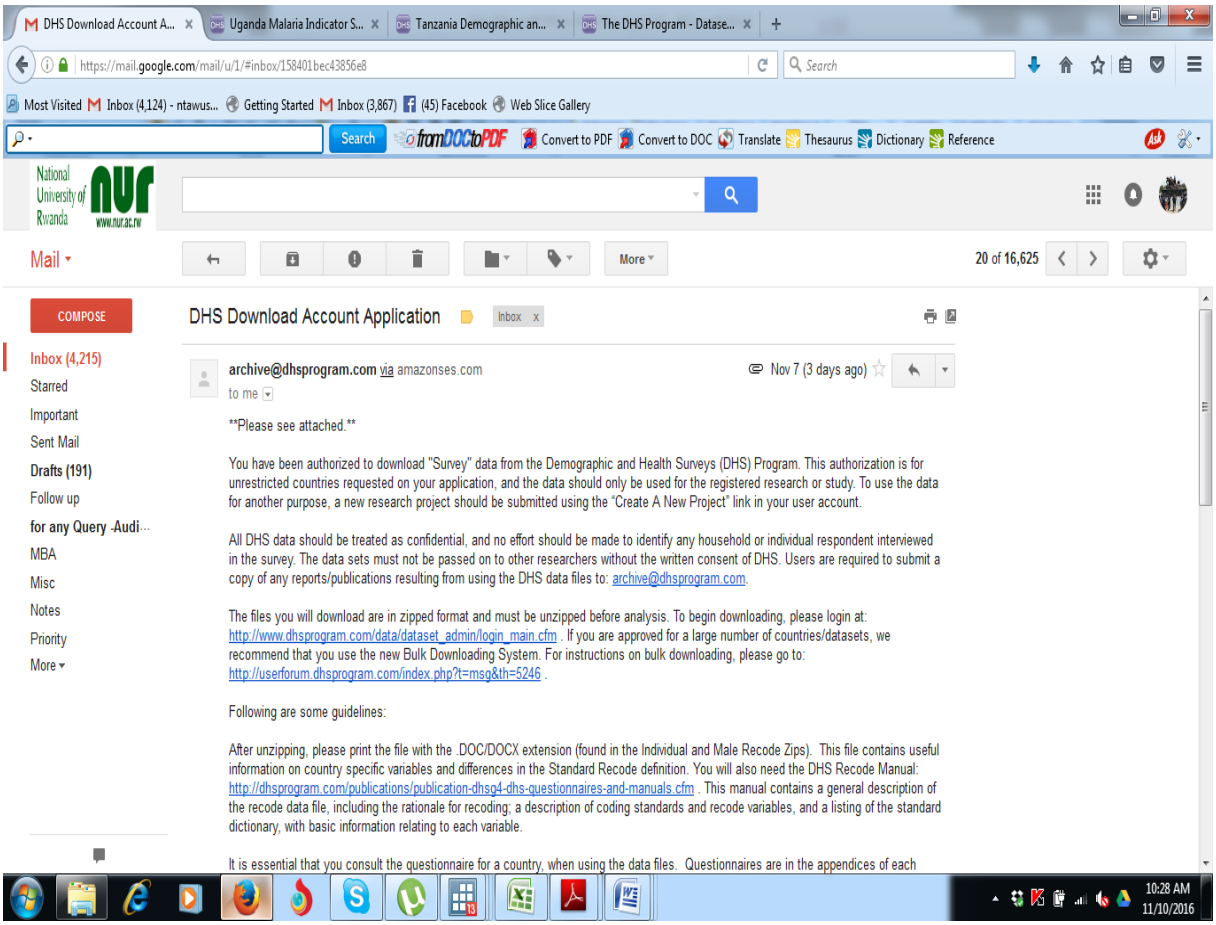
VII. APPENDICES

Author approval to use DHS dataset



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