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CONSULTING

Impact of Child Marriage and Social Determinants of Health on Pregnancy Termination in Selected African Countries

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EXECUTIVE SUMMARY

Background

Child marriage, defined as a marriage prior to 18 years of age is associated with poor health outcomes among both the teen mothers and their children. Globally, an estimated 10 million girls marry before the age of 18 years. Sub-Saharan Africa and South Asia regions have one of the highest rates of child marriages in the world. Child marriage is a human rights issue and is a clear violation of the Universal Declaration of Human Rights 1948 and International Covenant on Civil and Political Rights 1966. Further, the United Nations Sustainable Development Goals (SDGs) clearly highlight the goals of promoting gender equality and women empowerment, and provision of quality education for all, which underscore the need for reducing the prevalence of child marriage and its harmful effects on maternal and child health. The objective of the following analysis is to explore and to provide a deeper and more thorough analysis of the relationships that exist between child marriage, social determinants of health and pregnancy termination among seven African countries.

Methods

We examined seven African countries, Kenya, Uganda, Rwanda, Zambia, Tanzania, Malawi, and Democratic Republic of Congo using publically available Demographic and Health Survey (DHS) data. DHS are nationally representative household surveys that provide data on monitoring and impact evaluation indicators in various health topics. We used data from the DHS women's questionnaire. We characterized child marriage and social determinants to estimate the country-specific prevalence and association of child marriage and pregnancy termination. The sample was limited to ever-married women aged 15-24 years. The demographics and social determinants of the participants were assessed by questions regarding age, level of education, area of residence, wealth index, years of cohabitation, current use of contraceptives, age discrepancy between couple, and number of children. In the survey data, area of residence is categorized into urban and rural areas. A wealth index has been calculated in quintiles based on ownership of consumer items and dwelling characteristics between 1 (poorest) and 5 (wealthiest). We considered child marriage as an exposure variable for all countries, which was defined as marriage/cohabitation before 18 years of age. We assessed pregnancy termination as an outcome for all countries. We assessed pregnancy

termination by a question if a participant's pregnancy had ever resulted in miscarriage, abortion, or stillbirth. The prevalence of child marriage and its descriptive statistics including 95% confidence interval (CI) was calculated for total sample of women aged 15-24 years, and the associations between child marriage and pregnancy termination were assessed by calculating adjusted odds ratios (AORs) using logistic regression model. We also constructed an overall model including all countries together to account for country-specific variations.

Results

Our findings showed that child marriage was prevalent among ever-married women aged 15-24 years in seven African countries, and the prevalence varies between countries from 64% to 18%. Women were mostly poor, had primary education, and were from rural areas. Overall, 38.2% of women were currently using contraceptives and an estimated 9.9% of women reported at least one pregnancy termination. Seventeen percent of women reported that their husbands were at least 10 years older than them. Overall, child marriage was found associated with pregnancy termination, and the likelihood of pregnancy termination increased with decreasing age of marriage as compared to those married as adults i.e., women married prior to 15 years have higher odds of pregnancy termination vs. women married between 16-17 years of age. Less educated mothers, and age discrepancy among the couples were found independent risk factors for pregnancy termination in our study. In addition, contraceptive use was found protective with decreased likelihood of pregnancy termination among those using them.

Conclusions

Child marriage is prevalent among ever-married women aged 15-24 years in seven African countries. Child marriage was found to be associated with pregnancy termination and the risk increased linearly with decreasing age of marriage. We found contraceptive use was a protective factor with decreased likelihood of pregnancy termination among those using them. Our findings support that increase in provision of education, income-generating opportunities, and promoting civil, sexual and reproductive health rights for women can help alleviate child marriage practice in Africa.

BACKGROUND

Child marriage has been defined by the international community as a marriage between two individuals that occurs prior to 18 years of age (*1, 2*). Globally, approximately 10 million girls annually marry before the age of 18 (*3*). Despite the associations between child marriage and negative health outcomes including elevated risk for mortality and morbidity among both the teen mothers and their children (*4-8*), Sub-Saharan Africa and South Asia regions have one of the highest rates of child marriages in the world (*1, 9*).

International studies have demonstrated that compared to women who marry as adults, women marrying prior to the age of 18 have worse maternal and neonatal health outcomes such as grand multiparity (*10*), unplanned pregnancies (*11*), and premature and low-birth weight infants (*12*). Child marriage is also a human rights issue and is a clear violation of the Universal Declaration of Human Rights 1948 and International Covenant on Civil and Political Rights 1966 (*13*). In addition, the United Nations Sustainable Development Goals (SDGs) (*14*) clearly highlight the goals of promoting gender equality and women empowerment, and provision of quality education for all, which underscore the need for reducing the prevalence of child marriage and its harmful effects on maternal and child health.

The practice of child marriage is common in poor countries and regions of the world, and within these countries, the practice occurs most frequently among poor families (*15*). Several reports produced by the United Nations Children's Fund (UNICEF) and International Council for Research on Women (ICRW) utilizing data from South Asia, Africa and Latin America found that women who married as children compared to those who married as adults are more likely to be poor, uneducated, reside in rural areas, and have low access to healthcare services (*1, 2*). Additional studies have found that most girls who are victims of child marriage often drop out of school at a very early age (*13, 16*). As a result of this problem, a substantial number of these girls are unable to earn an appropriate standard of living and become socially and economically dependent on their in-laws or husbands/partners.

For girls that enter into a child marriage, the husbands and partners are frequently much older, and the substantial age gap often relates to abusive power dynamics that often occur within these types of marriages (*1, 17*). This disproportionate risk of high maternal and child mortality and morbidity seems to be related to socio-economic, cultural and structural vulnerabilities such as increased poverty, lack of access to quality health care, and restricted mobility in rural areas. Such vulnerabilities are further aggravated due to under-developed health related infrastructure, limited decision-making power of women within the household, and their restricted access to resources (*18*).

A broad theoretical framework for understanding how social determinants of health are related to adverse outcomes associated with child marriage are described in Figure 1.

Figure 1: Graphical representation of social and gender vulnerabilities to women married as children leading to poor health outcomes (adapted from Raj, 2010 (*8*))

We believe it is critical to understand the impact of child marriage on women's health and to clarify and better understand whether the poor health outcomes associated with child marriage are the consequence of the actual age when these girls gets married or whether it might be due to other social determinants of health that lead to both social and structural vulnerabilities among these young mothers and puts them at increased risk for negative health outcomes.

Objective

The objective of the following analysis is to explore and to provide a deeper and more thorough analysis of the relationships that exist between child marriage, social determinants of health and pregnancy termination among seven African countries.

METHODS

Setting

We examined seven African countries, Kenya, Uganda, Rwanda, Zambia, Tanzania, Malawi, and Democratic Republic of Congo. In subsequent chapters, we will provide a detailed analysis for each country with respect to demographic and geopolitical characteristics, social determinants of health and the general health profile of the country and comparisons to other countries in the same region.

Data Source

Demographic Health Surveys (DHS)

Demographic and Health Surveys (DHS) are nationally-representative household surveys that provide data on monitoring and impact evaluation indicators in various health topics (*19*). Standard DHS Surveys are large-sample datasets and are usually conducted every five years to allow comparisons over time (*19*).

These are rich data sets that provides information on various health topics such as anemia, child health, domestic violence, education, family planning and their unmet needs, female genital cutting, fertility and fertility preferences, HIV/AIDS knowledge and attitude, infant and child mortality, malaria, maternal health, maternal mortality, nutrition, tobacco use, wealth and women's empowerment.

Survey Instrument

There are four Model Questionnaires in DHS-7 surveys: A Household Questionnaire, a Woman's Questionnaire, a Man's Questionnaire, and a Biomarker Questionnaire. We used woman's questionnaire for the analysis in this report.

Sample Design

Typically, the sample is representative at the national level, the residence level (urban-rural), and the regional level (departments, states) using stratified two-stage cluster design (*20*). Typically,

during the first stage, enumeration areas are drawn from census files, and later a sample of households is drawn from each enumeration areas during the second stage (*20*).

Study Sample and Data Management

We used data from the DHS women's questionnaire, and characterize child marriage and social determinants to estimate the country-specific prevalence and association of child marriage and pregnancy termination. The sample was limited to ever-married women aged 15-24 years to ensure the inclusion of a population that reflects current marriage practices. The demographics and social determinants of the participants were assessed by questions regarding age, level of education, area of residence, wealth index, years of cohabitation, current use of contraceptives, age discrepancy between couple, and number of children. In the survey data, area of residence had been categorized into urban and rural areas. A wealth index had been calculated in quintiles based on ownership of consumer items and dwelling characteristics between 1 (poorest) and 5 (wealthiest).

Exposure Variable

We considered child marriage as an exposure variable for all countries, which was defined as marriage/cohabitation before 18 years of age.

Outcome Measure

We assessed pregnancy termination as an outcome for all countries. We assessed pregnancy termination by a question if a participant's pregnancy had ever resulted in miscarriage, abortion, or stillbirth.

The seven African countries, years, data sources, inclusion criteria, exposure and outcomes variables, and socio-economic covariates of interest has been described in Table 1.

Table 1: Characteristics of sample used in the report

Study setting (years)	Nationally representative data from selected African countries 1. Kenya (2014) 2. Uganda (2011) 3. Rwanda (2014-15) 4. Zambia (2013-14) 5. Tanzania (2015-16) 6. Malawi (2015-16) 7. Democratic Republic of Congo (2013-14)
Data source	Demographic Health Survey (DHS) data are cross-sectional, nationally representative datasets. DHS program has collected, analyzed, and disseminated accurate and representative data on population, health, HIV, and nutrition through more than 300 surveys in over 90 countries.
Inclusion criteria	Ever-married women aged 15-24 years
Exposure variable	Child marriage (<18 years)
Outcome measure	At least one pregnancy termination†
Covariates	Participant age, level of education, area of residence, wealth index, contraception (current use)††, age discrepancy between couple, number of children, marriage duration (only in overall model that includes all countries).

†Ever resulted in miscarriage, abortion, or stillbirth
††Participant currently used a modern, traditional or any other method of contraception

Data Analysis

The prevalence of child marriage and its descriptive statistics including 95% confidence interval (CI) was calculated for total sample of women aged 15-24 years. The characteristics of child marriage were compared with adult marriage using Chi-square test. We considered two-tailed p-value of <0.05 to be statistically significant. Associations between child marriage and pregnancy termination was assessed by calculating adjusted odds ratios (AORs) using logistic regression models. We also constructed an overall model including all countries together to account for country-specific variations. All the data were weighted and analyzed using SAS statistical software version 9.4 to account for selection probability, non-response, and sampling differences between regions to produce national estimates of the population. We calculated weighted percentages of the national population including the absolute numbers of participants from the original sample.

KENYA

Background:

Kenya is a low income country that borders the Indian Ocean, between Somalia and Tanzania (*21*). The country has a population of around 47.6 million with a birth rate of 23.9 births/1,000 population (*21*). The population size has increased substantially, almost tripling between 1969 and 2009 (*22*). Kenya is predominantly an agricultural country.

Figure 2: Map of Kenya *(22)*

The median age of marriage among women in Kenya is 20.2 years, and has been stable for the last 10 years (*22*). An estimated 50% of women aged 20-29 had first experience of sexual intercourse

by the age of 18 (*22*). Women residing in rural areas tend to marry much earlier than those living in urban areas (*22*). Child marriage disproportionately affects girls with less education and those residing in rural regions (*23*). The national data show a close relationship between marriage and childbearing, with almost 25% of women having a child by the age of 18, and nearly 50% by the age of 20 (*22*). Teen pregnancy is prevalent in the country. An estimated 18% of women aged 15-19 reported having either a child or were pregnant with their first child before 18 years of age (*22*).

Methods:

Data Source and Sample of Participant

We selected participants from the 2014 Kenya Demographic and Health Survey (DHS), implemented by the Kenya National Bureau of Statistics (KNBS). The 2014 Kenya Demographic and Health Survey (DHS) is a nationally-representative household survey that provides country-level estimates of selected demographic and health indicators in Kenya (*22*). The survey instrument was finalized in English, and then translated in 16 languages (Borana, Embu, Kalenjin, Kamba, Kikuyu, Kisii, Luhya, Luo, Maasai, Maragoli, Meru, Mijikenda, Pokot, Somali, Swahili, and Turkana). After training of the trainers and field staff, and pretesting activities, the field work was conducted during May 7 to October 20, 2014. Depending on the preference of household members, trained interviewers verbally administered the survey. A nationally representative household-based sample was obtained by a two-stage, stratified, random sample design.

The Fifth National Sample Survey and Evaluation Programme (NASSEP V) was considered as a master sampling frame. During the first stage, 1612 enumeration areas (or clusters) spread across the country (995 clusters in rural areas and 617 in urban areas) were selected with a probability proportional to size from a total of 96,251 enumeration areas (or clusters) using the 2009 Kenya Population and Housing Census. During the second stage, 25 households were selected from each cluster. In the 36,430 households successfully interviewed, a total of 32,172 ever-married women aged 15–49 years were identified, of whom 31,079 were successfully interviewed, yielding a response rate of 96.6%. The detailed methodology of survey design, data collection and management has been described elsewhere (*22*).

Survey Instrument and Data Management

We used data from the DHS women's questionnaire, and characterize child marriage and social determinants to estimate the country-specific prevalence and association of child marriage and pregnancy termination. We limited the sample to ever-married women aged 15-24 years (n=4,346; 14% [4,346/31,079]). Our sample focused on 15–24-year-old mothers to ensure the inclusion of a population that reflects current marriage practices in Kenya. The demographics and social determinants of the participants were assessed by questions regarding age, level of education, area of residence, wealth index, years of cohabitation, current use of contraceptives, age discrepancy between couple, and number of children. In the survey data, area of residence had been categorized into urban and rural areas. A wealth index had been calculated in quintiles based on ownership of consumer items and dwelling characteristics between 1 (poorest) and 5 (wealthiest). Contraception use was assessed by a question whether a participant currently used a modern, traditional or any other method of contraception. We dichotomize the variable whether the participants are currently using any contraceptive or not.

Exposure Variable

We considered child marriage as an exposure variable, which was defined as marriage/cohabitation before 18 years of age.

Outcome Measure

We assessed pregnancy termination as an outcome. We assessed pregnancy termination by a question if a participant's pregnancy had ever resulted in miscarriage, abortion, or stillbirth.

Data Analysis

The prevalence of child marriage and its descriptive statistics including 95% confidence interval (CI) was calculated for total sample of women aged 15-24 years. The characteristics of child marriage were compared with adult marriage using Chi-square test. We considered two-tailed p-value of <0.05 to be statistically significant. Associations between child marriage and pregnancy termination was assessed by calculating adjusted odds ratios (AORs) using logistic regression models. All the data were weighted and analyzed using SAS statistical software version 9.4. to account for selection probability, non-response, and sampling differences between regions to

produce national estimates of the population. We calculated weighted percentages of the national population including the absolute numbers of participants from the original sample.

Results

The estimated child marriage prevalence among ever-married women aged 15-24 years in Kenya was 41.8% with an estimated 15.2% married between 10-15 years of age (Table 2; Figures 3-6). Women were mostly poor, had primary education and were from rural areas. Majority (50.8%) of women were currently using contraceptives and an estimated 8.8% of women reported at least one pregnancy termination. Almost one quarter of women reported that their husbands were at least 10 years older than them. In the adjusted logistic regression models, we found that women married between the ages of 10-15 years have increased likelihood of termination of pregnancy as compared to those married as adults (18+ years) (Figure 7).

Table 2: Characteristics of ever-married women aged 15-24 years, Kenya

Variable	Category	Frequency (N)	Weighted %
Child marriage (years)	18+	956	58.2
	16-17	497	26.6
	10-15	361	15.2
Education	No Education	302	8.1
	Primary	967	52.1
	Secondary or more	545	39.8
Wealth index	Poorest	547	19.9
	Poorer	398	21.1
	Middle	302	16.8
	Richer	319	21.9
	Richest	248	20.2
Type of residence	Urban	695	44.1
	Rural	1,119	55.9
Husband 10 years or more older than wife	No	1,354	77.7
	Yes	460	22.4
Duration of marriage (years)	0 -9	1,771	98.4
	10-14	43	1.6
Number of children	0-2 children	1,494	85.0
	> 2 children	320	15.0
Contraception use (current)	No	1,029	49.2
	Yes	785	50.8
Pregnancy termination (at least one)	No	1,668	91.2
	Yes	146	8.8

Figure 3: Prevalence of child marriage among ever-married women aged 15-24 years, Kenya

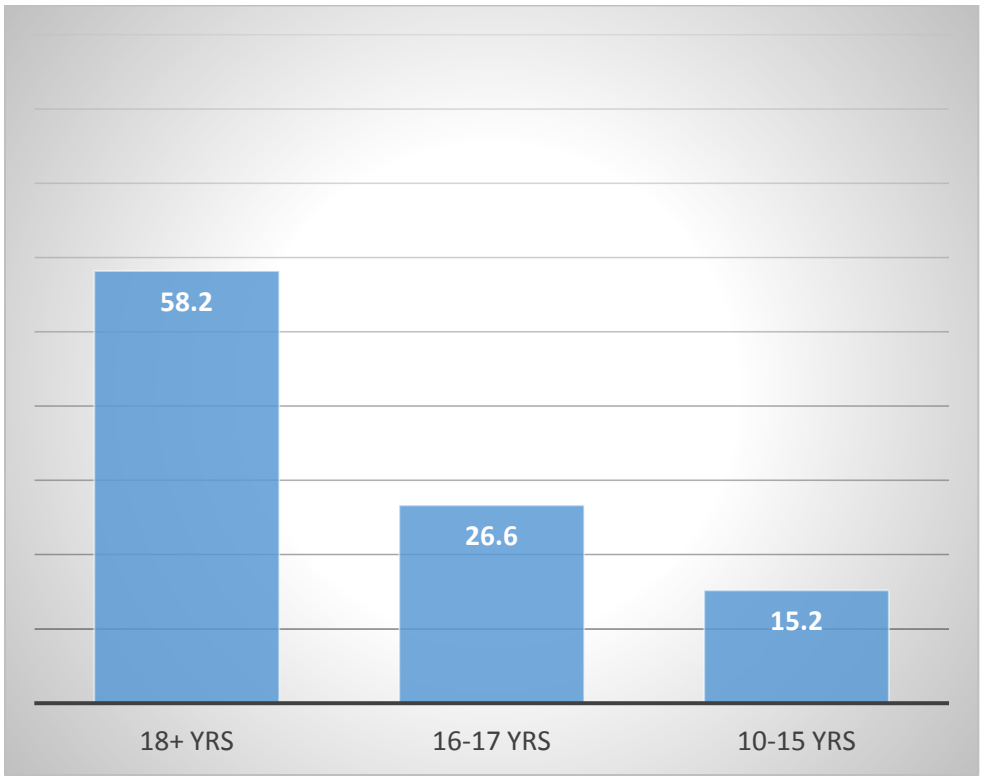


Figure 4: Type of education level among ever-married women aged 15-24 years, Kenya

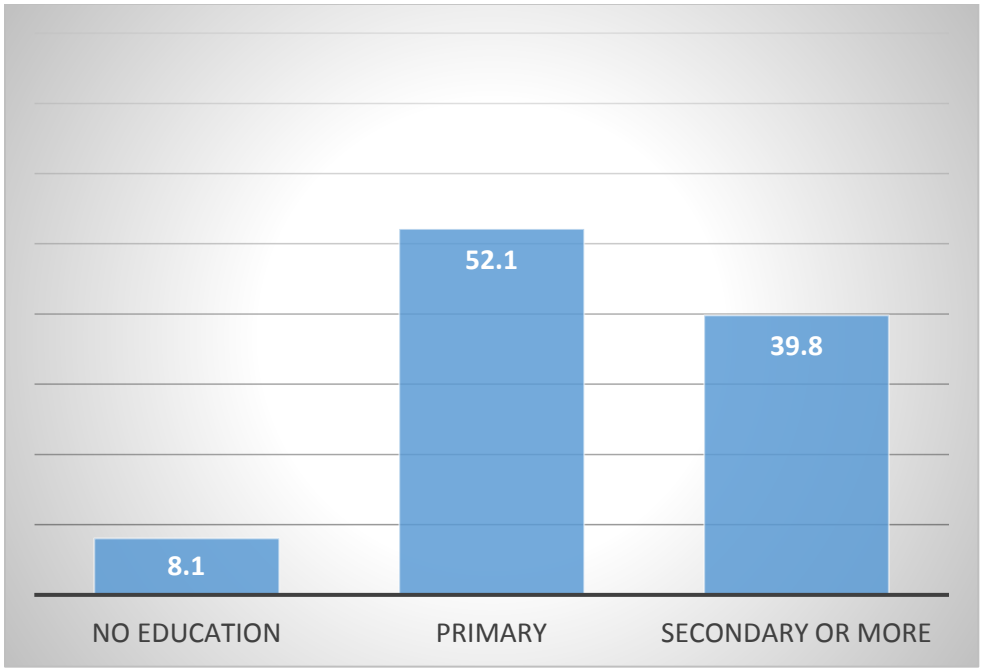


Figure 5: Prevalence of contraceptive use among ever-married women aged 15-24 years, Kenya

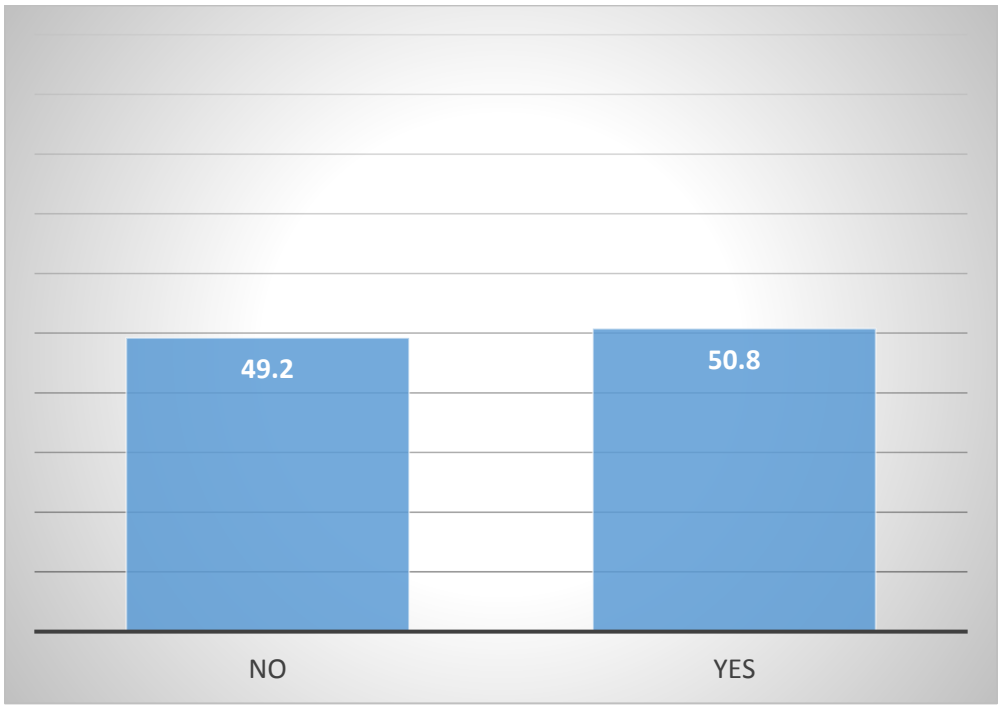


Figure 6: Prevalence of pregnancy termination among ever-married women aged 15-24 years, Kenya

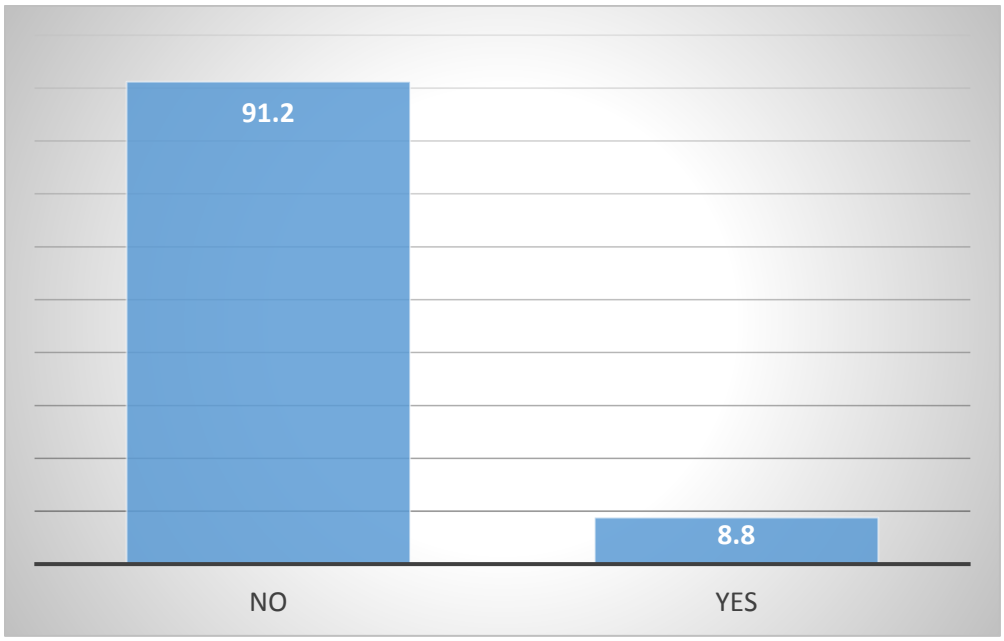
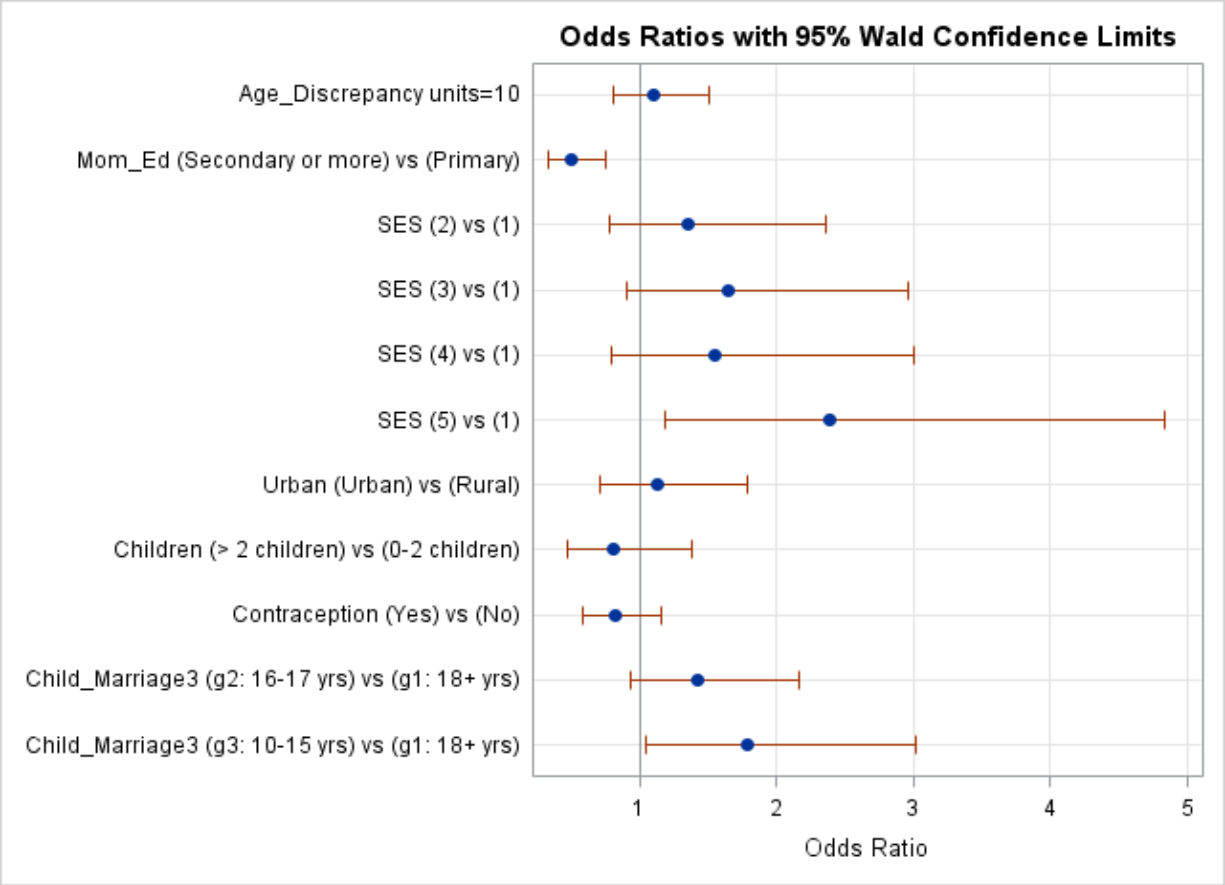


Figure 7: Association of child marriage and social determinants of health with termination of pregnancy, Kenya



UGANDA

Background:

Uganda is a low income country that borders the Kenya to the east, Tanzania to the south, Rwanda to the southwest, the Democratic Republic of Congo to the west, and South Sudan to the north (*24*). The country has a population of around 39.6 million with a birth rate of 42.9 births/1,000 population (*25*). The population size has increased substantially, with 2.5 folds increase between 1969 and 2002 (*24*). Uganda is predominantly an agricultural country.

Figure 8: Map of Uganda *(24)*

The median age of marriage among women aged 20-49 years in Uganda is 18 years (*24*). An estimated 62% of women aged 20-49 had their first experience of sexual intercourse by the age of 18 (*24*). Women residing in rural areas tend to marry much earlier than those living in urban areas

(*24*). Child marriage disproportionately affects girls with less education and those belong to poor socioeconomic status (*26*). The national data show a close relationship between marriage and childbearing, with almost 39% women having a child by the age of 18, and nearly 63% by the age of 20 (*24*). Teen pregnancy is prevalent in the country. An estimated 24% of women aged 15-19 reported having either had a child or were pregnant with their first child (*24*) before 18 years of age.

Methods:

Data Source and Sample of Participant

We selected participants from the 2011 Uganda Demographic and Health Survey (DHS), implemented by the Uganda National Bureau of Statistics. The 2011 Uganda DHS is a nationally-representative household survey that provides country-level estimates of selected demographic and health indicators in Uganda (*24*). The survey instrument was finalized in English, and then translated in 7 major languages (Ateso, Ngakarimojong, Luganda, Lugbara, Luo, Runyankole-Rukiga, and Runyoro-Rutoro). After training of the trainers and field staff, and pretesting activities, the field work was conducted from end of June 2011 to early December 2011. Depending on the preference of household members, trained interviewers verbally administered the survey. A nationally representative household-based sample was obtained by a two-stage, stratified, random sample design.

The 2002 Population Census provided by the Uganda Bureau of Statistics was considered as a master sampling frame. During the first stage, 404 enumeration areas (or clusters) spread across the country (286 clusters in rural areas and 119 in urban areas) were selected from a total of 48,715 enumeration areas (or clusters) among a list of clusters sampled for the 2009/10 Uganda National Household Survey. During the second stage, fixed number of households in each cluster were selected from a complete listing of households. A total of 135 households were there in an urban enumeration area and 100 in a rural enumeration area, with an overall average of 104 households per enumeration area. In the 9,033 households successfully interviewed, a total of 9,247 ever-married women aged 15–49 years were identified, of whom 8,674 were successfully interviewed, yielding a response rate of 94%. The detailed methodology of survey design, data collection and management has been described elsewhere (*24*).

Survey Instrument and Data Management

We used data from the DHS women's questionnaire, and characterize child marriage and social determinants to estimate the country-specific prevalence and association of child marriage and pregnancy termination. We limited the sample to ever-married women aged 15-24 years (n=1,672; 19% [1,672/8,674]). Our sample focused on 15–24-year-old mothers to ensure the inclusion of a population that reflects current marriage practices in Uganda. The demographics and social determinants of the participants were assessed by questions regarding age, level of education, area of residence, wealth index, years of cohabitation, current use of contraceptives, age discrepancy between couple, and number of children. In the survey data, area of residence had been categorized into urban and rural areas. A wealth index had been calculated in quintiles based on ownership of consumer items and dwelling characteristics between 1 (poorest) and 5 (wealthiest). Contraception use was assessed by a question whether a participant currently used a modern, traditional or any other method of contraception. We dichotomize the variable whether the participants are currently using any contraceptive or not.

Exposure Variable

We considered child marriage as the exposure variable, which was defined as marriage/cohabitation before 18 years of age.

Outcome Measure

We assessed pregnancy termination as an outcome. We assessed pregnancy termination by a question if a participant's pregnancy had ever resulted in miscarriage, abortion, or stillbirth.

Data Analysis

The prevalence of child marriage and its descriptive statistics including 95% confidence interval (CI) was calculated for total sample of women aged 15-24 years. The characteristics of child marriage were compared with adult marriage using Chi-square test. We considered two-tailed p-value of <0.05 to be statistically significant. Associations between child marriage and pregnancy termination was assessed by calculating adjusted odds ratios (AORs) using logistic regression models. All the data were weighted and analyzed using SAS statistical software version 9.4 to account for selection probability, non-response, and sampling differences between regions to

produce national estimates of the population. We calculated weighted percentages of the national population including the absolute numbers of participants from the original sample.

Results

The estimated child marriage prevalence among ever-married women aged 15-24 years in Uganda was 52.4% with an estimated 19.7% married between 10-15 years of age (Table 3; Figures 9-12). Women were mostly poor, had primary education and were from rural areas. Over 30% of women were currently using contraceptives and an estimated 14.1% of women reported at least one pregnancy termination. Almost one fifth of women reported that their husband was at least 10 years older than them. In the adjusted logistic regression models, we found that women married between the ages of 10-15 years and those aged 16-17 years have increased likelihood of termination of pregnancy as compared to those married as adults (18+ years) (Figure 13).

Table 3: Characteristics of ever-married women aged 15-24 years, Uganda

Variable	Category	Frequency (N)	Weighted %
Child marriage (years)	18+	1,497	47.7
	16-17	1,141	32.7
	10-15	686	19.7
Education	No Education	171	3.9
	Primary	2,209	63.3
	Secondary or more	944	32.8
Wealth index	Poorest	888	22.9
	Poorer	797	22.4
	Middle	588	17.7
	Richer	544	18.0
	Richest	507	19.0
Type of residence	Urban	615	22.5
	Rural	2,709	77.5
Husband 10 years or more older than wife	No	2,734	82.9
	Yes	590	17.1
Duration of marriage (years)	0 -9	3,262	98.2
	10-14	62	1.8
Number of children	0-2 children	2,659	80.6
	> 2 children	665	19.4
Contraception use (current)	No	2,326	69.1
	Yes	998	30.9
Pregnancy termination (at least one)	No	2,855	85.9
	Yes	469	14.1

Figure 9: Prevalence of child marriage among ever-married women aged 15-24 years, Uganda

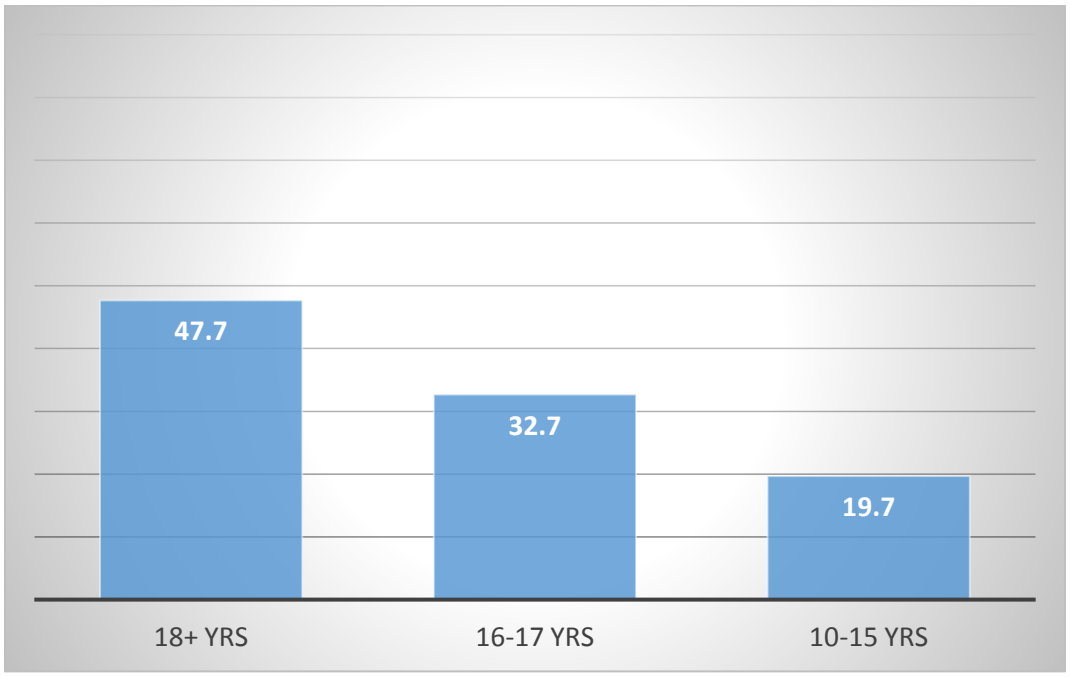


Figure 10: Type of education level among ever-married women aged 15-24 years, Uganda

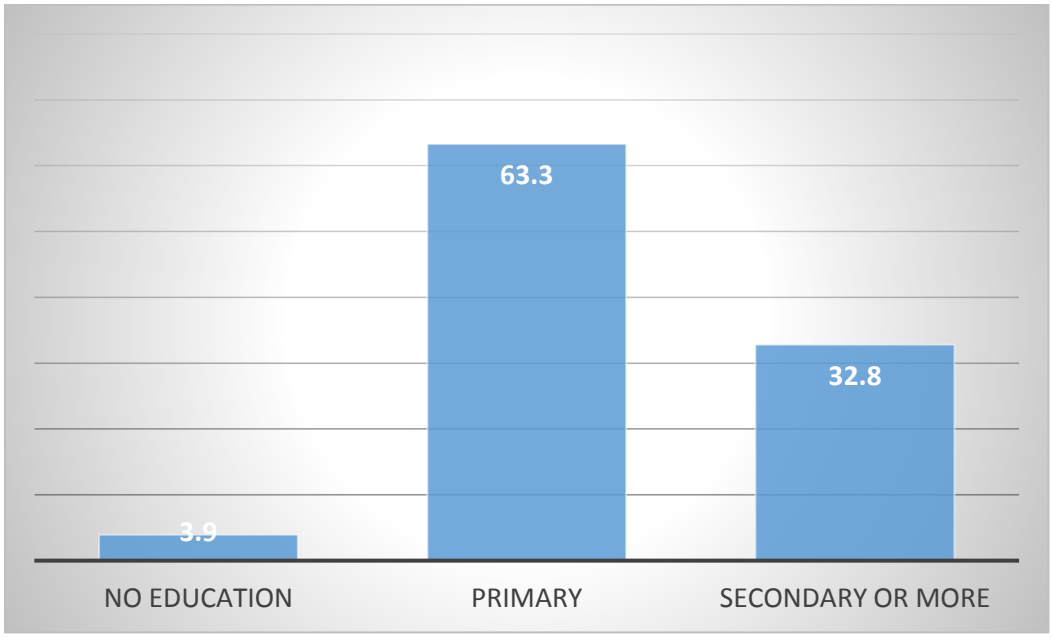


Figure 11: Prevalence of contraceptive use among ever-married women aged 15-24 years, Uganda

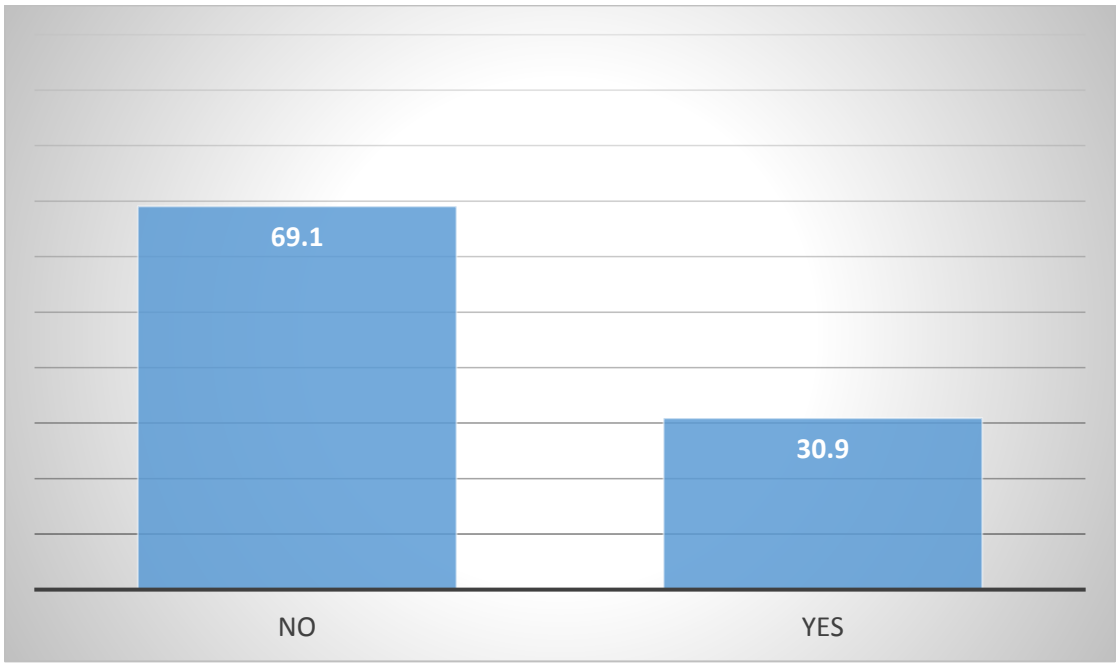


Figure 12: Prevalence of pregnancy termination among ever-married women aged 15-24 years, Uganda

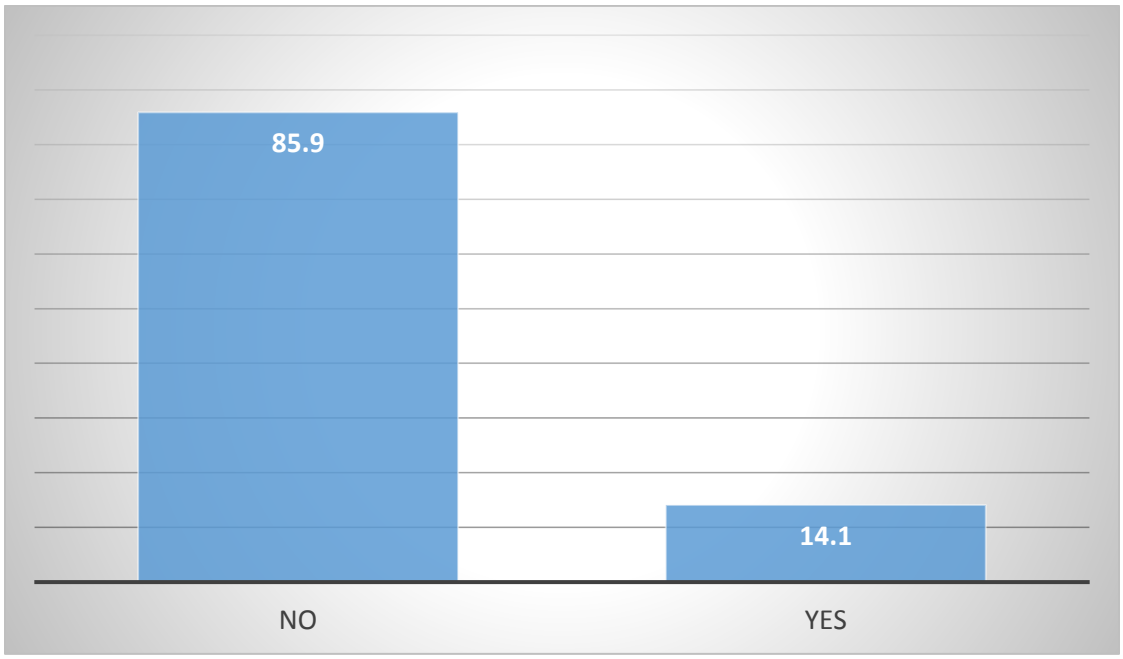
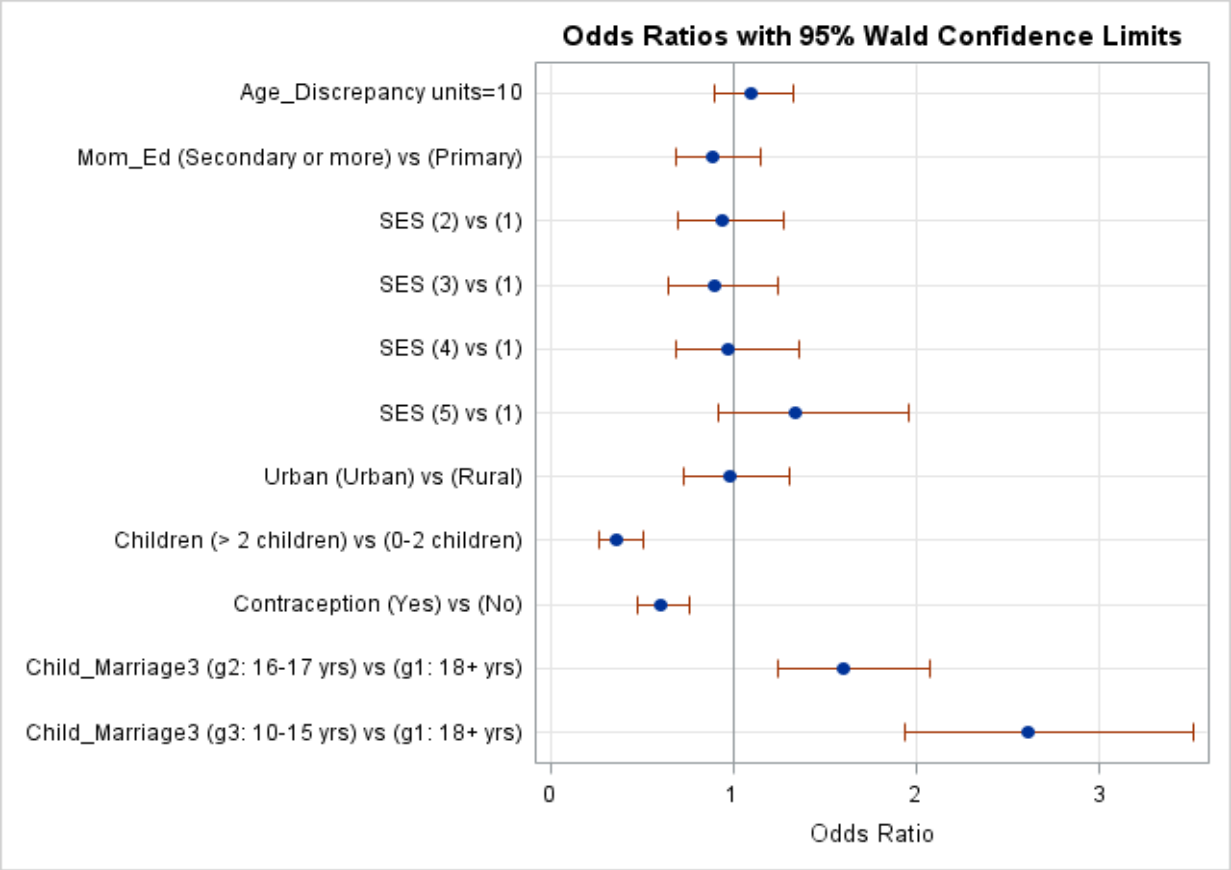


Figure 13: Association of child marriage and social determinants of health with termination of pregnancy, Uganda



RWANDA

Background:

Rwanda is a low income country is situated in Central Africa and borders Uganda to the north, Tanzania to the east, the Democratic Republic of the Congo to the west, and Burundi to the south (*27*). The country has a population of around 11.9 million with a birth rate of 30.7 births/1,000 population (*28*). The population size has increased steadily and substantially with a growth rate at 2.6 percent and the fertility rate of 5.9 according to 2002 General Population and Housing Census (*27*). Uganda is predominantly an agricultural country. In recent years, service sector has dominated and contributed more to the economy than the agricultural sector (*27*).

Figure 14: Map of Rwanda *(27)*

The median age of marriage among women aged 25-49 years in Rwanda is 21 years (*27*). An estimated 20% of women aged 20-49 had their first experience of sexual intercourse by the age of 18 (*27*). Women residing in rural areas tend to marry much earlier than those living in urban areas (*27*). Internationally it has been shown, the child marriage practice disproportionately affects girls with less education and those belong to poor socioeconomic status (*1*). The national data of Rwanda show close relationship of marriage and childbearing with almost 8% women have a child by the age of 18, and nearly 23% by the age of 20 (*27*). Teen pregnancy is prevalent in the country. An estimated 6% of women aged 15-19 reported having either had a child or were pregnant with their first child before 18 years of age (*27*).

Methods:

Data Source and Sample of Participant

We selected participants from the 2014-15 Rwanda Demographic and Health Survey (DHS), implemented by the National Institute of Statistics of Rwanda (NISR). The 2014-15 Rwanda DHS is a nationally-representative household survey that provides country-level estimates of selected demographic and health indicators in Rwanda (*27*). The survey instrument was finalized in English, and then translated in Kinyarwanda language. After training of the trainers and field staff, and pretesting activities, the field work was conducted from November 9, 2014, to April 8, 2015. Depending on the preference of household members, trained interviewers verbally administered the survey. A nationally representative household-based sample was obtained by a two-stage, stratified, random sample design.

The 2012 Rwanda Population and Housing Census (RPHC) provided by the NISR was considered as a master sampling frame. During the first stage, 492 enumeration areas (or clusters) spread across the country (379 clusters in rural areas and 113 in urban areas) were selected. During the second stage, systematic sampling of households in each cluster were selected from a complete listing of households. In the 12,699 households successfully interviewed, a total of 13,564 ever-married women aged 15–49 years were identified, of whom 13,497 were successfully interviewed, yielding a response rate of 99.5%. The detailed methodology of survey design, data collection and management has been described elsewhere (*27*).

Survey Instrument and Data Management

We used data from the DHS women's questionnaire, and characterize child marriage and social determinants to estimate the country-specific prevalence and association of child marriage and pregnancy termination. We limited the sample to ever-married women aged 15-24 years (n=1,074; 8% [1,074/13,497]). Our sample focused on 15–24-year-old mothers to ensure the inclusion of a population that reflects current marriage practices in Rwanda. The demographics and social determinants of the participants were assessed by questions regarding age, level of education, area of residence, wealth index, years of cohabitation, current use of contraceptives, age discrepancy between couple, and number of children. In the survey data, area of residence had been categorized into urban and rural areas. A wealth index had been calculated in quintiles based on ownership of consumer items and dwelling characteristics between 1 (poorest) and 5 (wealthiest). Contraception use was assessed by a question whether a participant currently used a modern, traditional or any other method of contraception. We dichotomize the variable whether the participants are currently using any contraceptive or not.

Exposure Variable

We considered child marriage as the exposure variable, which was defined as marriage/cohabitation before 18 years of age.

Outcome Measure

We assessed pregnancy termination as an outcome. We assessed pregnancy termination by a question if a participant's pregnancy had ever resulted in miscarriage, abortion, or stillbirth.

Data Analysis

The prevalence of child marriage and its descriptive statistics including 95% confidence interval (CI) was calculated for total sample of women aged 15-24 years. The characteristics of child marriage were compared with adult marriage using Chi-square test. We considered two-tailed p-value of <0.05 to be statistically significant. Associations between child marriage and pregnancy termination was assessed by calculating adjusted odds ratios (AORs) using logistic regression models. All the data were weighted and analyzed using SAS statistical software version 9.4 to account for selection probability, non-response, and sampling differences between regions to

produce national estimates of the population. We calculated weighted percentages of the national population including the absolute numbers of participants from the original sample.

Results

The estimated child marriage prevalence among ever-married women aged 15-24 years in Rwanda was 17.8% with an estimated 2.4% married between 10-15 years of age (Table 4; Figures 15-18). Women were mostly poor, had primary education and were from rural areas. Over 46% of women were currently using contraceptives and an estimated 10.5% of women reported at least one pregnancy termination. Over 11% of women reported that their husband was at least 10 years older than them. In the adjusted logistic regression models, we found that women married between the ages of 10-15 years and those aged 16-17 years have an increased likelihood of termination of pregnancy as compared to those married as adults (18+ years) (Figure 19).

Table 4: Characteristics of ever-married women aged 15-24 years, Rwanda

Variable	Category	Frequency (N)	Weighted %
Child marriage (years)	18+	760	82.2
	16-17	141	15.4
	10-15	23	2.4
Education	No Education	65	7.4
	Primary	667	72.5
	Secondary or more	192	20.1
Wealth index	Poorest	236	24.8
	Poorer	202	23.3
	Middle	182	20.5
	Richer	154	16.5
	Richest	150	15.0
Type of residence	Urban	196	17.1
	Rural	728	83.0
Husband 10 years or more older than wife	No	817	88.6
	Yes	107	11.4
Duration of marriage (years)	0 -9	922	99.8
	10-14	2	0.2
Number of children	0-2 children	885	95.6
	> 2 children	39	4.4
Contraception use (current)	No	501	53.6
	Yes	423	46.4
Pregnancy termination (at least one)	No	826	89.6
	Yes	98	10.5

Figure 15: Prevalence of child marriage among ever-married women aged 15-24 years, Rwanda

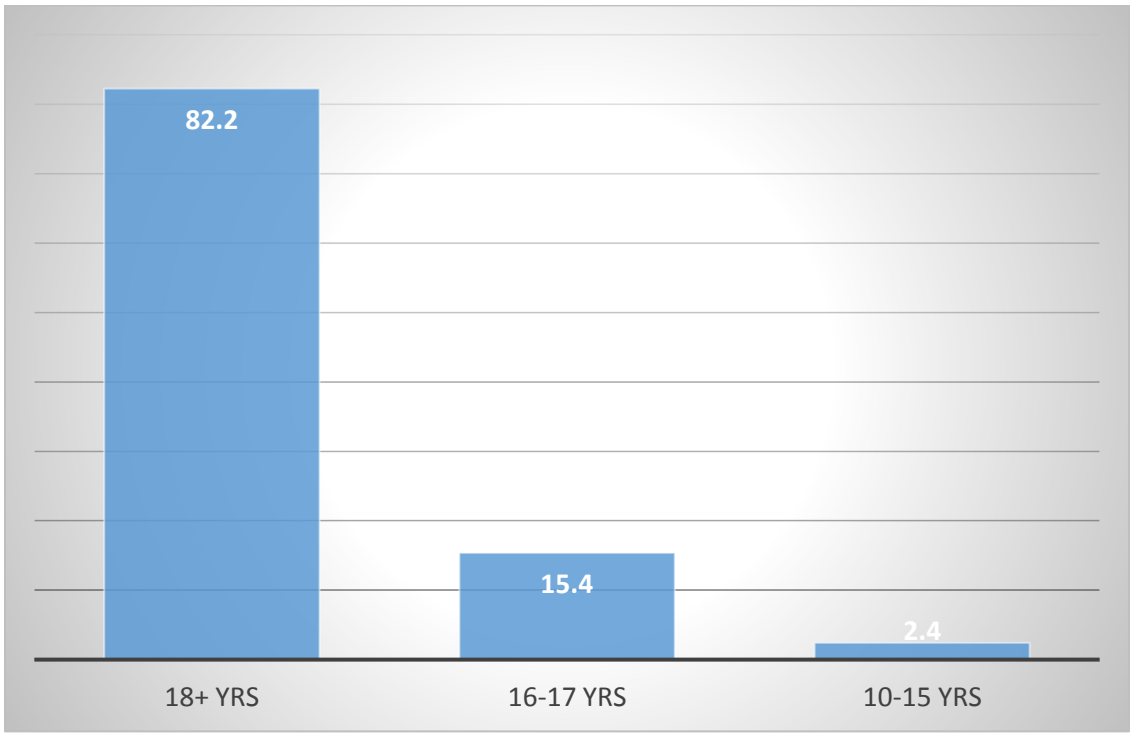


Figure 16: Type of education level among ever-married women aged 15-24 years, Rwanda

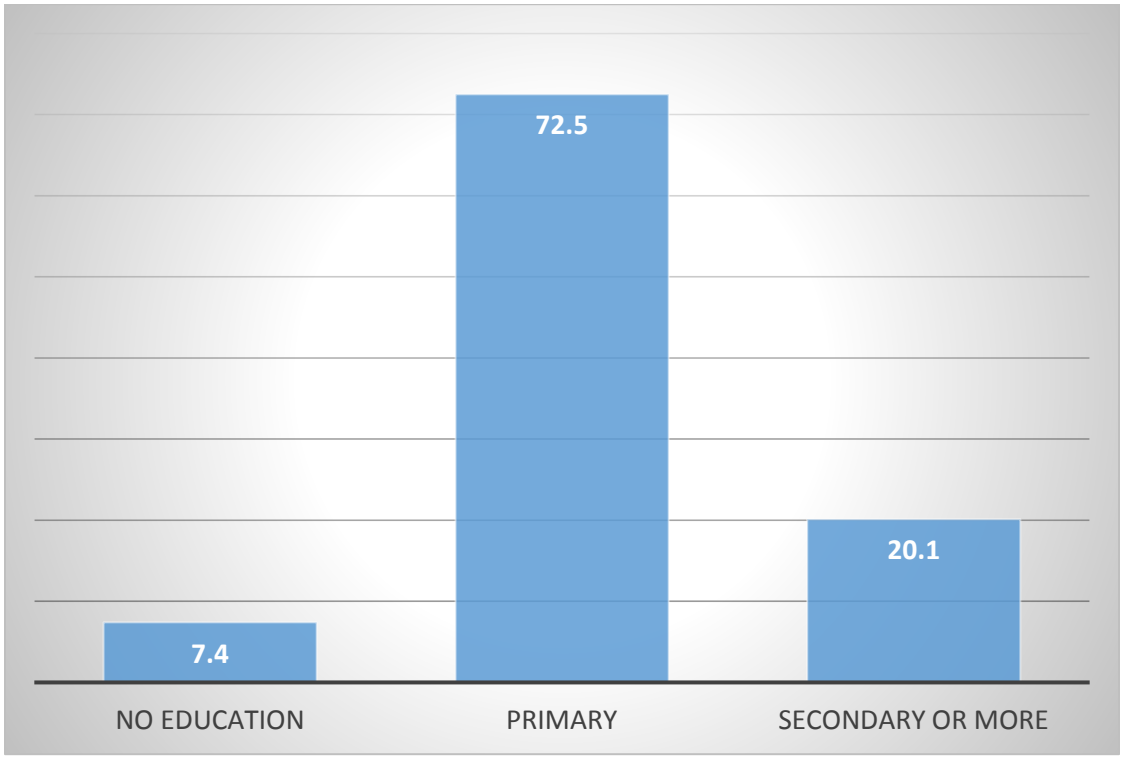


Figure 17: Prevalence of contraceptive use among ever-married women aged 15-24 years, Rwanda

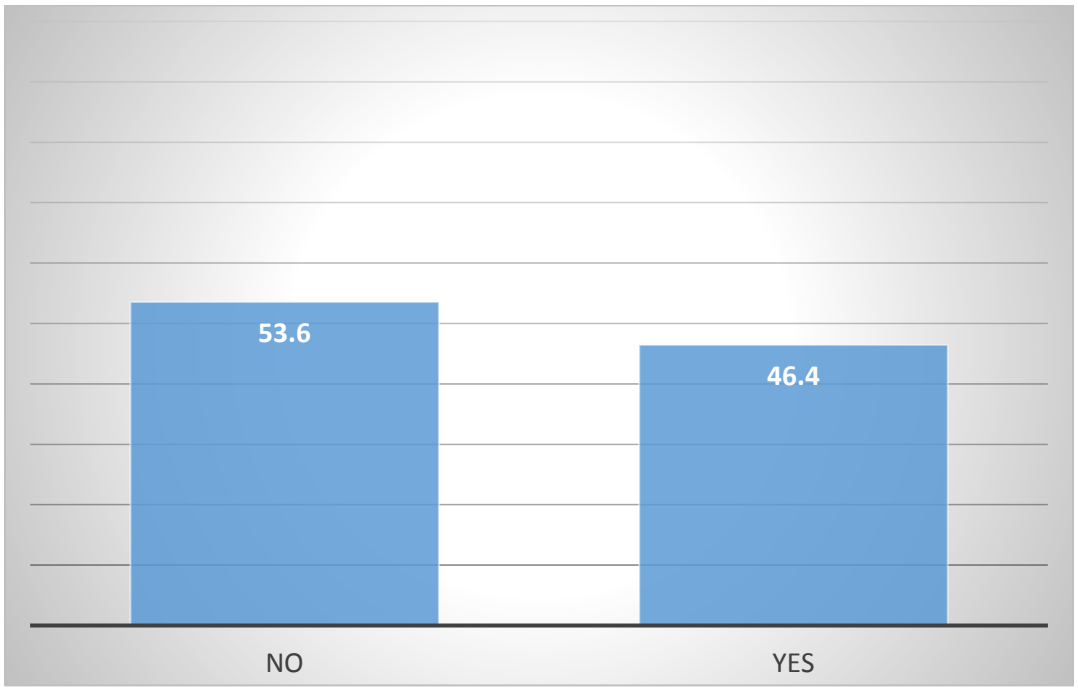


Figure 18: Prevalence of pregnancy termination among ever-married women aged 15-24 years, Rwanda

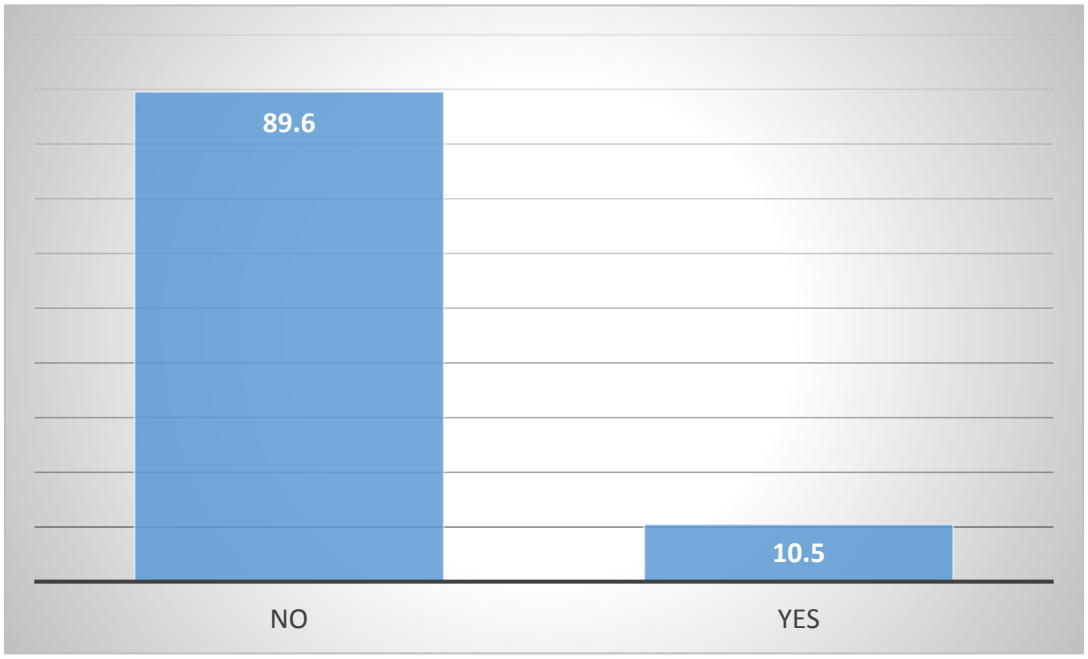
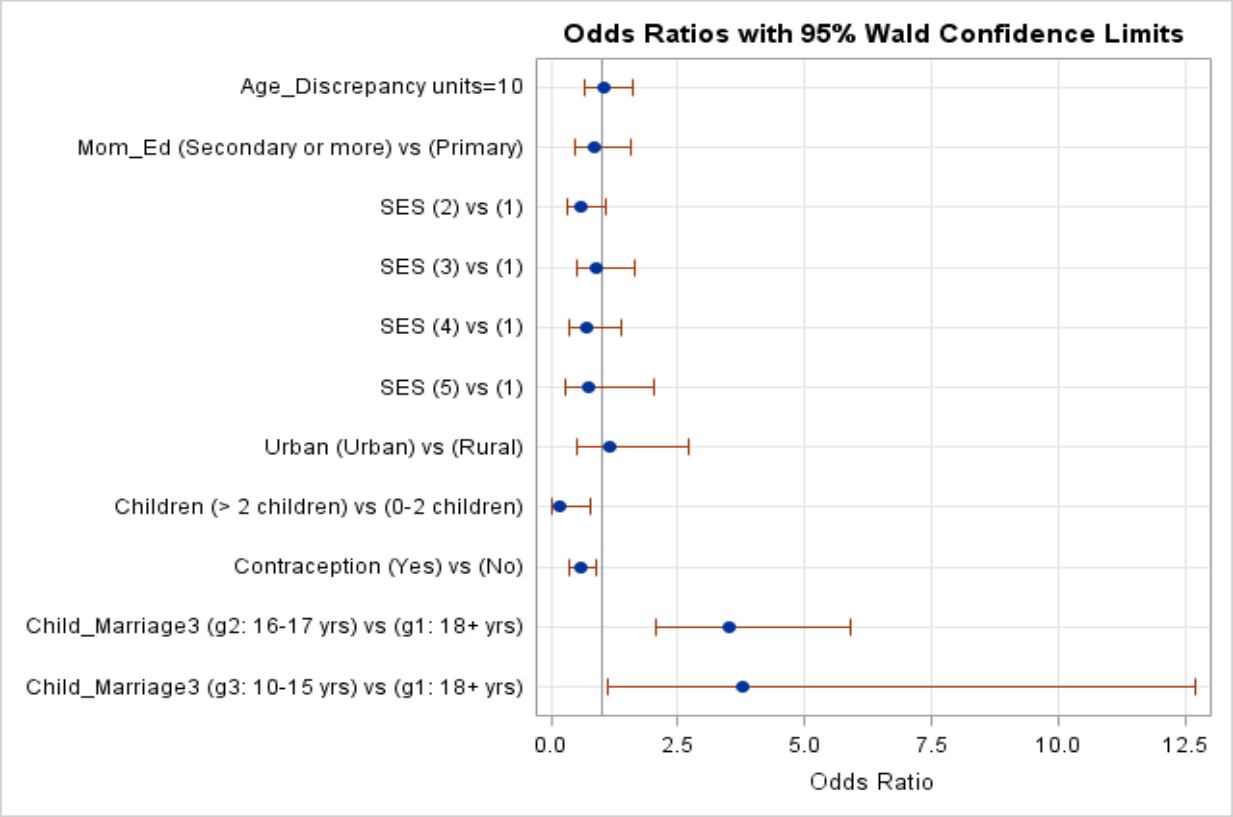


Figure 19: Association of child marriage and social determinants of health with termination of pregnancy, Rwanda



ZAMBIA

Background:

Zambia is a low income country that borders the Democratic Republic of Congo to the north, Tanzania to the northeast, Malawi and Mozambique to the east, Zimbabwe and Botswana to the south, Namibia to the southwest, and Angola to the west (*29*). The country has a population of around 16 million with a birth rate of 41.5 births/1,000 population (*30*). The population size has increased substantially with over 2 folds increase between 1980 and 2010 (*29*). Zambia has a mixed economy that consists of a rural agricultural sector and a modern urban sector predominantly manufacturing and mining sectors.

Figure 20: Map of Zambia *(29)*

The median age of marriage among women aged 20-49 years in Zambia is 18.7 years (*29*). An estimated 57% of women aged 20-49 had experienced their first sexual intercourse by the age of 18 (*29*). Women residing in rural areas tend to marry much earlier than those living in urban areas (*29*). Child marriage disproportionately affects girls with less education and those belong to poor socioeconomic status (*31*). The national data show a close relationship between marriage and childbearing, with almost 34% of women have a child by the age of 18, and nearly 61% by the age of 20 (*29*). Teen pregnancy is prevalent in the country. An estimated 29% of women aged 15-19 reported having either had a child or were pregnant with their first child before 18 years of age (*29*).

Methods:

Data Source and Sample of Participant

We selected participants from the 2013-14 Zambia Demographic and Health Survey (DHS), implemented by the Central Statistical Office. The 2013-14 Zambia DHS is a nationally-representative household survey that provides country-level estimates of selected demographic and health indicators in Zambia (*29*). The survey instrument was finalized in English, and then translated in 7 major languages (Bemba, Kaonde, Lozi, Lunda, Luvale, Nyanja, and Tonga). After training of the trainers and field staff, and pretesting activities, the field work was conducted from August 2013 to April 2014. Depending on the preference of household members, trained interviewers verbally administered the survey. A nationally representative household-based sample was obtained by a two-stage, stratified, random sample design.

The 2010 Population and Housing Census was considered as a master sampling frame. During the first stage, 722 enumeration areas (or clusters) spread across the country (417 clusters in rural areas and 305 in urban areas) were selected with probability proportional to size. During the second stage, an average of 25 households was selected in each enumeration area that comprised of a representative sample of 18,052 households. In the 15,920 households successfully interviewed, a total of 17,064 ever-married women aged 15–49 years were identified, of whom 16,411 were successfully interviewed, yielding a response rate of 96%. The detailed methodology of survey design, data collection and management has been described elsewhere (*29*).

Survey Instrument and Data Management

We used data from the DHS women's questionnaire, and characterize child marriage and social determinants to estimate the country-specific prevalence and association of child marriage and pregnancy termination. We limited the sample to ever-married women aged 15-24 years (n=2,507; 15.3% [2,507/16,411]). Our sample focused on 15–24-year-old mothers to ensure the inclusion of a population that reflects current marriage practices in Zambia. The demographics and social determinants of the participants were assessed by questions regarding age, level of education, area of residence, wealth index, years of cohabitation, current use of contraceptives, age discrepancy between couple, and number of children. In the survey data, area of residence had been categorized into urban and rural areas. A wealth index had been calculated in quintiles based on ownership of consumer items and dwelling characteristics between 1 (poorest) and 5 (wealthiest). Contraception use was assessed by a question whether a participant currently used a modern, traditional or any other method of contraception. We dichotomize the variable whether the participants are currently using any contraceptive or not.

Exposure Variable

We considered child marriage as the exposure variable, which was defined as marriage/cohabitation before 18 years of age.

Outcome Measure

We assessed pregnancy termination as an outcome. We assessed pregnancy termination by a question if a participant's pregnancy had ever resulted in miscarriage, abortion, or stillbirth.

Data Analysis

The prevalence of child marriage and its descriptive statistics including 95% confidence interval (CI) was calculated for total sample of women aged 15-24 years. The characteristics of child marriage were compared with adult marriage using Chi-square test. We considered two-tailed p-value of <0.05 to be statistically significant. Associations between child marriage and pregnancy termination was assessed by calculating adjusted odds ratios (AORs) using logistic regression models. All the data were weighted and analyzed using SAS statistical software version 9.4 to account for selection probability, non-response, and sampling differences between regions to

produce national estimates of the population. We calculated weighted percentages of the national population including the absolute numbers of participants from the original sample.

Results

The estimated child marriage prevalence among ever-married women aged 15-24 years in Zambia was 56.1% with an estimated 20.2% married between 10-15 years of age (Table 5; Figures 21-24). Women were mostly poor, had primary education and were from rural areas. Over 44% of women were currently using contraceptives and an estimated 8.0% of women reported at least one pregnancy termination. Over 15% of women reported that their husband was at least 10 years older than them. In the adjusted logistic regression models, we did not find any association between child marriage and termination of pregnancy (Figure 25).

Table 5: Characteristics of ever-married women aged 15-24 years, Zambia

Variable	Category	Frequency (N)	Weighted %
Child marriage (years)	18+	975	43.9
	16-17	759	35.9
	10-15	461	20.2
Education	No Education	129	5.9
	Primary	1,109	50.6
	Secondary or more	957	43.5
Wealth index	Poorest	556	24.7
	Poorer	507	22.3
	Middle	464	19.2
	Richer	419	20.4
	Richest	249	13.4
Type of residence	Urban	857	37.3
	Rural	1,338	62.8
Husband 10 years or more older than wife	No	1,851	84.2
	Yes	344	15.8
Duration of marriage (years)	0 -9	2,164	98.8
	10-14	31	1.2
Number of children	0-2 children	1,795	82.9
	> 2 children	400	17.1
Contraception use (current)	No	1,231	55.5
	Yes	964	44.5
Pregnancy termination (at least one)	No	2,009	92.0
	Yes	186	8.0

Figure 21: Prevalence of child marriage among ever-married women aged 15-24 years, Zambia

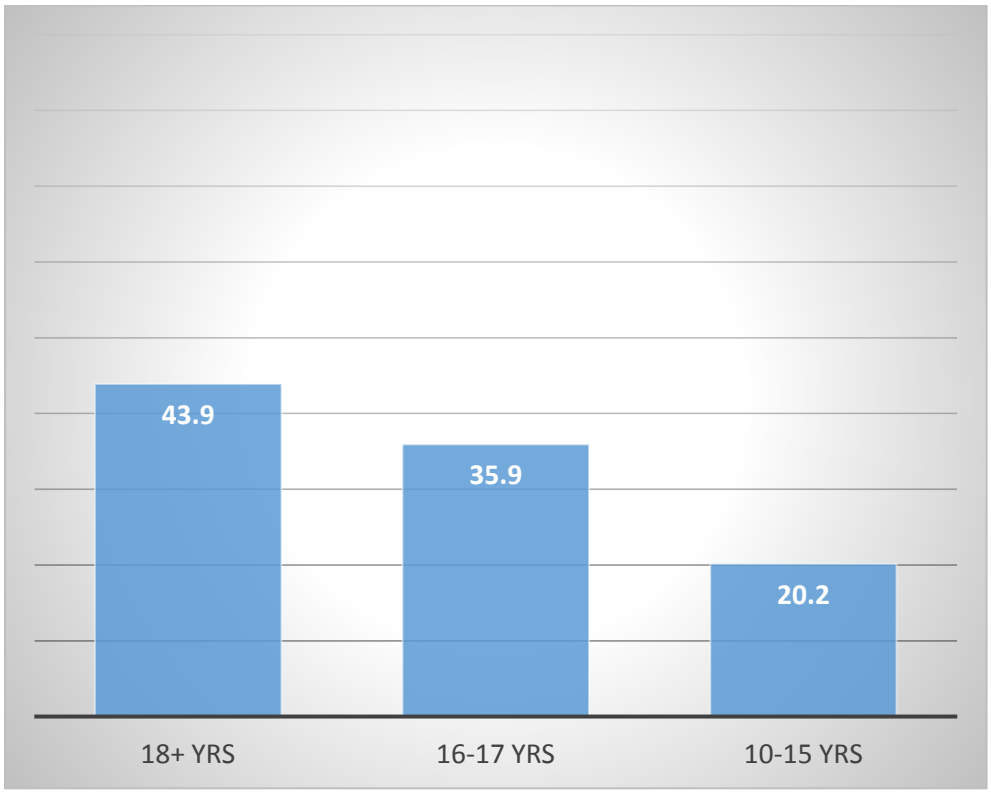


Figure 22: Type of education level among ever-married women aged 15-24 years, Zambia

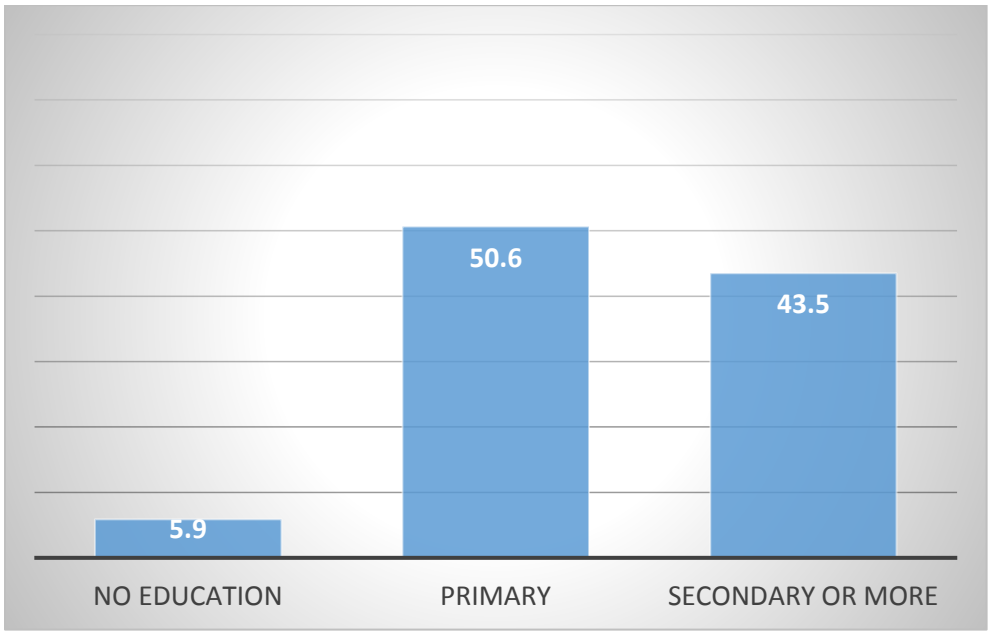


Figure 23: Prevalence of contraceptive use among ever-married women aged 15-24 years, Zambia

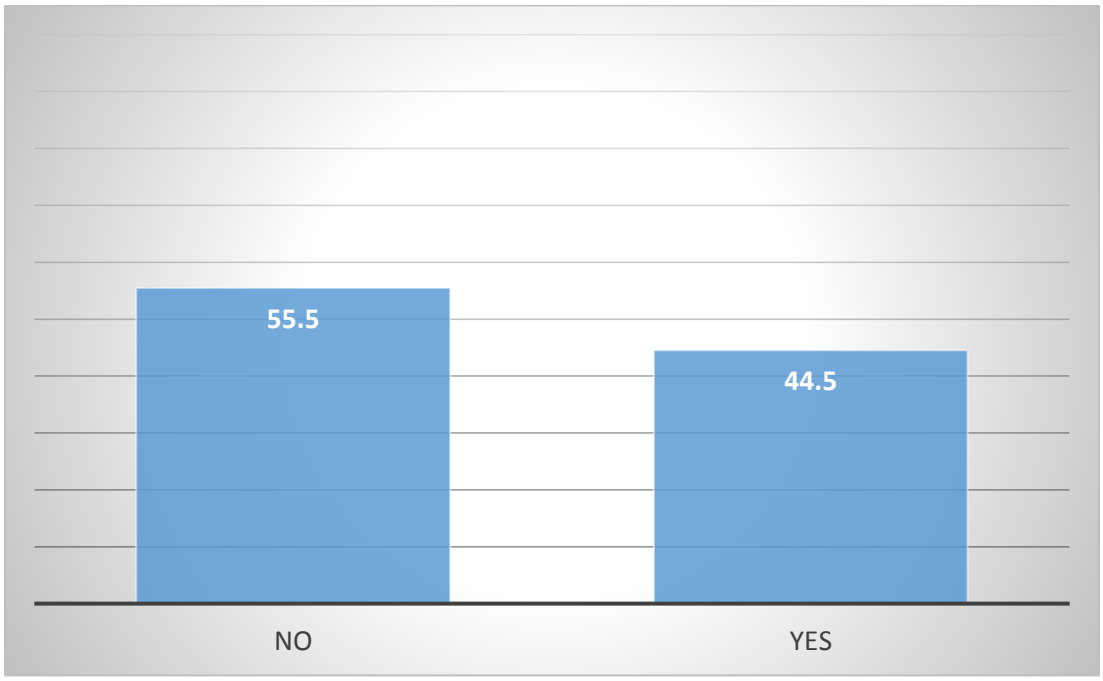


Figure 24: Prevalence of pregnancy termination among ever-married women aged 15-24 years, Zambia

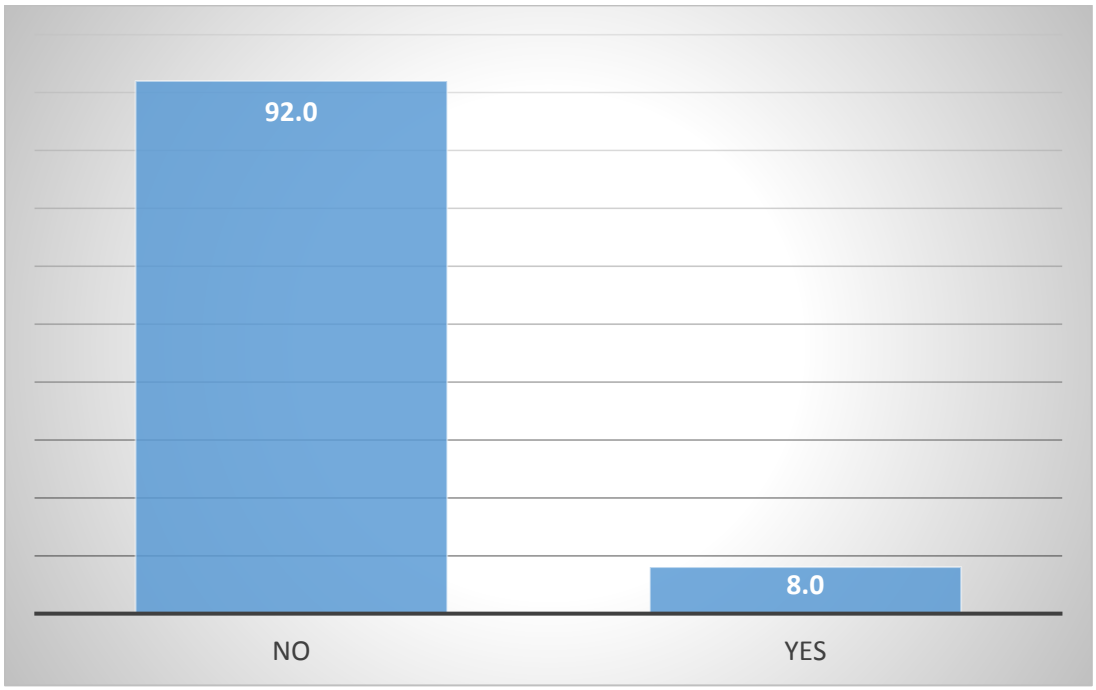
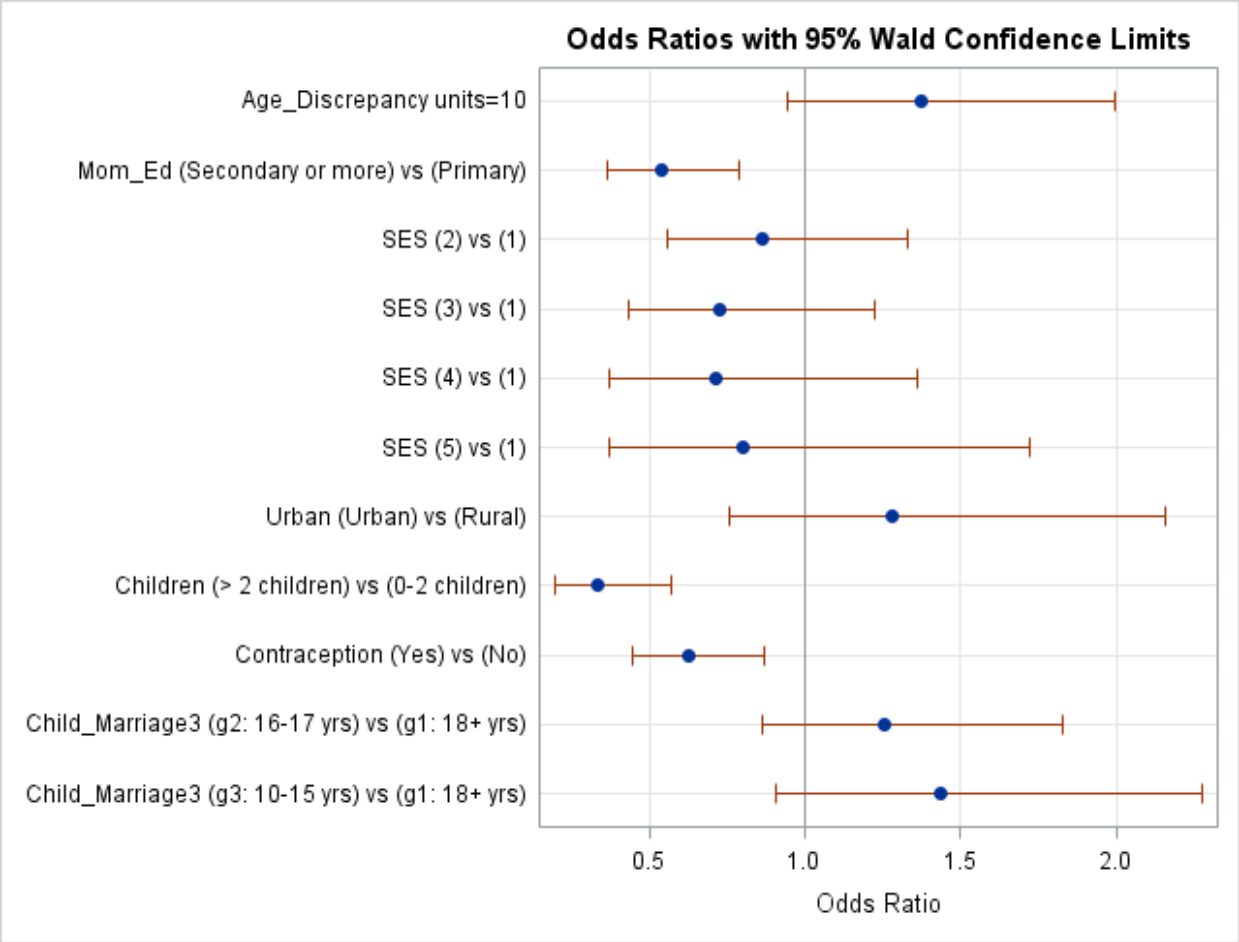


Figure 25: Association of child marriage and social determinants of health with termination of pregnancy, Zambia



TANZANIA

Background:

Tanzania is a low income country that borders the Kenya and Uganda to the North; Rwanda, Burundi, the Democratic Republic of Congo, and Zambia to the West; and Malawi and Mozambique to the South (*32*). The country has a population of around 54 million with a birth rate of 35.6 births/1,000 population (*33*). The population size has increased substantially with over 3 folds increase between 1967 and 2012 (*32*). Tanzania has a mixed economy that consists of agricultural sector and a service industry.

Figure 26: Map of Tanzania *(32)*

The median age of marriage among women aged 20-49 years in Tanzania is 19.3 years (*32*). An estimated 60% of women aged 20-49 had experienced their first sexual intercourse by the age of 18 (*32*). Women residing in rural areas tend to marry much earlier than those living in urban areas (*32*). Child marriage disproportionately affects girls with less education and those belong to poor socioeconomic status (*34*). The national data show a close relationship between marriage and childbearing, with almost 25% women having a child by the age of 18, and nearly 53% by the age of 20 (*32*). Teen pregnancy is prevalent in the country. An estimated 27% of women aged 15-19 reported having either a child or were pregnant with their first child before 18 years of age (*32*).

Methods:

Data Source and Sample of Participant

We selected participants from the 2015-16 Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS), implemented by the National Bureau of Statistics (NBS) and the Office of Chief Government Statistician (OCGS), Zanzibar. The 2015-16 (TDHS-MIS) is a nationally-representative household survey that provides country-level estimates of selected demographic and health indicators in Tanzania (*32*). The survey instrument was finalized in English, and then translated into Kiswahili. After training of the trainers and field staff, and pretesting activities, the field work was conducted during from August 22, 2015, through February 14, 2016. Depending on the preference of household members, trained interviewers verbally administered the survey. A nationally representative household-based sample was obtained by a two-stage, stratified, random sample design.

The 2012 Tanzania Population and Housing Census was considered as a master sampling frame. During the first stage, 608 enumeration areas (or clusters) spread across the country were selected. During the second stage, 22 households were systematically selected from each cluster. In the 12,563 households successfully interviewed, a total of 13,634 ever-married women aged 15–49 years were identified, of whom 13,266 were successfully interviewed, yielding a response rate of 97%. The detailed methodology of survey design, data collection and management has been described elsewhere (*32*).

Survey Instrument and Data Management

We used data from the TDHS-MIS women's questionnaire, and characterize child marriage and social determinants to estimate the country-specific prevalence and association of child marriage and pregnancy termination. We limited the sample to ever-married women aged 15-24 years (n=2,377; 17.9% [2,377/13,266]). Our sample focused on 15–24-year-old mothers to ensure the inclusion of a population that reflects current marriage practices in Tanzania. The demographics and social determinants of the participants were assessed by questions regarding age, level of education, area of residence, wealth index, years of cohabitation, current use of contraceptives, age discrepancy between couple, and number of children. In the survey data, area of residence had been categorized into urban and rural areas. A wealth index had been calculated in quintiles based on ownership of consumer items and dwelling characteristics between 1 (poorest) and 5 (wealthiest). Contraception use was assessed by a question whether a participant currently used a modern, traditional or any other method of contraception. We dichotomize the variable whether the participants are currently using any contraceptive or not.

Exposure Variable

We considered child marriage as an exposure variable, which was defined as marriage/cohabitation before 18 years of age.

Outcome Measure

We assessed pregnancy termination as an outcome. We assessed pregnancy termination by a question if a participant's pregnancy had ever resulted in miscarriage, abortion, or stillbirth.

Data Analysis

The prevalence of child marriage and its descriptive statistics including 95% confidence interval (CI) was calculated for total sample of women aged 15-24 years. The characteristics of child marriage were compared with adult marriage using Chi-square test. We considered two-tailed p-value of <0.05 to be statistically significant. Associations between child marriage and pregnancy termination was assessed by calculating adjusted odds ratios (AORs) using logistic regression models. All the data were weighted and analyzed using SAS statistical software version 9.4 to account for selection probability, non-response, and sampling differences between regions to

produce national estimates of the population. We calculated weighted percentages of the national population including the absolute numbers of participants from the original sample.

Results

The estimated child marriage prevalence among ever-married women aged 15-24 years in Tanzania was 54.3% with an estimated 19.6% married between 10-15 years of age (Table 6; Figures 27-30). Women were mostly poor, had primary education and were from rural areas. Twenty nine percent of women were currently using contraceptives and an estimated 10.5% of women reported at least one pregnancy termination. Over 23% of women reported that their husband was at least 10 years older than them. In the adjusted logistic regression models, we found that women married between the ages of 10-15 years have an increased likelihood of termination of pregnancy as compared to those married as adults (18+ years) (Figure 31).

Table 6: Characteristics of ever-married women aged 15-24 years, Tanzania

Variable	Category	Frequency (N)	Weighted %
Child marriage (years)	18+	962	45.7
	16-17	703	34.7
	10-15	409	19.6
Education	No Education	295	14.0
	Primary	1,309	66.4
	Secondary or more	470	19.6
Wealth index	Poorest	522	26.4
	Poorer	409	21.0
	Middle	393	18.2
	Richer	444	18.7
	Richest	306	15.8
Type of residence	Urban	460	25.0
	Rural	1,614	75.0
Husband 10 years or more older than wife	No	1,584	76.6
	Yes	490	23.4
Duration of marriage (years)	0 -9	2,045	98.6
	10-14	29	1.4
Number of children	0-2 children	1,796	87.9
	> 2 children	278	12.1
Contraception use (current)	No	1,507	71.0
	Yes	567	29.0
Pregnancy termination (at least one)	No	1,845	89.5
	Yes	229	10.5

Figure 27: Prevalence of child marriage among ever-married women aged 15-24 years, Tanzania

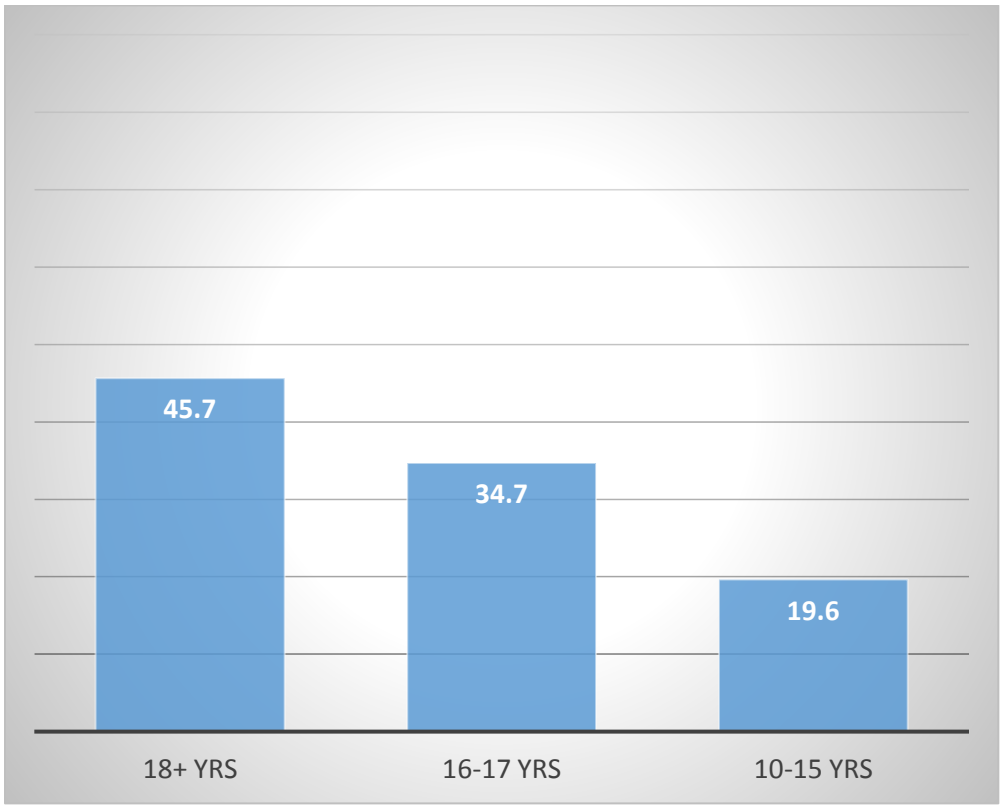


Figure 28: Type of education level among ever-married women aged 15-24 years, Tanzania

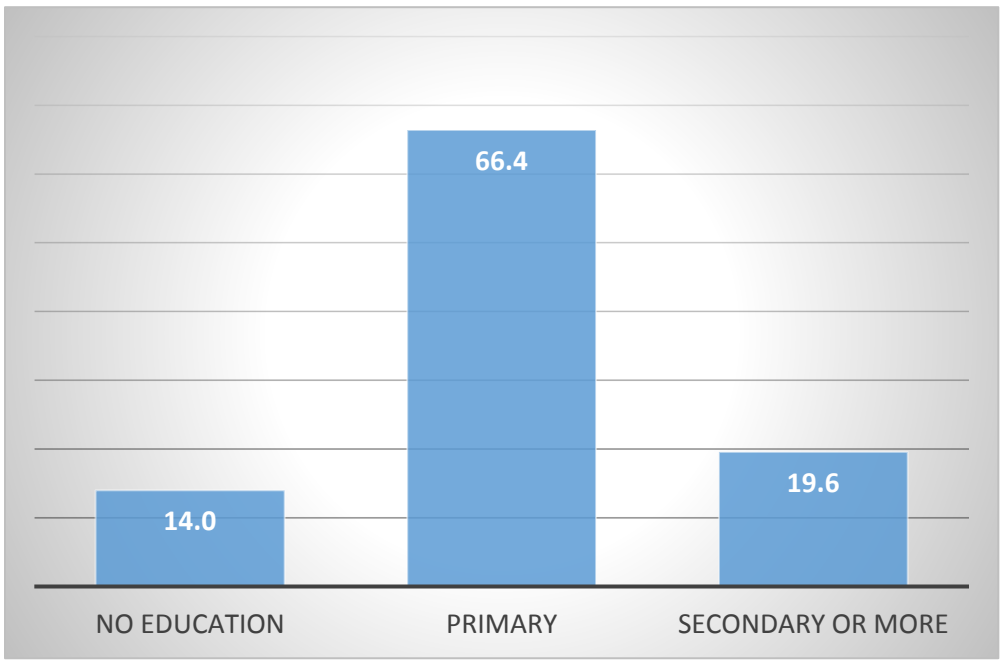


Figure 29: Prevalence of contraceptive use among ever-married women aged 15-24 years, Tanzania

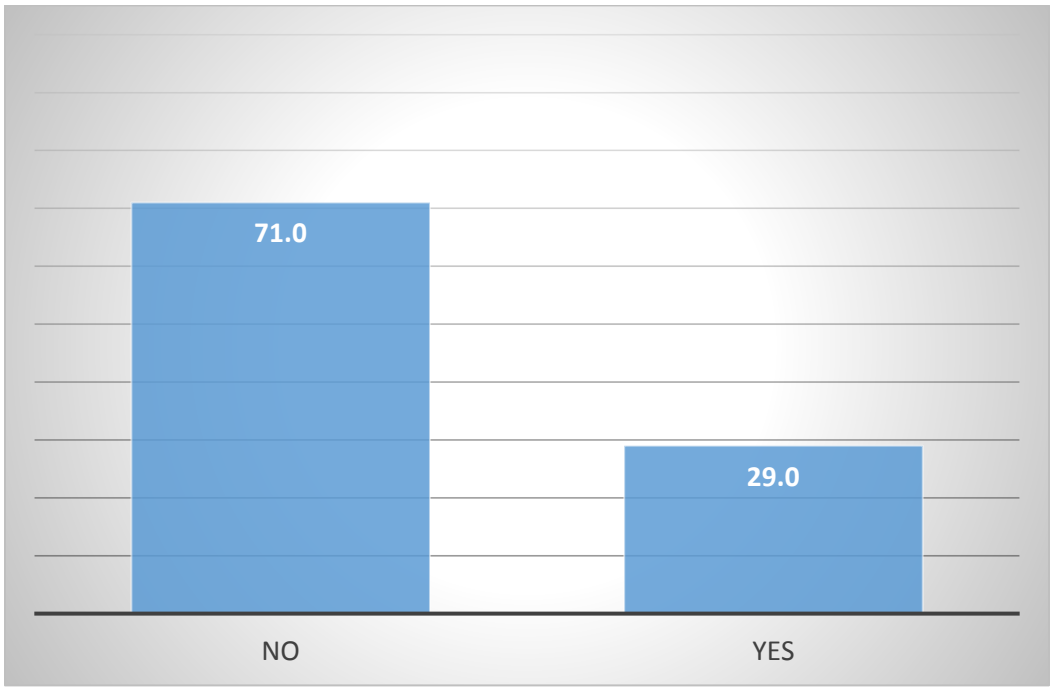


Figure 30: Prevalence of pregnancy termination among ever-married women aged 15-24 years, Tanzania

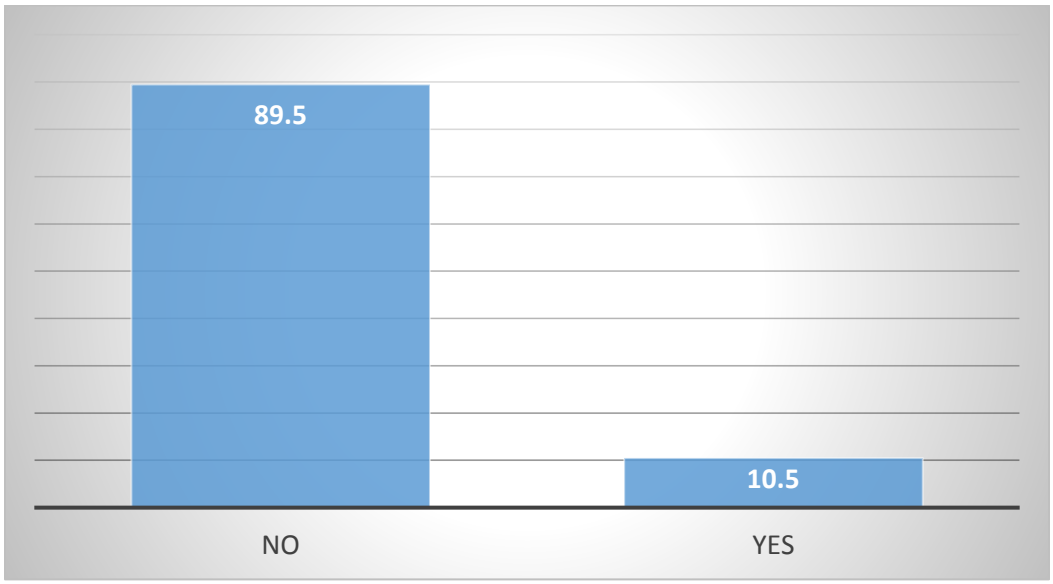
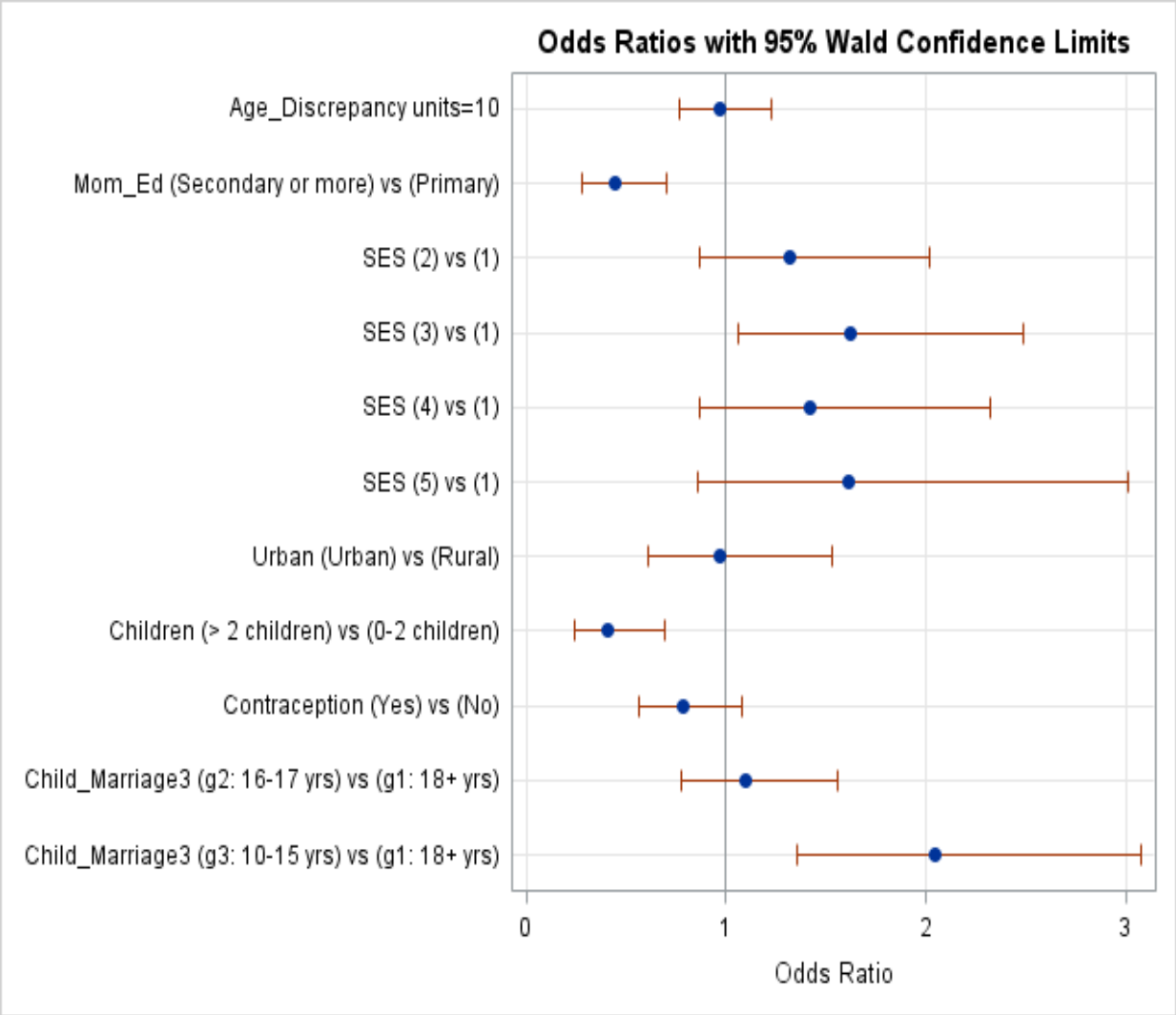


Figure 31: Association of child marriage and social determinants of health with termination of pregnancy, Tanzania



MALAWI

Background:

Malawi is situated in Southern Africa, east of Zambia, west and north of Mozambique (*35*). The country has a population of around 19 million with a birth rate of 41 births/1,000 population (*35*). Malawi is predominantly an agricultural country. Most women are employed in the agricultural sector that is the mainstay of Malawi's economy, but they earn less than their male counterparts.

Figure 32: Map of Malawi *(36)*

The median age of marriage among women aged 20-49 years in Malawi is 18.3 years (*36*). An estimated 62% of women aged 20-49 had their first experience of sexual intercourse by the age of 18 (*36*). Women residing in rural areas tend to marry much earlier than those living in urban areas (*36*). Child marriage disproportionately affects girls with less education and those belong to poor socioeconomic status (*37*). The national data show a close relationship between marriage and childbearing, with almost 34% women having a child by the age of 18, and nearly 62% by the age of 20 (*36*). Teen pregnancy is prevalent in the country. An estimated 29% of women aged 15-19 reported having either had a child or were pregnant with their first child before 18 years of age (*36*).

Methods:

Data Source and Sample of Participant

We selected participants from the 2015-16 Malawi Demographic and Health Survey (DHS), implemented by the National Statistical Office (NSO) in collaboration with the Ministry of Health. The 2015-16 Malawi Demographic and Health Survey (DHS) is a nationally-representative household survey that provides country-level estimates of selected demographic and health indicators in Malawi (*36*). The survey instrument was finalized in English, and then translated into Chichewa and Tumbuka languages. After training of the trainers and field staff, and pretesting activities, the field work was conducted during from 19 October 2015 through 17 February 2016. Depending on the preference of household members, trained interviewers verbally administered the survey. A nationally representative household-based sample was obtained by a two-stage, stratified, random sample design.

The Malawi Population and Housing Census (MPHC), conducted in Malawi in 2008 was considered as a master sampling frame. During the first stage, 850 enumeration areas (or clusters) spread across the country (677 clusters in rural areas and 173 in urban areas) were selected with a probability proportional to size. During the second stage, 30 households per urban cluster and 33 per rural cluster were selected. In the 26,361 households successfully interviewed, a total of 25,146 ever-married women aged 15–49 years were identified, of whom 24,562 were successfully interviewed, yielding a response rate of 98%. The detailed methodology of survey design, data collection and management has been described elsewhere (*36*).

Survey Instrument and Data Management

We used data from the DHS women's questionnaire, and characterize child marriage and social determinants to estimate the country-specific prevalence and association of child marriage and pregnancy termination. We limited the sample to ever-married women aged 15-24 years (n=5,422; 22% [5,422/24,562]). Our sample focused on 15–24-year-old mothers to ensure the inclusion of a population that reflects current marriage practices in Malawi. The demographics and social determinants of the participants were assessed by questions regarding age, level of education, area of residence, wealth index, years of cohabitation, current use of contraceptives, age discrepancy between couple, and number of children. In the survey data, area of residence had been categorized into urban and rural areas. A wealth index had been calculated in quintiles based on ownership of consumer items and dwelling characteristics between 1 (poorest) and 5 (wealthiest). Contraception use was assessed by a question whether a participant currently used a modern, traditional or any other method of contraception. We dichotomize the variable whether the participants are currently using any contraceptive or not.

Exposure Variable

We considered child marriage as an exposure variable, which was defined as marriage/cohabitation before 18 years of age.

Outcome Measure

We assessed pregnancy termination as an outcome. We assessed pregnancy termination by a question if a participant's pregnancy had ever resulted in miscarriage, abortion, or stillbirth.

Data Analysis

The prevalence of child marriage and its descriptive statistics including 95% confidence interval (CI) was calculated for total sample of women aged 15-24 years. The characteristics of child marriage were compared with adult marriage using Chi-square test. We considered two-tailed p-value of <0.05 to be statistically significant. Associations between child marriage and pregnancy termination was assessed by calculating adjusted odds ratios (AORs) using logistic regression models. All the data were weighted and analyzed using SAS statistical software version 9.4 to account for selection probability, non-response, and sampling differences between regions to

produce national estimates of the population. We calculated weighted percentages of the national population including the absolute numbers of participants from the original sample.

Results

The estimated child marriage prevalence among ever-married women aged 15-24 years in Malawi was 56.1% with an estimated 22.1% married between 10-15 years of age (Table 7; Figures 33-36). Women were mostly poor, had primary education and were from rural areas. Over 51% of women were currently using contraceptives and an estimated 8.0% of women reported at least one pregnancy termination. Over 10% of women reported that their husband was at least 10 years older than them. In the adjusted logistic regression models, we found that women married between the ages of 10-15 years have an increased likelihood of termination of pregnancy as compared to those married as adults (18+ years) (Figure 37).

Table 7: Characteristics of ever-married women aged 15-24 years, Malawi

Variable	Category	Frequency (N)	Weighted %
Child marriage (years)	18+	2,043	43.9
	16-17	1,640	34.0
	10-15	1,059	22.1
Education	No Education	291	6.5
	Primary	3,311	71.0
	Secondary or more	1,140	22.5
Wealth index	Poorest	1,086	25.0
	Poorer	1,187	26.3
	Middle	900	18.8
	Richer	819	16.2
	Richest	750	13.8
Type of residence	Urban	756	13.0
	Rural	3,986	87.0
Husband 10 years or more older than wife	No	4,181	89.5
	Yes	561	10.5
Duration of marriage (years)	0 -9	4,647	98.1
	10-14	95	1.9
Number of children	0-2 children	4,247	90.4
	> 2 children	495	9.6
Contraception use (current)	No	2,291	48.8
	Yes	2,451	51.2
Pregnancy termination (at least one)	No	4,372	92.0
	Yes	370	8.0

Figure 33: Prevalence of child marriage among ever-married women aged 15-24 years, Malawi

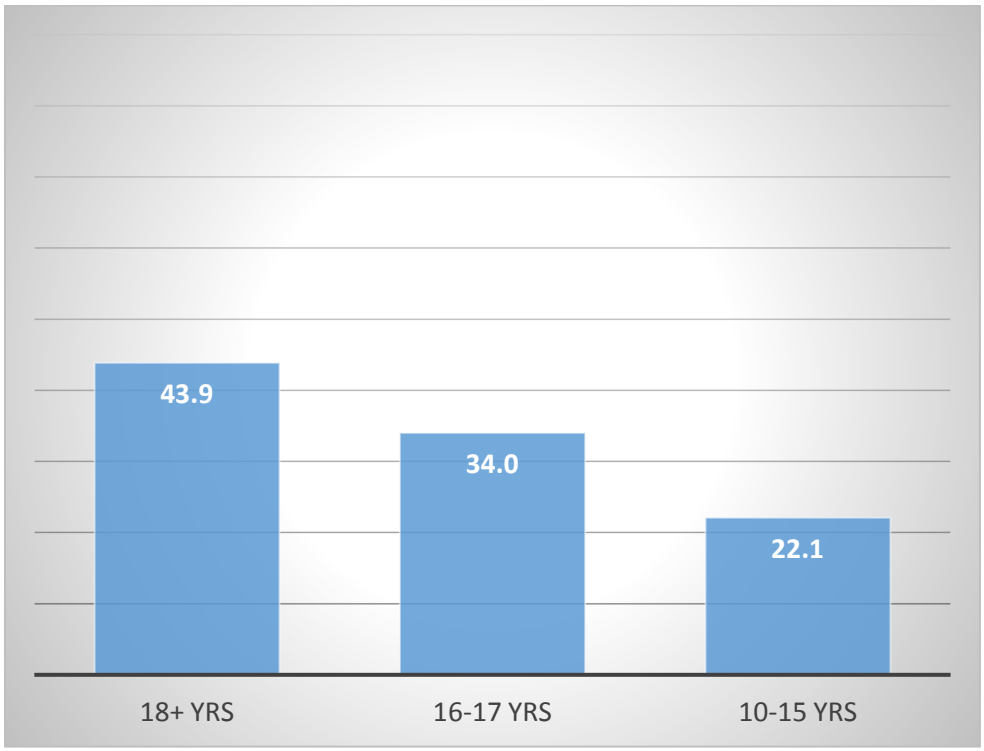


Figure 34: Type of education level among ever-married women aged 15-24 years, Malawi

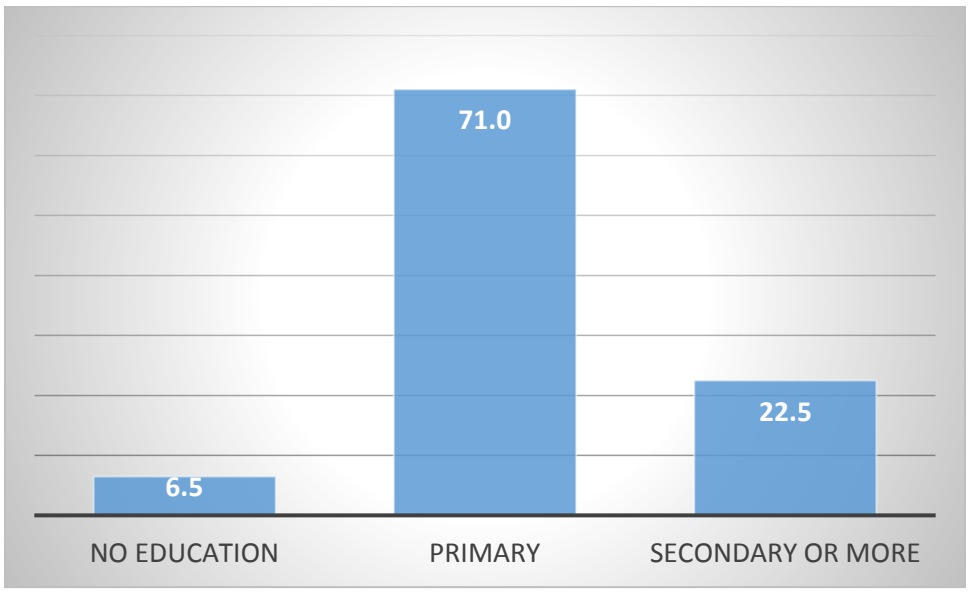


Figure 35: Prevalence of contraceptive use among ever-married women aged 15-24 years, Malawi

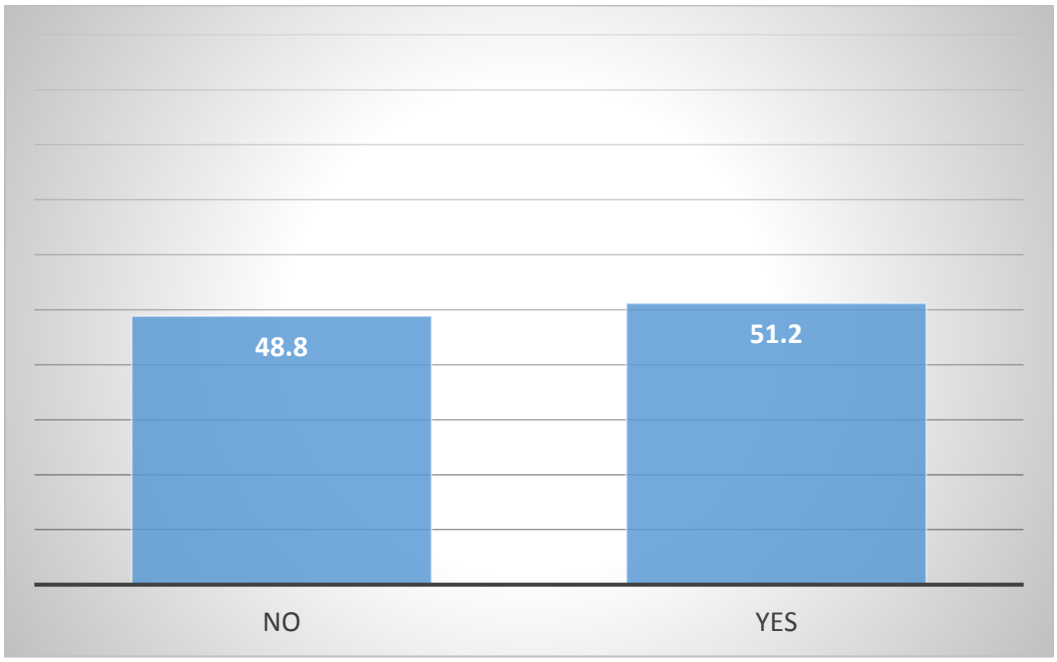


Figure 36: Prevalence of pregnancy termination among ever-married women aged 15-24 years, Malawi

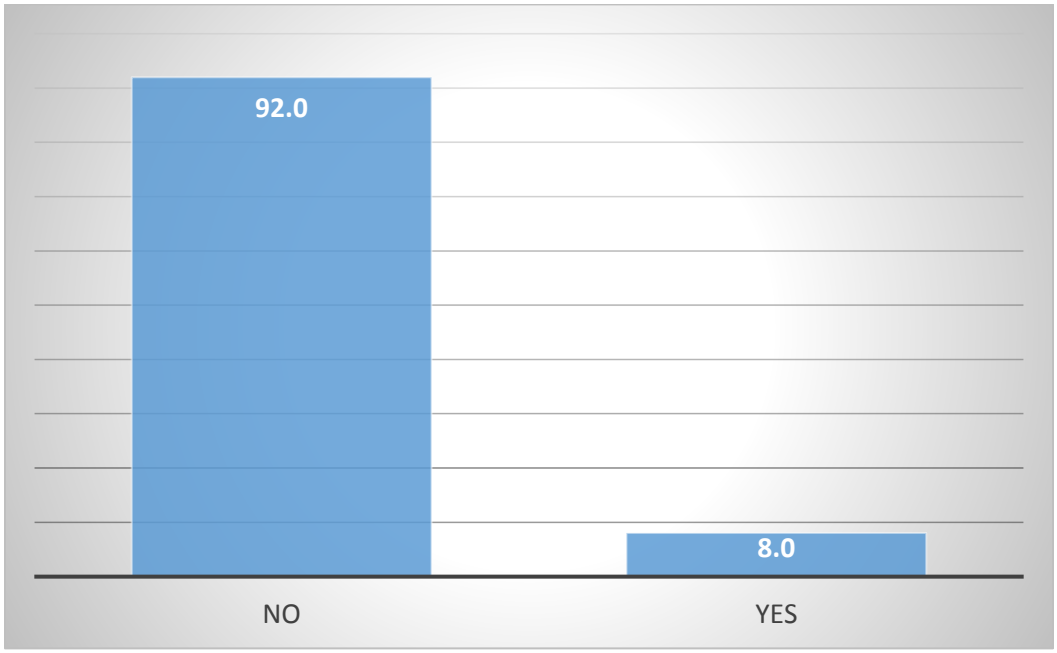
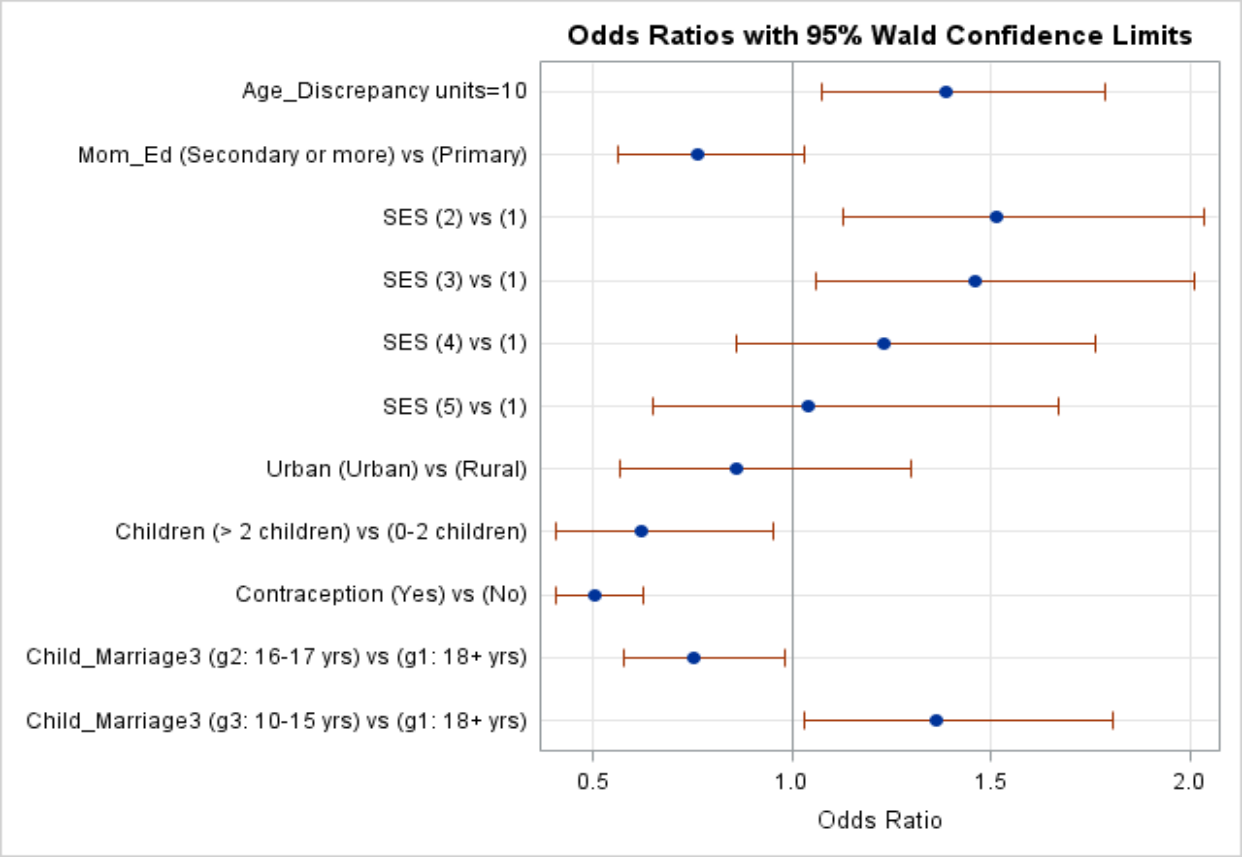


Figure 37: Association of child marriage and social determinants of health with termination of pregnancy, Malawi



DEMOCRATIC REPUBLIC OF CONGO

Background:

Democratic Republic of Congo (DRC) is a low income country is situated in Central Africa and borders, the Republic of Congo and the enclave of Cabinda (Angola) in the west; the Central African Republic and South Sudan to the north; Uganda, Rwanda, Burundi and Tanzania to East Zambia to the southeast and Angola to the south (*38*). The country has a population of around 83 million with a birth rate of 33.5 births/1,000 population (*39*). The population has increased substantially with 1.4 folds increase between 1970 and 1984 (*38*).

Figure 38: Map of Democratic Republic of Congo *(38)*

The median age of marriage among women aged 20-49 years in DRC is 19.9 years (*38*). An estimated 64% of women aged 20-49 had their first experience of sexual intercourse by the age of 18 (*38*). Women residing in rural areas tend to marry much earlier than those living in urban areas (*38*). Child marriage disproportionately affects girls with less education and those belong to poor socioeconomic status (*40*). The national data show a close relationship between marriage and

childbearing, with almost 28% women having a child by the age of 18, and nearly 51% by the age of 20 (*38*). Teen pregnancy is prevalent in the country. An estimated 27% of women aged 15-19 reported having either had a child or were pregnant with their first child before 18years of age (*38*).

Methods:

Data Source and Sample of Participant

We selected participants from the second 2013-14 demographic and health survey in the Democratic Republic of Congo (EDS-RDC II), implemented by the Ministry of Planning. The EDS-RDC II is a nationally-representative household survey that provides country-level estimates of selected demographic and health indicators in DRC (*38*). The survey instrument was translated in 4 main national languages (Kikongo, Lingala, Swahili and Tshiluba). After training of the trainers and field staff, and pretesting activities, the field work was conducted during November 2013 to February 2014. Depending on the preference of household members, trained interviewers verbally administered the survey. A nationally representative household-based sample was obtained by a two-stage, stratified, random sample design.

The Population Census of 1984 was considered as a master sampling frame. During the first stage, 540 enumeration areas (or clusters) spread across the country were selected with a probability proportional to size. During the second stage, 25 households were selected from each cluster. In the 18,171 households successfully interviewed, a total of 19,097 ever-married women aged 15–49 years were identified, of whom 18,827 were successfully interviewed, yielding a response rate of 98.6%. The detailed methodology of survey design, data collection and management has been described elsewhere (*38*).

Survey Instrument and Data Management

We used data from the DHS women's questionnaire, and characterize child marriage and social determinants to estimate the country-specific prevalence and association of child marriage and pregnancy termination. We limited the sample to ever-married women aged 15-24 years (n=3,663; 19.5% [3,663/18,827]). Our sample focused on 15–24-year-old mothers to ensure the inclusion of a population that reflects current marriage practices in DRC. The demographics and social determinants of the participants were assessed by questions regarding age, level of education, area

of residence, wealth index, years of cohabitation, current use of contraceptives, age discrepancy between couple, and number of children. In the survey data, area of residence had been categorized into urban and rural areas. A wealth index had been calculated in quintiles based on ownership of consumer items and dwelling characteristics between 1 (poorest) and 5 (wealthiest). Contraception use was assessed by a question whether a participant currently used a modern, traditional or any other method of contraception. We dichotomize the variable whether the participants are currently using any contraceptive or not.

Exposure Variable

We considered child marriage as an exposure variable, which was defined as marriage/cohabitation before 18 years of age.

Outcome Measure

We assessed pregnancy termination as an outcome. We assessed pregnancy termination by a question if a participant's pregnancy had ever resulted in miscarriage, abortion, or stillbirth.

Data Analysis

The prevalence of child marriage and its descriptive statistics including 95% confidence interval (CI) was calculated for total sample of women aged 15-24 years. The characteristics of child marriage were compared with adult marriage using Chi-square test. We considered two-tailed p-value of <0.05 to be statistically significant. Associations between child marriage and pregnancy termination was assessed by calculating adjusted odds ratios (AORs) using logistic regression models. All the data were weighted and analyzed using SAS statistical software version 9.4 to account for selection probability, non-response, and sampling differences between regions to produce national estimates of the population. We calculated weighted percentages of the national population including the absolute numbers of participants from the original sample.

Results:

The estimated child marriage prevalence among ever-married women aged 15-24 years in DRC was 63.8% with an estimated 29.8% married between 10-15 years of age (Table 8; Figures 39-42). Women were mostly poor, had secondary education or above, and were from rural areas. Over 17% of women were currently using contraceptives and an estimated 10.0% of women reported at

least one pregnancy termination. Over 22% of women reported that their husband was at least 10 years older than them. In the adjusted logistic regression models, we found that women married between the ages of 10-15 years and those aged 16-17 years have an increased likelihood of termination of pregnancy as compared to those married as adults (18+ years) (Figure 43).

Table 8: Characteristics of ever-married women aged 15-24 years, Democratic Republic of Congo

Variable	Category	Frequency (N)	Weighted %
Child marriage (years)	18+	1,102	36.3
	16-17	1,109	34.0
	10-15	1,036	29.8
Education	No Education	530	14.9
	Primary	1,419	40.5
	Secondary or more	1,298	44.7
Wealth index	Poorest	915	23.9
	Poorer	780	22.6
	Middle	680	21.1
	Richer	542	18.8
	Richest	330	13.7
Type of residence	Urban	894	28.8
	Rural	2,353	71.2
Husband 10 years or more older than wife	No	2,542	77.4
	Yes	705	22.6
Duration of marriage (years)	0 -9	3,177	98.0
	10-14	70	2.0
Number of children	0-2 children	2,646	81.7
	> 2 children	601	18.4
Contraception use (current)	No	2,771	82.6
	Yes	476	17.4
Pregnancy termination (at least one)	No	2,919	90.0
	Yes	328	10.0

Figure 39: Prevalence of child marriage among ever-married women aged 15-24 years, Democratic Republic of Congo

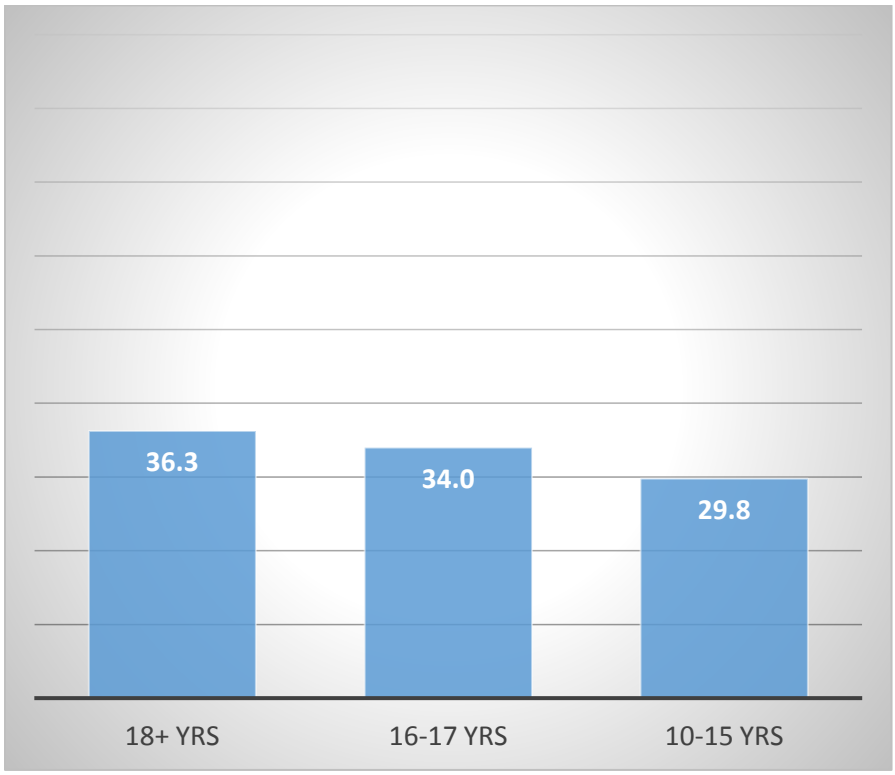


Figure 40: Type of education level among ever-married women aged 15-24 years, Democratic Republic of Congo

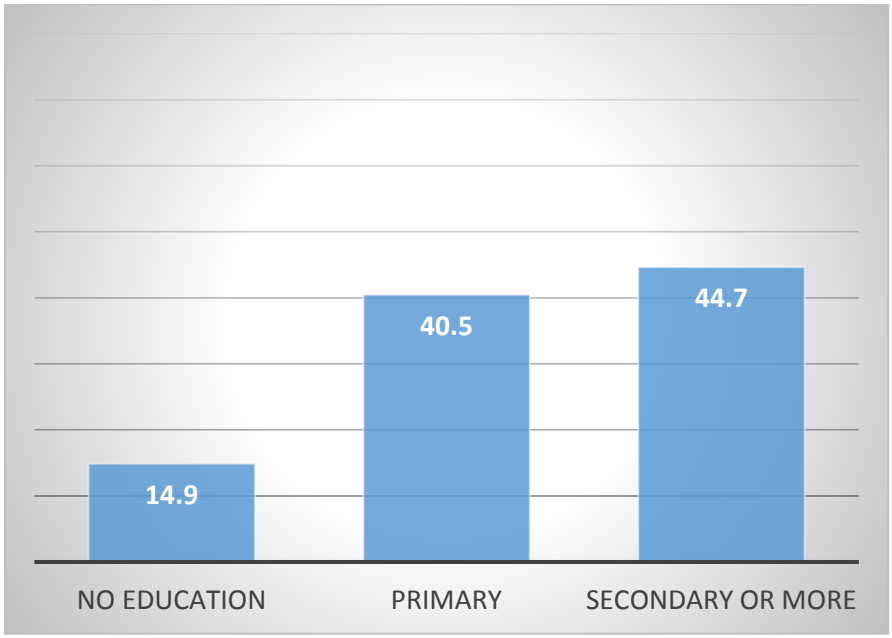


Figure 41: Prevalence of contraceptive use among ever-married women aged 15-24 years, Democratic Republic of Congo

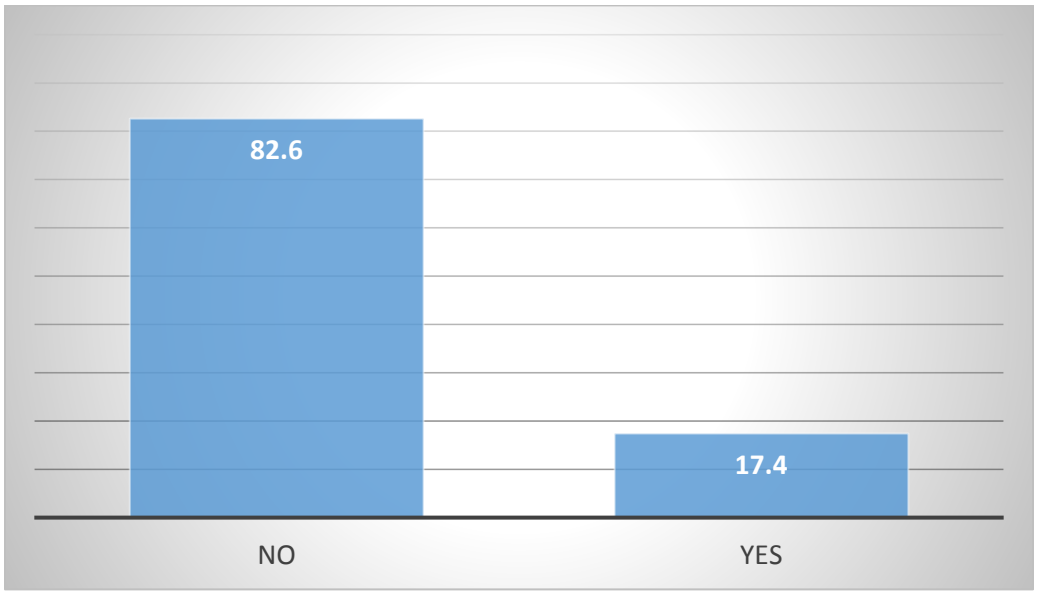


Figure 42: Prevalence of pregnancy termination among ever-married women aged 15-24 years, Democratic Republic of Congo

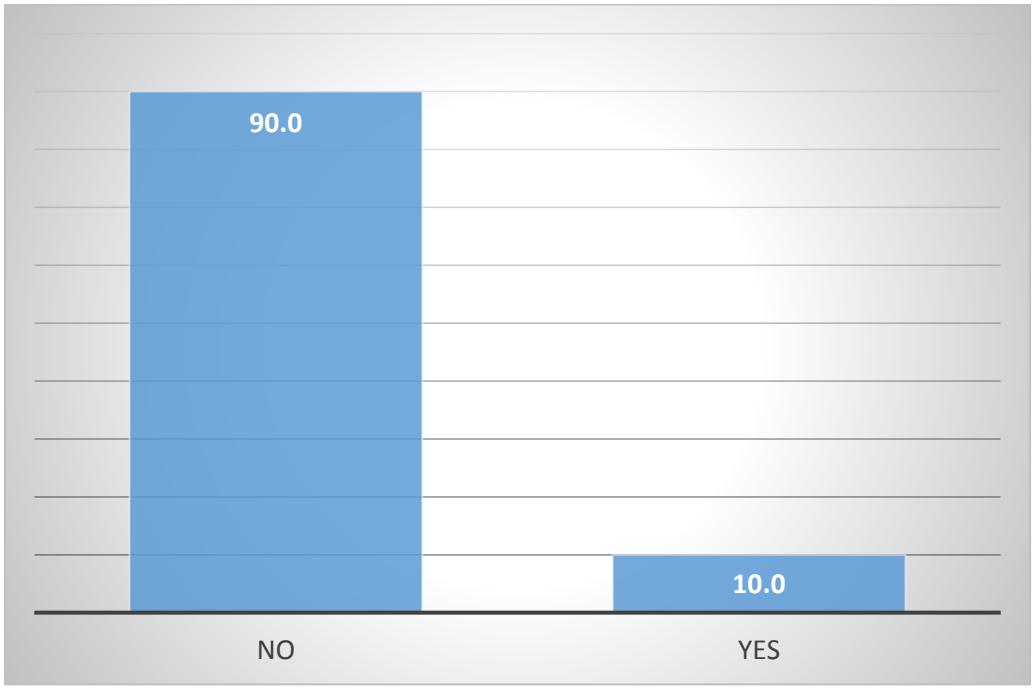
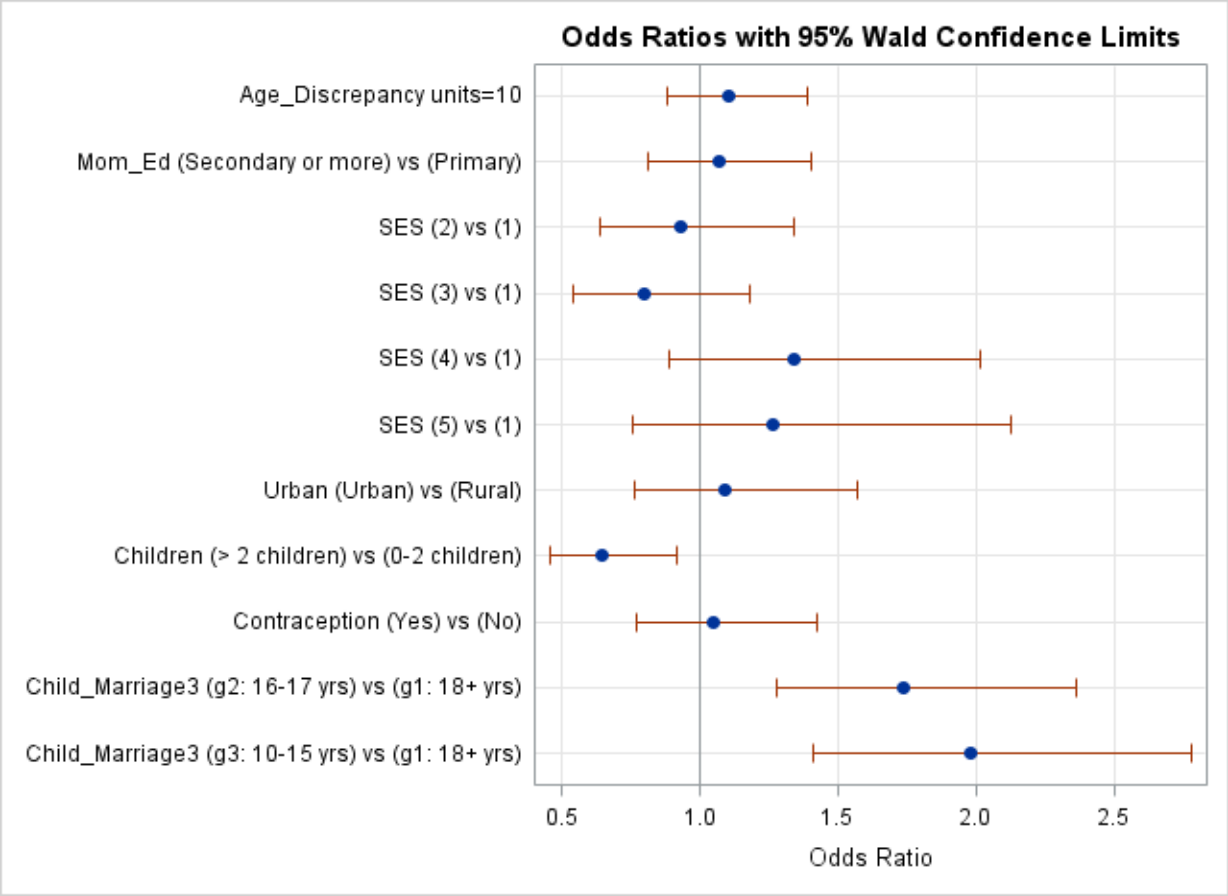


Figure 43: Association of child marriage and social determinants of health with termination of pregnancy, Democratic Republic of Congo



SUMMARY RESULTS

Overall, among seven African countries combined the child marriage prevalence among ever-married women aged 15-24 years was 53.1% with an estimated 20.7% married between 10-15 years of age. The child marriage prevalence varied by countries and it was highest (63.8%) in DRC and the lowest (17.8%) in Rwanda. Women were mostly poor, had primary education, and were from rural areas. Overall, 38.2% of women were currently using contraceptives and an estimated 9.9% of women reported at least one pregnancy termination. Seventeen percent of women reported that their husbands were at least 10 years older than them. In the adjusted logistic regression models, we found that women married between the ages of 10-15 years and those aged 16-17 years have increased likelihood of termination of pregnancy as compared to those married as adults (18+ years) (Figure 48). Less educated mothers, and age discrepancy among the couples were found independent risk factors for pregnancy termination in our study. In addition, contraceptive use was found protective with decreased likelihood of pregnancy termination among those using them.

Table 9: Characteristics of ever-married women aged 15-24 years among seven African countries combined (Kenya, Uganda, Rwanda, Zambia, Tanzania, Malawi, and Democratic Republic of Congo)

Variable	Category	Frequency (N)	Weighted %
Child marriage (years)	18+	8,295	46.9
	16-17	5,990	32.4
	10-15	4,035	20.7
Education	No Education	1,783	8.4
	Primary	10,991	59.8
	Secondary or more	5,546	31.8
Wealth index	Poorest	4,750	24.1
	Poorer	4,280	23.2
	Middle	3,509	18.9
	Richer	3,241	18.3
	Richest	2,540	15.6
Type of residence	Urban	4,473	24.9
	Rural	13,847	75.1
Husband 10 years or more older than wife	No	15,063	83.0
	Yes	3,257	17.0
Duration of marriage (years)	0 -9	17,988	98.4
	10-14	332	1.6

Number of children	0-2 children	15,522	85.7
	> 2 children	2,798	14.3
Contraception use (current)	No	11,656	61.8
	Yes	6,664	38.2
Pregnancy termination (at least one)	No	16,494	90.1
	Yes	1,826	9.9

Figure 44: Prevalence of child marriage among ever-married women aged 15-24 years in seven African countries (Kenya, Uganda, Rwanda, Zambia, Tanzania, Malawi, and Democratic Republic of Congo)

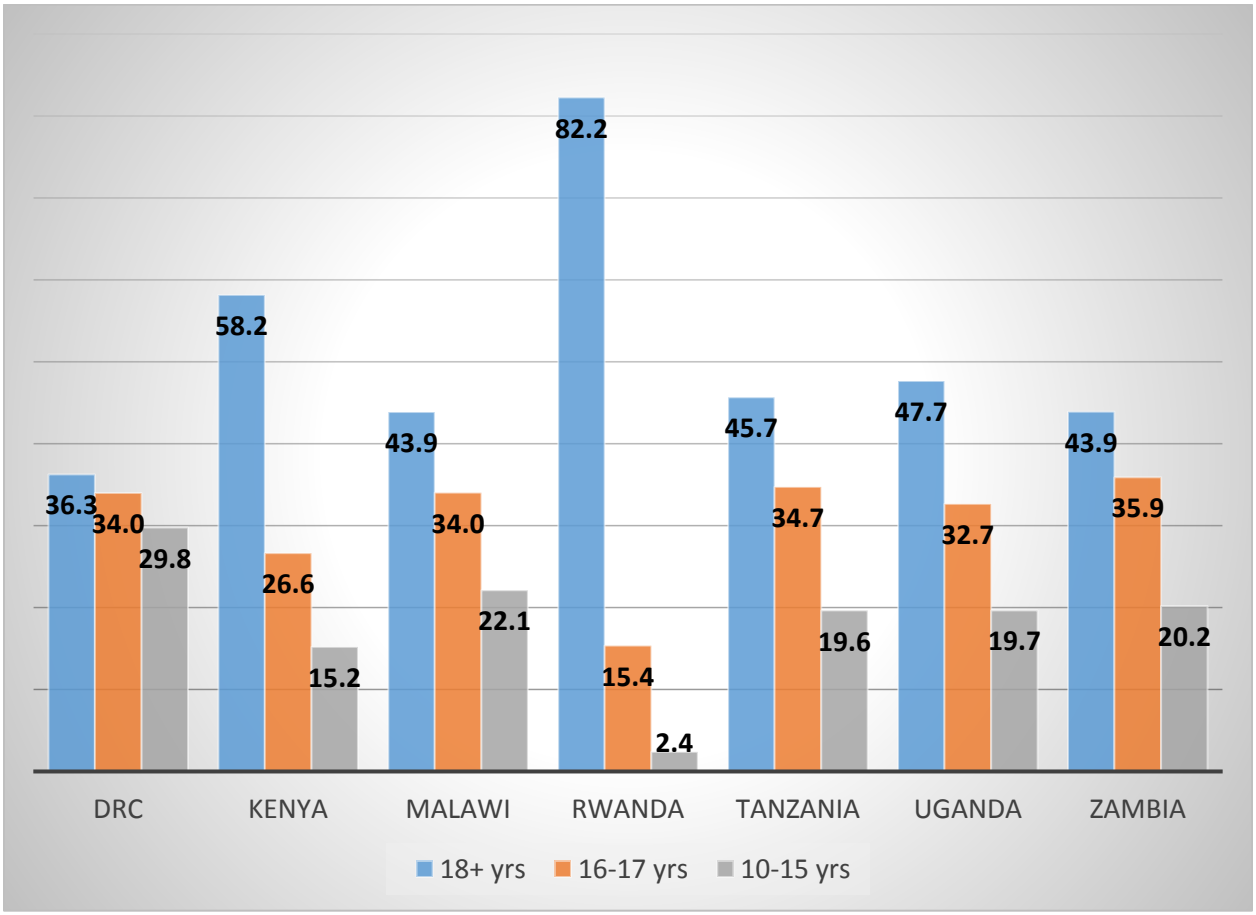


Figure 45: Type of education level among ever-married women aged 15-24 years years in seven African countries (Kenya, Uganda, Rwanda, Zambia, Tanzania, Malawi, and Democratic Republic of Congo)

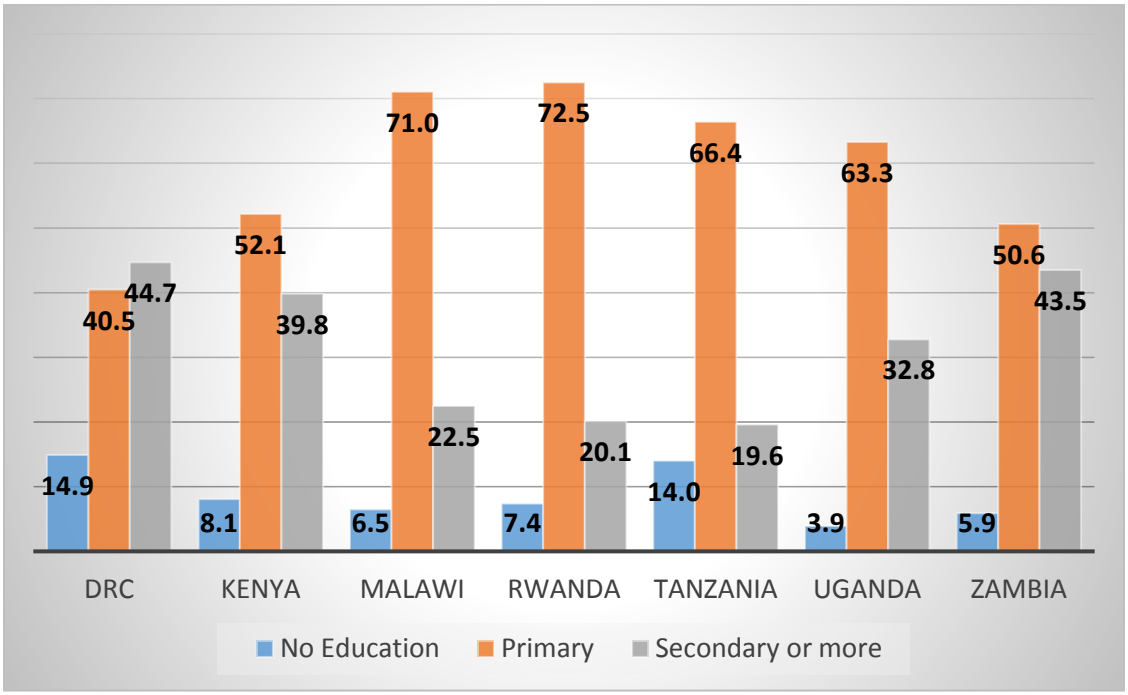


Figure 46: Prevalence of contraceptive use among ever-married women aged 15-24 years years in seven African countries (Kenya, Uganda, Rwanda, Zambia, Tanzania, Malawi, and Democratic Republic of Congo)

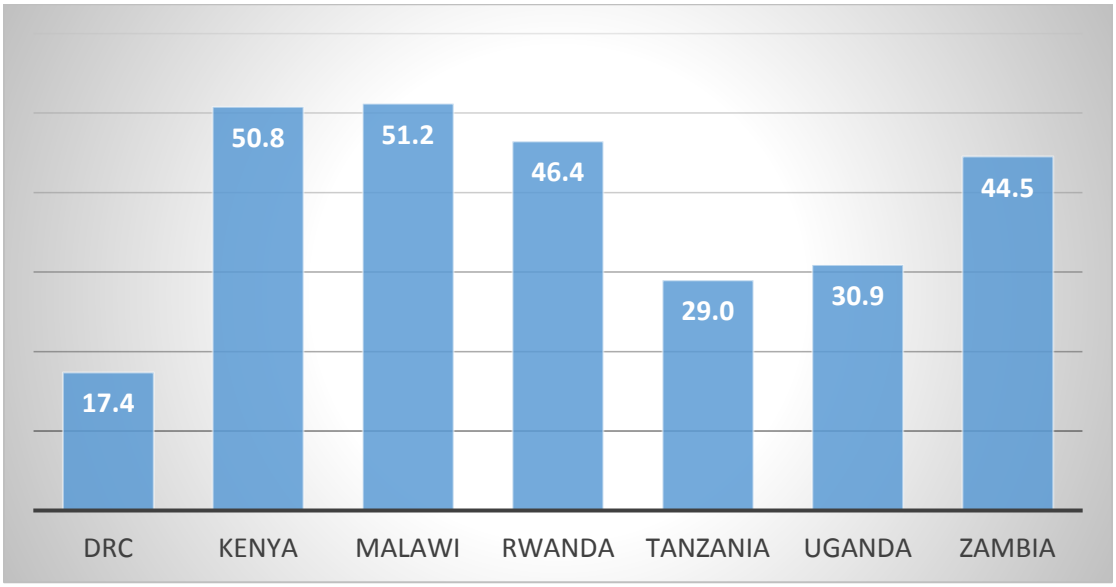


Figure 47: Prevalence of pregnancy termination among ever-married women aged 15-24 years in seven African countries (Kenya, Uganda, Rwanda, Zambia, Tanzania, Malawi, and Democratic Republic of Congo)

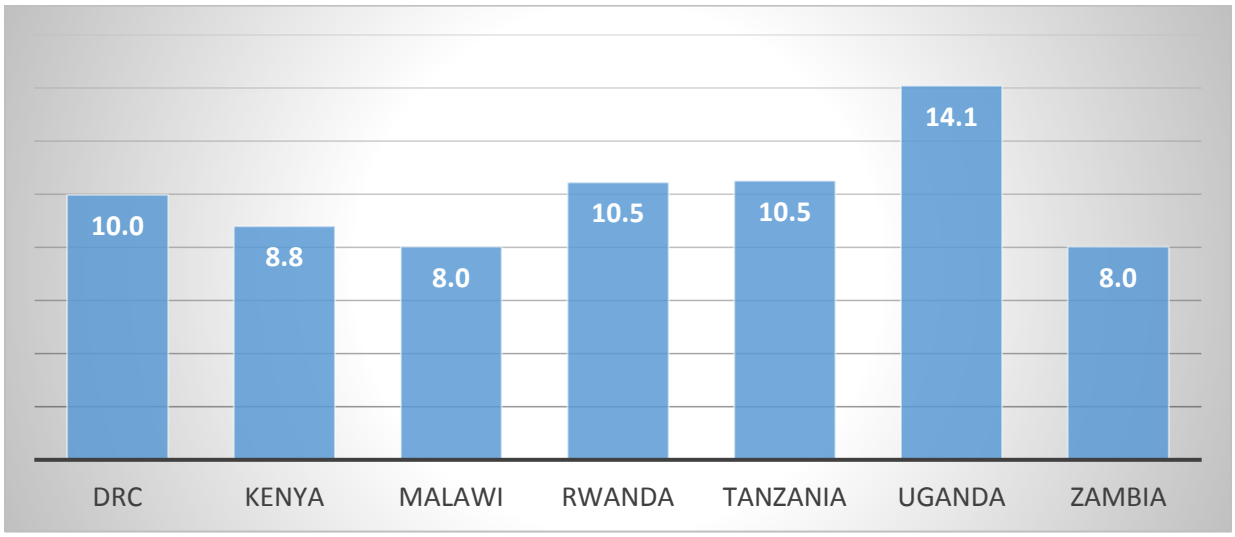
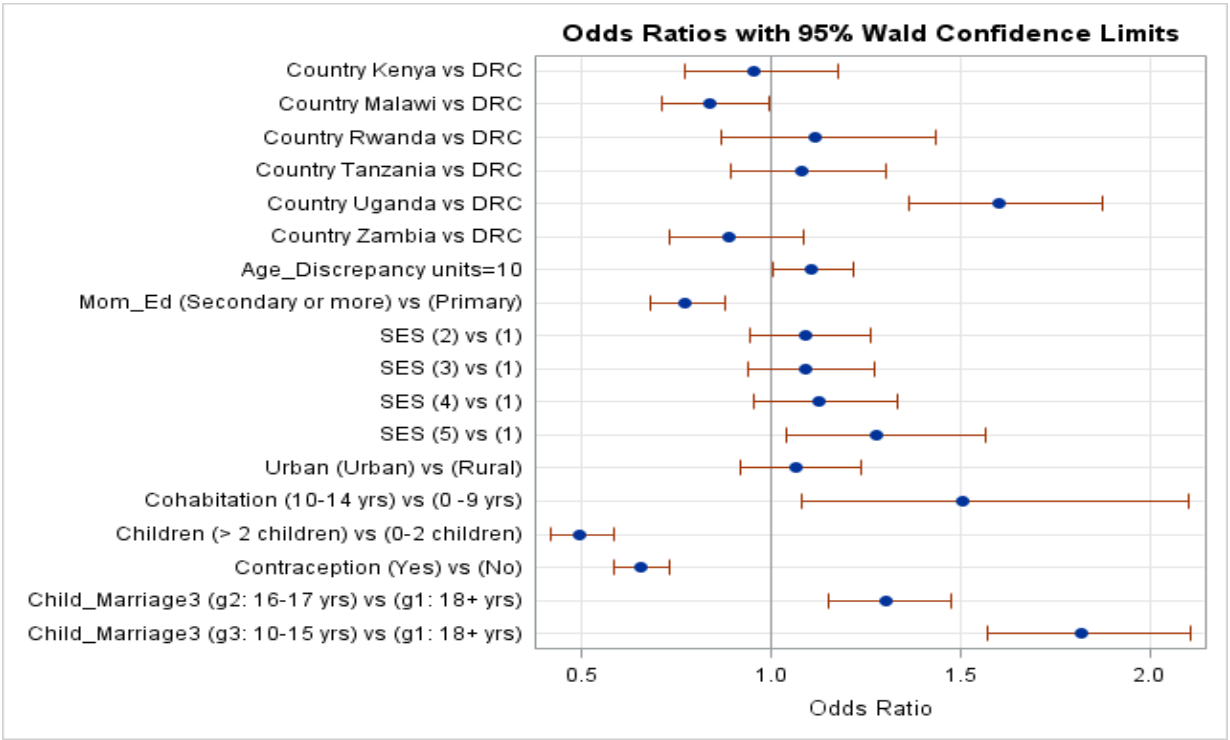


Figure 48: Association of child marriage and social determinants of health with termination of pregnancy among seven countries (Kenya, Uganda, Rwanda, Zambia, Tanzania, Malawi, and Democratic Republic of Congo)



DISCUSSION

Overall, our findings demonstrated that the prevalence child marriage among ever-married women aged 15-24 years in the seven African countries that we examined was substantial and varied significantly between countries (64% to 18%). In general, women surveyed from these countries were mostly poor, had less education, and lived in rural areas. Overall, 38.2% of women were currently using contraceptives and an estimated 9.9% of women reported at least one pregnancy termination. Seventeen percent of women reported that their husbands were at least 10 years older than themselves. In addition, child marriage was found to be associated with pregnancy termination where the likelihood of pregnancy termination increased with decreasing age of marriage (i.e., women married prior to 15 years had a higher odds of pregnancy termination compared to women married between 16-17 years of age). Less educated mothers and the age discrepancy between married couples were found to be independent risk factors for pregnancy termination in our study. In addition, contraceptive use was found to be protective where contraceptive use decreased the likelihood of pregnancy termination.

Child Marriage Practice in Africa

Child marriage practice is common in poor countries and regions of the world, and within any one country, the practice is usually more likely to occur in poor families (*15*). Sub-Saharan Africa has one of the highest rates of child marriages in the world (*1, 9*), and it is estimated that more than 40% of girls are married before their 18th birthday in Africa (*5*). Worldwide, poverty is one of the primary factors associated with child marriage (*1, 2, 15*). Male children are preferred over female children because males are often perceived as an economic and social utility to the immediate family. Allowing young girls to marry at an early age is one of many ways to avoid the responsibility of feeding, clothing and educating them. Furthermore, one of the ways to recover economic resources associated with raising young girls is to arrange marriages for them in exchange for a dowry (*5, 6*). A dowry consists of the exchange of wealth, either in the form of money or gifts, before and after the marriage among the bride's and groom's family. In some countries, the younger the girl is, the higher the dowry (*5, 6*). As a result, girls are more likely to get married at a much younger age and as therefore become economically and socially dependent

on the family they marry into. These factors clearly compromise the productivity of women by limiting their role in family decision-making even in matters related to their well-being.

Pregnancy Termination in Africa

Worldwide, it is estimated that approximately 36 million pregnancies are legally terminated and 20 million are illegally terminated, resulting in more than 78,000 deaths (*41*). During 2010-2014, an estimated 56 million induced abortions occurred every year globally, and 45% of these were unsafe resulting in around 8% of maternal deaths (*42*). Almost all abortion-related maternal deaths occur in developing countries with the highest death rate in Africa (*42*). In Africa alone, 8.2 million induced abortions occurred each year during 2010–2014 with an annual rate of 34 abortions per 1,000 women of reproductive age (15–44), and roughly 26 abortions per 1,000 for married women (*43*). Abortion rates varies across Africa with the highest rates found in Southern Africa (24%) followed by Northern (23%), Eastern (14%), Middle (13%), and Western Africa (12%) (*43*). The most common complications of unsafe abortion includes incomplete abortion, infection and excessive blood loss (*43*). The negative consequences of these outcomes goes beyond its immediate effects on personal health including the increased economic burden on families already living below the poverty line. Most abortions occur because individuals have unintended pregnancies (i.e. the women got pregnant when in fact they would have chosen to avoid the pregnancy). Unmet needs of modern contraceptives are attributed with majority of unintended pregnancies in Africa (*43*).

Child Marriage and Negative Health Outcomes

Child marriage is found to be associated with poor maternal and child health outcomes. The published literature has shown that child marriage as compared to adult marriage are associated with decreased likelihood of prenatal care during pregnancy, and those who receive prenatal are more likely to receive the care by unskilled medical providers and deliver their babies at home (*8, 44*). This resulted in the increased likelihood of pregnancy complications such as spontaneous abortion, delivery problems such a fistula formation, and maternal and child morbidity and mortality (*8*). The problems are not limited to pregnancy or delivery but as these girls transition into adulthood, those girls that married prior to the age of 18 years as compared to those who married as adults are more likely to have unwanted pregnancies, pregnancy termination, and a greater number of children with less time between pregnancies/children. This has been shown to

increase the risk of maternal and child health negative outcomes (*8, 11, 45*). Further, studies within Africa have shown that girls who are married before 18 years of age are more prone to acquire HIV and sexually transmitted infections (STIs) (*5, 6, 8*).

Child Marriage and Non-use of Contraception

Unwanted pregnancy is usually a consequence of either non-use of contraception or using less reliable traditional contraceptive methods such as withdrawal methods etc. Most unwanted pregnancies end up in pregnancy termination or abortion. Girls married as children may not be able to negotiate condom use with their male partners, especially when these girls are vulnerable due to economic constraints that make them more reliant on male partners for financial support. Further, male partners are many fold older than their female counterpart (*8, 46*), and had likely prior sexual partners and/or polygamous (*6*). This power imbalance among couples including prior exposure to multiple partners by men not only increased the vulnerability of young females of contracting HIV and STIs but also unwanted pregnancy and consequently pregnancy termination. Further, these young girls married as children are more vulnerable to physical (*46*) and sexual violence (*47*), which increased the risk of unwanted pregnancy and/or pregnancy termination in addition to HIV and STIs. Our study confirms the findings that child marriages are associated with pregnancy termination and contraceptive use has a protective effect among those using them.

International Laws Against Child Marriage

Child marriage violates international laws in terms of development and the girl child's right of attaining standard care of health, sexual and reproductive rights, and enjoying equal opportunities for education and employment.

Universal declaration of Human Rights 1948

The Universal Declaration of Human Rights, 1948 (Article 7) emphasized on fundamental human rights for men and women equally without any distinction of sex, and states "All are equal before the law and are entitled without any discrimination to equal protection of the law" (*48*). Child marriage where young girls do not enjoy equal human rights like men is a clear violation of the law.

CEDAW prohibits child marriage via Article 16 (2) that says “The betrothal and the marriage of a child shall have no legal effect, and all necessary action, including legislation, shall be taken to specify a minimum age for marriage” (*48*).

Convention on the Rights of the Child 1989 (CRC)

CRC prohibits traditional practices that are harmful to the health of children contains (Article 24 [3]), and forbids States to not give validity to marriages that have not attained majority (Article 16 [2]) (*48*). CRC defines child as “a child means every human being below the age of 18 years unless, under the law applicable to the child, majority is attained earlier." (*48*) Further, CRC considers 18 years as the minimum age for marriage for both man and woman (*48*).

The Convention on the Consent to Marriage, Minimum Age for Marriage and Registration of Marriage

This Convention requires “the state parties to take legislative action to specify a minimum age for marriage and stipulates that no marriage shall be legally entered into by any person under this age, except where a competent authority has granted a dispensation as to the age, for serious reasons, in the interest of the intending spouses” (*48*). Additionally, “All marriages shall be registered in an appropriate official register by the competent authority” (*48*).

International Convention on Civil and Political Rights (ICCPR)

ICCPR 1966, Article 23 states that “no marriage shall be entered into without the free and full consent of the intending spouse” (*48*).

International Convention on Economic Social and Cultural Rights (ICESCR)

The convention says “Differences in marriageable age between males and females violate Article 10; the practice of early marriage has a negative impact on the right to health, education and work, and the committee has recommended that the legal minimum age of marriage be raised to 18” (*48*).

The Supplementary Convention on the Abolition of Slavery, the Slave Trade and Institutions and Practices, 1956

The Supplementary Convention says “any marriage that is forced upon a girl or woman by her family or guardians as similar to slavery and requires the state party to eliminate it” (*48*).

The World Health Organization (WHO) Constitution

The WHO Constitution defines health as a "state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity" (*48*). Child marriage is a clear violation of the WHO Constitution.

Other International Agreements

Other international agreements related to child marriage are the African Charter on the Rights and Welfare of the Child, and the Protocol to the African Charter on Human and People's Rights on the Rights of Women in Africa. The Pan-African Forum also considers child marriage as sexual exploitation of children.

RECOMMENDATIONS

1. Provision of Educational Resources and Opportunities

It has been clearly demonstrated in many different countries and many different settings that higher levels of education are associated with increases in income potential, reduces poverty rates and improves health. Education has also been shown to be a very effective tool for changing social and cultural environments within a country. Enrollment of girls in secondary school is inversely proportional to the number of girls married before the age of 18. It has also been shown that girls with less than a primary school education are more likely to marry earlier, bear children earlier, and have more children when compared with girls who have completed primary schooling (*49*). Furthermore, it has been shown that infant mortality rates decrease by 5-10% with each additional year of a mother's schooling (*49*), and by increasing secondary and college level schooling there is an associated improvement in health outcomes among these woman (*49*). Interventions such as reducing costs associated with schools, scholarship programs, building schools close to girls' residents, and making them safe and girl-friendly have proved successful in increasing girls' participation in primary and post primary school (*49*). In addition, providing incentives to the parents of these young girls, such as free meals, while they attend school increases the overall enrolment of girls in primary schools by approximately 135% (*50*).

2. Strict Laws Against Child Marriage

Implementation and enforcement of strict laws against child marriage practice with severe penalties is important for the elimination of child marriage practice. Engaging local communities in the process of raising awareness is a useful measure in containing child marriage practice. One of the best examples of reducing rates of child marriage is in the country of Sri Lanka, where the government put into law the requirement to register all marriages and demonstrate the mutual consent of both the bride and bridegroom (*9*). Furthermore, coupling these legislative measures with free education (i.e., from primary to university level) played an important role in the decline the rates of child marriage practices (*9*).

3. Income-earning and Employment Opportunities

Poverty is one of the main reasons of parents for keeping girls away from the school, that indirectly prevent girls later in life to join the workforce of the country and to become independent of their own finances. Provision of income-earning and employment opportunities to young girls may help lessen financial burden of the family, what poor families usually think of their girls. Provision of employment opportunities to young girls after completion of schooling may also help containing child marriage practice in the country as delaying marriage of their daughters would provide monetary gains to the family that otherwise would not, which is one of the reasons of child marriage.

4. Awareness Raising of Harmful Effects of Child Marriage

Raising awareness of the negative health outcomes of child marriage by the government, local and international non-governmental organizations through mass-media campaign is an important tool (*51, 52*). Media like radio and television should be used to educate and sensitize people, especially parents about negative health outcomes of child marriage practice in the country. One of the ways is collaboration between media and public health officials and have various advertisements, stage shows and telefilms showing the harmful effects of child marriages.

5. Improving Cultural Barriers

Historically as well as currently, patriarchal and repressive attitudes of men towards women, rigid sex-role stereotypes, and non-egalitarian expectations directed toward women married as children has been cited as one of the primary reasons for negative health outcomes among these

women. Designing culturally sensitive and country-specific interventions are needed to eliminate child marriage.

CONCLUSIONS

Child marriage is a very common practice among married women aged 15-24 years in seven African countries and is associated with pregnancy termination in a dose response manner (i.e., women married prior to 15 years is associated with a greater likelihood of terminated pregnancies compared to those married between 16-17 years of age). We also demonstrated that contraceptive use decreased the likelihood of pregnancy termination. Provision of education, income-generating opportunities, civil rights, and reproductive health rights of women will help alleviate child marriage in Africa.

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