Do Female Orphans Face an Increased Risk of Early Sexual Debut, Early Marriage and Teen Pregnancy in Zimbabwe?

Tafadzwa Jani

Supervised by:

Professor Cally Ardington

Previous research based on 2005 data found no association between female orphanhood and the risk of early sexual debut, early marriage and teen pregnancy in Zimbabwe. This study draws on the Demographic and Health Survey conducted in Zimbabwe in 2011, to analyse the relationship between orphanhood and early sexual debut, early marriage and teen pregnancy. In contrast to the earlier study, the results indicate orphanhood has a strong association with an early sexual debut and teen pregnancy; although there is a weaker association between orphanhood and early marriage. When orphanhood is separated into the different orphan types, paternal orphans have a significant increased risk for all three outcomes even after controlling for a range of socio-economic variables. Financial incentives targeted at orphans to stay in school could be the policy mechanisms needed to address the issues of early sexual debut, early marriage and teen pregnancy.

I. INTRODUCTION

Adolescence is a period in time when a child transitions from childhood into adulthood and this comes with emotional, psychological, hormonal and physical changes (Chae, 2013). In this time period female adolescents may also transition into sexual debut, marriage and child bearing. Through no choice of their own, millions of female adolescents make these transitions early (Palermo & Peterman, 2009). A varying range of adverse outcomes are seen for those adolescent females that involuntarily engage in early transitions. Early sexual debut before the age of 18, increases the risk of contracting HIV and AIDS (Birdthistle, et al., 2008). Furthermore, there is evidence that suggests that early marriage and child bearing before the age of 18 results in poorer educational outcomes, maternal health, infant health and an increased experience of domestic violence and sexual abuse (Jain & Kurz, 2007).

Parents are there to support and make it easier for their children as they make the transition into adulthood and go through various life events (Corak, 2013). Due to decreased parental support, through the death of a parent or both parents, generally orphans are believed to experience worse outcomes when compared to non-orphans. There is a growing body of research that provides evidence that orphans suffer poorer educational and health outcomes, and are more at risk to contract HIV (Birdthistle et al 2008; Chae 2013; Gregson et al 2005; Thurman et al 2006; Ardington & Leibbrandt 2010). This study aims to add to this literature by examining whether female orphans in Zimbabwe are at higher risk of early sexual debut, early marriage and teen pregnancy.

This study seeks to update the work done for Zimbabwe by Tia Palermo and Amber Peterman (2009), who use the Demographic and Household Surveys (DHS) completed for 10 Sub Saharan African countries, to test whether female adolescent orphans are at higher risk for early sexual debut, early marriage and teen pregnancy. In their analysis using DHS data from 2005, Palermo and Peterman (2009), found that for Zimbabwe, orphan status was not significant in determining who experiences early sexual debut, early marriage or early pregnancy. Since 2005 when the survey was taken, Zimbabwe experienced hyper-inflation in 2008 which led to an economic crisis where the ordinary Zimbabwean faced substantial economic hardships (Pilossof, 2009). Inflation rates rose from over 1000% in 2006 to 89.7 sextillion percent by November 2008 (Hanke, 2008). Real wages fell and unemployment and poverty rates rose as a direct consequence of the hyperinflation (Chagonda, 2012).

This study will use the same characteristics controlled for by Palermo and Peterman (2009), and any change in the significance of the orphan status variables can partly be attributed to the different set of circumstances Zimbabweans now face as compared to 2005. There are limited number of empirical studies that focus on the linkages of HIV and orphans, furthermore there are even fewer studies that investigate whether orphan outcomes change after a period of years (Palermo & Peterman, 2009).

This study looks to add to the limited empirical studies by updating the investigation of orphan status as the determinant in early sexual debut, early marriage and teen pregnancy for Zimbabwe. For the purpose of this study early sexual debut, early marriage and teen pregnancy, will be defined as experiencing any one of those transition events before the age of 18. This study will give an overview of the relevant literature that shows that there could be significant relationship between orphanhood and early sexual debut, early marriage and teen pregnancy. A short description of the 2011 DHS data will follow, citing how the final sample of 15-17 years old females used in this population level analysis is created. The empirical model is adapted from Palermo and Peterman (2009) and is presented in section III. An OLS linear probability model will be used to test the relationship between orphanhood and three outcomes: ever had sex, ever been married, ever been pregnant. The model will be rerun using indicators for different types of orphans (maternal, paternal and double orphans) instead of any type of orphanhood. Orphanhood and in particular paternal orphans are found to be significant in our regression models on all three outcomes. Policy mechanisms around education will be suggested to address the issues around the association of orphanhood and early sexual debut, early marriage and teen pregnancy.

II. Literature Review

There are an estimated 143 million orphans in the world, and this has led to an increase the amount of literature and studies that explore the human outcomes of orphans (United Nations Children's Fund, 2016).

A. Orphan Status and Early Marriage

Recent literature and studies explore how orphan status affects decision making around marriage especially amongst female adolescents. The literature on this topic differs in the reasoning of why orphan status is linked to early marriage (Palermo & Peterman, 2009). Early marriage is defined as any marriage with a female below the age of 18 and before the female is ready to take on the responsibilities of marriage and childbearing (Walker, 2012). Female

teenagers in Africa are already at risk of early marriage regardless of orphan status due to mainly economic, religious sociologic and cultural factors (Walker, 2012). This risk is evident in the statistics: one in every seven girls is married before the age of 15 in developing countries in Africa (Population Council, 2011).

Early marriage is perceived to be negative because it is a violation of basic human rights and furthermore it is a barrier to the development of the female adolescent involved (Jain & Kurz, 2007). Barriers to development arise during the marriage when the female adolescent has household responsibilities, childbearing and raising and limited mobility due to being moved to a new household which could be in a different town or village. For these reasons, the married adolescent is unable to further her education or take advantage of work opportunities, and loses their childhood as they also unable to play and develop friendships (Nour, 2009). The stagnation of the adolescent's education, generally perpetuates and reinforces the circle of poverty (Jain & Kurz, 2007). Once the adolescent is in a marriage, she is more likely to have experienced and is currently experiencing domestic violence as compared to a female who gets married as an adult (Speizer & Pearson, 2011). The risk of HIV is increased for women who get married in their teens, as they try prove their fertility to their older husbands, by increasing the frequency of unprotected sex (Nour, 2009). In addition, a study in the United States of America observes that women who get married before the age of 18, have an increased risk of lifetime and existing psychiatric disorders compared to those women that get married as adults (Le Strat, et al., 2011).

One trend of thought is that a loss of parent leads to a decline in household income (Chae, 2013). Meaning that there is more financial pressure on the surviving parent and this pressure is magnified in poor households. These households then become unable to feed clothe and educate their adolescent daughters (Walker, 2012). Thus as a way to alleviate themselves of some of this financial burden, these households marry off their adolescent daughters and gain economically due to the bride price paid by the husband's family. In the case of double orphans who are absorbed into the extended family the risk of early marriage is increased especially in the case where the orphan is not closely related to the head of the household or the main decision maker (Walker, 2012).

Another trend of thought believes that while caregivers play a role in the decision for an adolescent female orphan to get married early, the decision is ultimately made by the orphan herself (Palermo & Peterman, 2009). Having little to no education combined with a heavy

domestic chore workload and no money are some of the factors that contribute to the adolescent orphan deciding to get married young in search of a better life (Oleke, et al., 2006). Furthermore, caregivers in African communities where HIV is prevalent encourage early marriage as they perceive this as a viable option in order to prevent female orphans from having multiple sexual partners in order to curb the spread of HIV (Oleke, et al., 2006). But this belief is proved to be incorrect as evidence from Kenya and Zambia suggests that married adolescents are 50%-59% more likely to have contracted HIV than unmarried adolescents (Nour, 2009).

B. Orphan Status and Sexual Debut

Early sexual debut increases the risk of contracting papilloma virus and sexually transmitted infections such as HIV and herpes, as early sexual debut is associated with an increased number of lifetime sexual partners (Mmbaga, et al., 2012). In addition, an early sexual debut is associated with a higher risk of teen of pregnancy. Teen pregnancy is believed to lead to adverse health outcomes for the adolescent and the infant (Nour, 2009). Mmbaga, Leonard and Leyna (2012) observed that early sexual activity in Tanzania also attributed to the increase in school drop-out rates, which then had severe economic consequences for the adolescents involved.

Studies have shown that orphan status is linked to an early sexual debut. One study conducted in South Africa concluded that orphans were more likely than non-orphans to have an early sexual debut. This study further showed that 75% of orphans in the sample experienced their sexual debut after their parents' death (Thurman, et al., 2006). Recent literature suggests that there are a number of different factors that can be attributed to the early sexual debut experienced by orphans. A study conducted on Kenyan school girls suggested that orphans increase their risk of experiencing early sexual debut due to the older male partners they choose to enter into a relationship with (Mojola, 2011). These older partners offer the orphans emotional support that they didn't receive from their caregivers. In addition, they receive financial support and other material benefits which make these older partners appealing (Mojola, 2011).

Some orphans experience an early sexual debut due to the fact that they are forced to engage in sexual activities (Birdthistle, et al., 2008). Force also includes peer pressure, whereby the orphan tries gain the respect of their friends by imitating their friend's sexual behaviours, or the orphan's perceptions of their friends behaviours (Mmbaga, et al., 2012). Going through hormonal and psychical changes coupled with dealing with the loss of a parent or parents makes

the adolescent period difficult. Therefore, orphans turn to sexual activity as an outlet for all the emotions surrounding the changes in their lives (Chae, 2013).

Lack of parental supervision combined with having no role model can increase the vulnerability of orphans to sexual experimentation (Palermo & Peterman, 2009). This sexual experimentation increases the risk of an early sexual debut for adolescent female orphans. Alcohol and substance abuse which arise from trying to deal with the loss of a parent is a factor that also increases the risk of an early sexual debut (Mmbaga, et al., 2012). Geographical location is a factor in determining the onset of sexual activities. Urban adolescents are more likely to be exposed to intervening sexual education thus making them more likely to delay the onset of sexual activity compared to rural adolescents (Mmbaga, et al., 2012). Thus all these factors contribute to linking orphan status and early sexual debut.

C. Orphan Status and Teen Pregnancy

Teen pregnancy is a concern because it leads to adverse health outcomes for women who give birth at a young age (Jain & Kurz, 2007).The infant mortality rate is 60% higher for women who give birth before the age of 18. Pregnant females are more at risk of malaria infection, when they stay in malaria regions such as Zimbabwe where 90% of the population is exposed to malaria (Nour, 2009). Furthermore, pregnant women under the age of 18 have a significantly higher malaria density which increases the likelihood of dying from malaria and malaria-related complications, as compared to those women pregnant over the age of 18 (Dzeing-Ella, et al., 2015). Even without the threat of malaria, women aged between 15-18 are twice as likely to die during childbirth, compared to older women (Jain & Kurz, 2007). Besides the adverse health effects, teen pregnancy forces the pregnant woman to drop out of school, thus limiting their education and possible returns to education (Mmbaga, et al., 2012).

The pathways that lead orphans to early marriage and early sexual debut, generally involve unprotected sex which increases the risk of teen pregnancy (Palermo & Peterman, 2009). The link between orphan status and teen pregnancy can be explained by a number of factors. One paper suggests that there is a high correlation between early marriage, early sexual debut and teen pregnancy (Gregson, et al., 2005). Thus if an orphan got married at a young age and had already experienced their sexual debut, the adolescent orphan faced increased risk of being pregnant. Whereas a study conducted by Thurman and others (2006), using cross sectional data from KwaZulu-Natal with orphans aged between 14-22 found that orphans were 1.5 times more likely to be have sexual activity than non-orphans. Although there was no statistical

significance in the difference in condom use by orphans and non-orphans (Thurman, et al., 2006). This implies that the risk of teen pregnancy does not differ due orphan status if condom use is used as a proxy for the risk of teen pregnancy. Birdthistle *et al* (2008) concur with this conclusion. Their study uses a sample of 15- 19-year-old girls from the high density suburbs in Harare. They find that is no difference in condom use by orphans and non-orphans during sexual activities (Birdthistle, et al., 2008).

In contrast to Thurman *et al* (2006), Gregson *et al* (2005) find that maternal orphans between the ages of 15-18 were the most likely to have experienced child birth and have been married. Furthermore 8% of orphans and vulnerable children between the ages 15 and 18 had actually gone through pregnancy compared to the 2% of non-orphans (Gregson, et al., 2005). This empirical evidence shows orphan status does increase the risk of teen pregnancy in the case of Zimbabwe.

Thus the literature suggests that there is a link between orphanhood and early sexual debut, early marriage and early pregnancy. Therefore, this analysis seeks to use the most recently available Demographic and Health Survey for Zimbabwe to analyse and check if this link holds for Zimbabwean orphans.

III. Data Description and The Empirical Model

A. Data Description

The DHS survey conducted in Zimbabwe in 2011 is used to construct the data used in this study. DHS is a cross sectional country representative dataset that provides data on range of issues including orphan status, education, sexual activity, wealth, marriage, and fertility rates (ZIMSTAT, 2012). The 2011 DHS dataset is used in this analysis as it as the most recent dataset available to the public for Zimbabwe. The overall sample has 9171 women aged 15-49 and 7480 men aged 15-54. The DHS dataset only asks questions related to orphan status to children aged 0 – 17 years. But the data related to reproductive health and marriage is only available for people between the ages of 15 years and 54 years. Therefore, the sample for this study is limited to adolescents who are between the ages of 15 and 17 years. This study only is focused on women, because pregnancy is only measured for women and that limits the overall sample to 1193 observations.

For the purpose of this analysis variables pertaining to orphan status were created, using the responses to the household questionnaire which asks the household head the status of the

parents of any child in the household who is below 18 years. A child is classified as a maternal orphan if the father is alive and the mother is deceased or her status is unknown by the household head (Ardington & Leibbrandt, 2010). A paternal orphan is classified as a child whose mother is alive and father is deceased or his status is unknown by the household head (Ardington & Leibbrandt, 2010). A double orphan is classified a child whose parents are both deceased or their status is unknown (Ardington & Leibbrandt, 2010). Those children whose parents' status were stated as unknown, were classified as orphans because these children have no contact or support of care from their parents and could be considered to have the same disadvantage as a child whose parents are known to be deceased. The variables showing whether an individual has ever had sex, ever been married and ever been pregnant, are generated using the individual questionnaires. The household questionnaire is not used in this particular case as it did not contain questions related to sexual health and fertility but it did contain questions on marriage. There are some women whose marital status in the household roster is not the same as she reported in the individual questionnaire. Thus for the sake of uniformity the ever married variable was also created using the individual questionnaire.

B. Empirical Model

The empirical model used in this analysis will follow a modified specification of the model used by Palermo and Peterman (2009). The probability of ever having sex is a function of orphan status, age, education, religion, wealth and geographical location (Palermo & Peterman, 2009). The Palermo and Peterman model is modified below into an OLS linear probability model:

$$(\Pr[\text{Ever had sex}= 1]) = \beta_0 + \beta_{\text{Orphan Status}} + \beta_{\text{Age}} + \beta_{\text{Education Level}} + \beta_{\text{Religion}} + \beta_{\text{Wealth}} + \beta_{\text{Urban}} \quad (1)$$

This model is run to see how orphanhood significantly affects the probability of ever having sex after controlling for age, education, religion, wealth and geographical location. The reference category for this model is non-orphans. This model is rerun using the other two dependent variables to test whether orphanhood significantly affects the probability of early marriage and teen pregnancy.

A second model is run using the specification below:

$$(\Pr[\text{Ever had sex}= 1]) = \beta_0 + \beta_{\text{Paternal Orphan}} + \beta_{\text{Maternal Orphan}} + \beta_{\text{Double Orphan}} + \beta_{\text{Age}} + \beta_{\text{Education Level}} + \beta_{\text{Religion}} + \beta_{\text{Wealth}} + \beta_{\text{Urban}} \quad (2)$$

This model disaggregates orphan status into paternal, maternal and double orphan keeping non-orphan as the reference category. This model checks which orphan type is significantly at risk for early sexual debut, early marriage and teen pregnancy, while controlling for the same variables as the model (1) above.

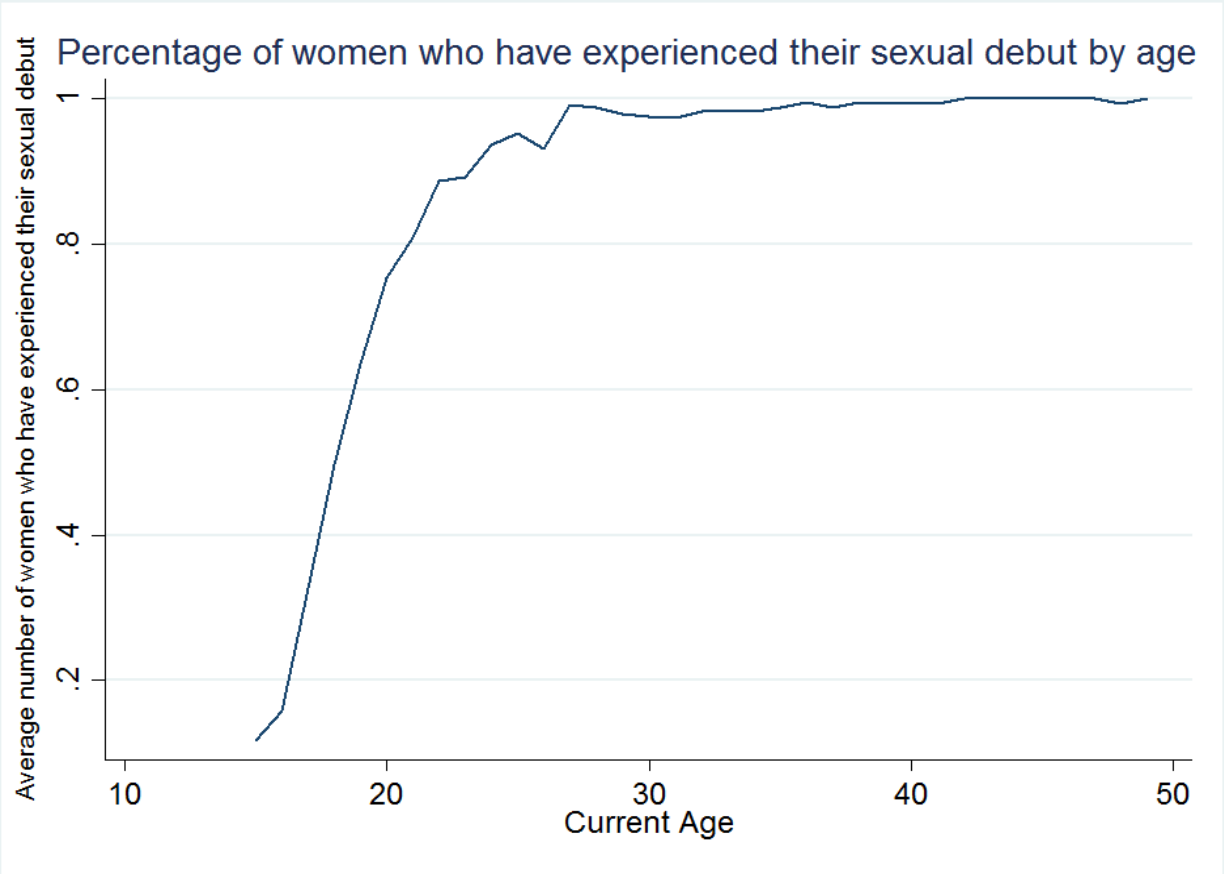
The control variables are created using the data from the individual and the household questionnaire. The wealth variable is divided into five different wealth quintiles using information such as ownership of assets, sanitation access and type of water access using the household questionnaire. Age, education level and religion are created from the girl's response to the individual questionnaire. The urban variable is created from the geographical location of the household, coded one if the household is located in an urban area and zero if the household is the rural area.

Ever had sex, ever married and ever been pregnant variables were created as dummy variables using information collected the individual questionnaire. The ever had sex variable is constructed using female adolescents' response to the question at the age they first had sex. If they answered this question by giving an age they are coded as 1 to represent that they have had sexual activity and 0 if they never had sex. It must be noted that there was one individual in the sample whose reported age at first sex is greater than their current age. This individual is coded as having sex, as they also reported having recent sexual activity. The ever married variable was created using our sample's response to the individual question whether they currently or ever have been married. An individual is coded when 1 for ever married if they are currently or ever have been married and are coded 0 if they have never been married. The ever pregnant variable is constructed using 3 questions from the individual questionnaire. The individual is coded 1 for ever been pregnant if, (i) the number of children ever born is larger than zero, or (ii) the individual is currently pregnant, or (iii) the individual has ever had a stillbirth, miscarriage, or abortion; and coded zero otherwise.

IV. Rates of Early Transitions

Before the analysis an of orphan status and the variables of interest can be conducted, we first look at the characteristics of the Zimbabwean population with respect to sexual behaviour.

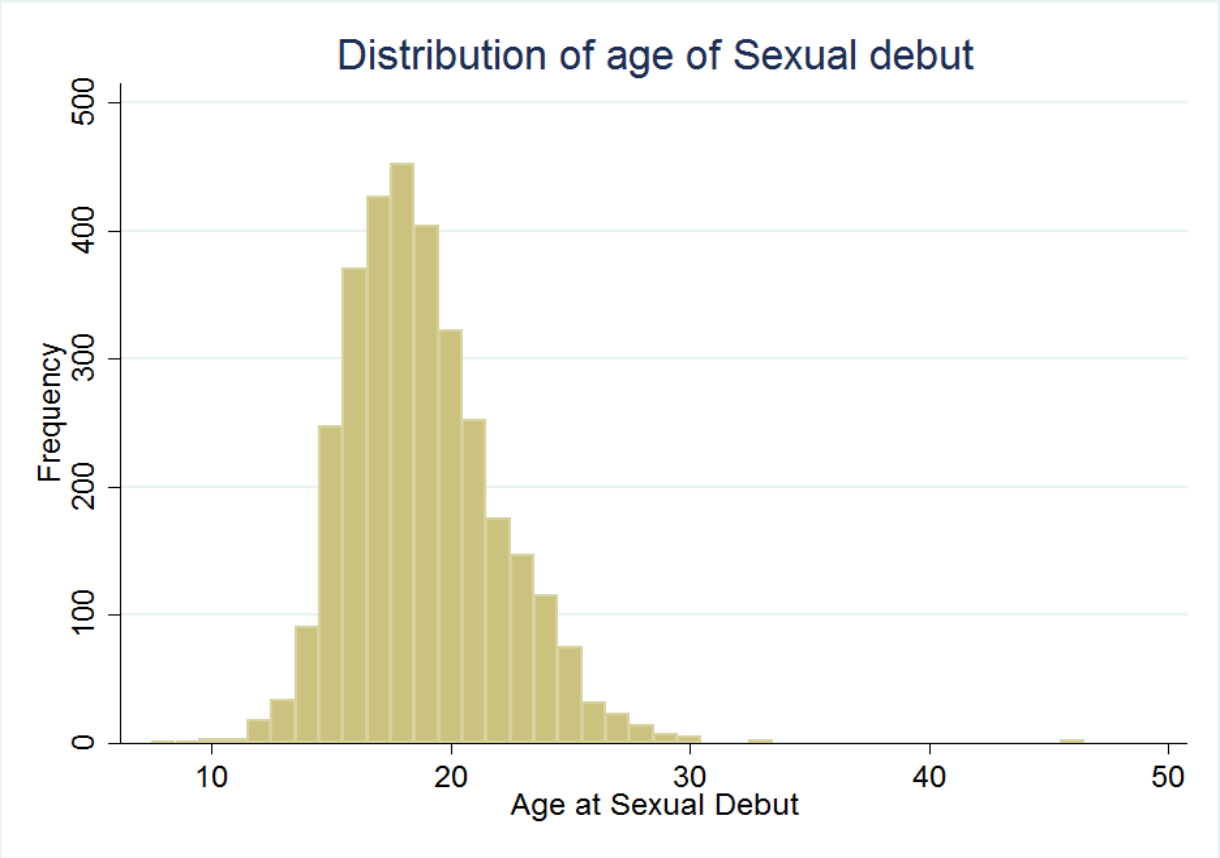
Figure 1: Percentage of women who have experienced their sexual debut by age



Source: DHS Zimbabwe 2010-2011

Figure 1 shows the percentage of women who have experienced their sexual debut. The data only asks those women between the ages of 15 to 49 questions about their sexual activity, hence the line graph begins at age 15. From age 16 we observe a steep increase in the percentage of women who have becomes sexually active. By the age of 28, close to every woman in the sample, has experienced their sexual debut. Figure 1 suggests that just over half the women aged 18 are already sexually active.

Figure 2: Distribution of age at Sexual debut

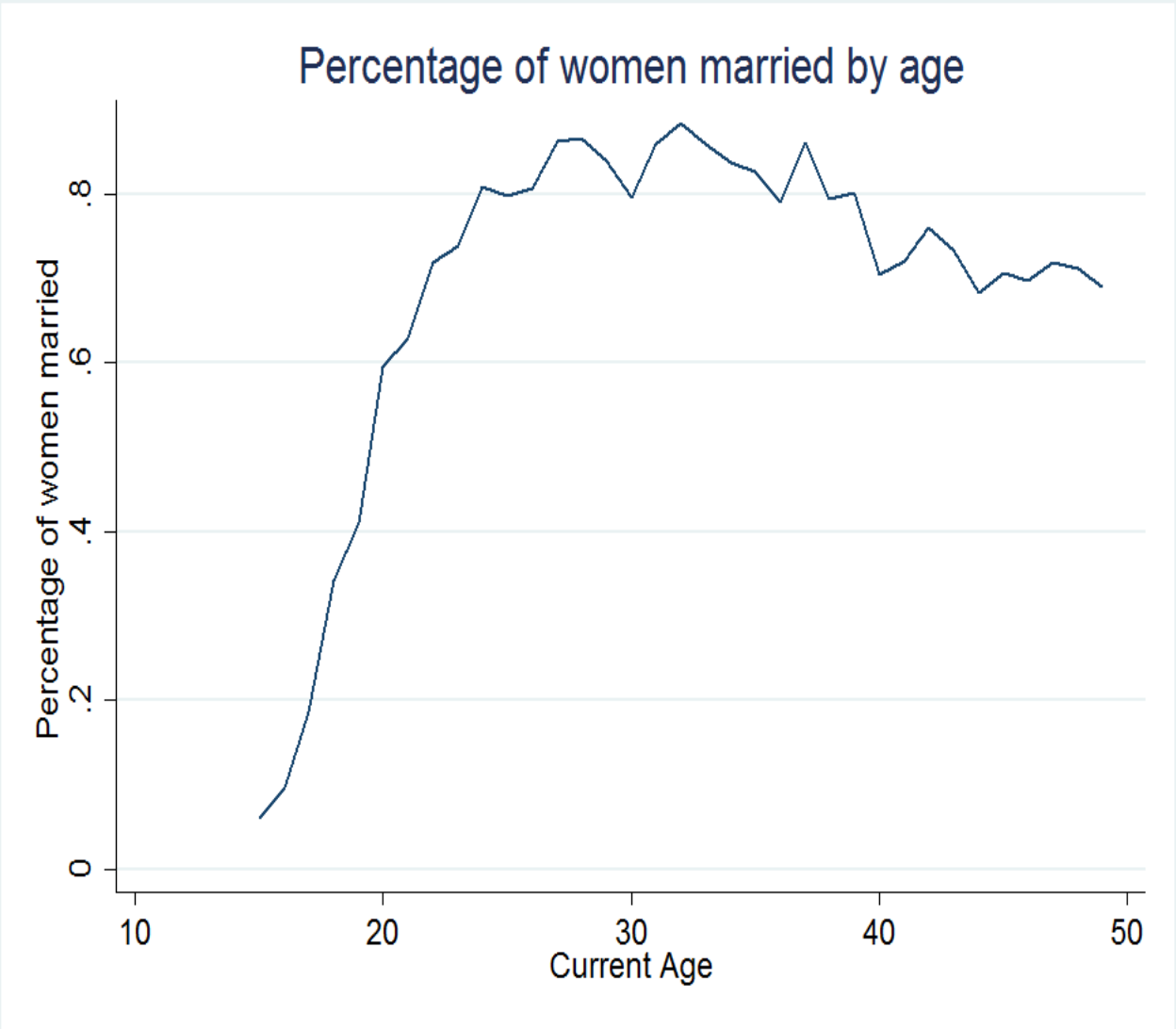


Source: DHS Zimbabwe 2010-2011

Samples are weighted using weights that were provided by DHS

Figure 2 shows for women aged 25-35 years, the distribution of their age at sexual debut. This age cohort was picked, as the vast majority of these women would have experienced their sexual debut and are the closest in terms of age to our final sample of 15 to 17 year olds. Furthermore, this age cohort would have been the 15-17 year olds sampled in the 2005 DHS for Zimbabwe that was used by Palermo and Peterman. Figure 2 shows that most women experience their sexual debut between the ages of 17 and 19. The median age of sexual debut in Zimbabwe for women between the ages of 25- 35 years is 18 and the average age of sexual debut is 18.42 years. Thus experiencing a sexual debut before the age of 18 in Zimbabwe can be considered early as it is, before the age that the majority of the women become sexually active. In addition, figure shows that two women experience their sexual debut below the age of 10. They be considered outliers as well as the women who reported her sexual debut at age 46 but whose actual age was 35. That observation can be disregarded as it is either mistake in the dataset or the women misunderstood the question.

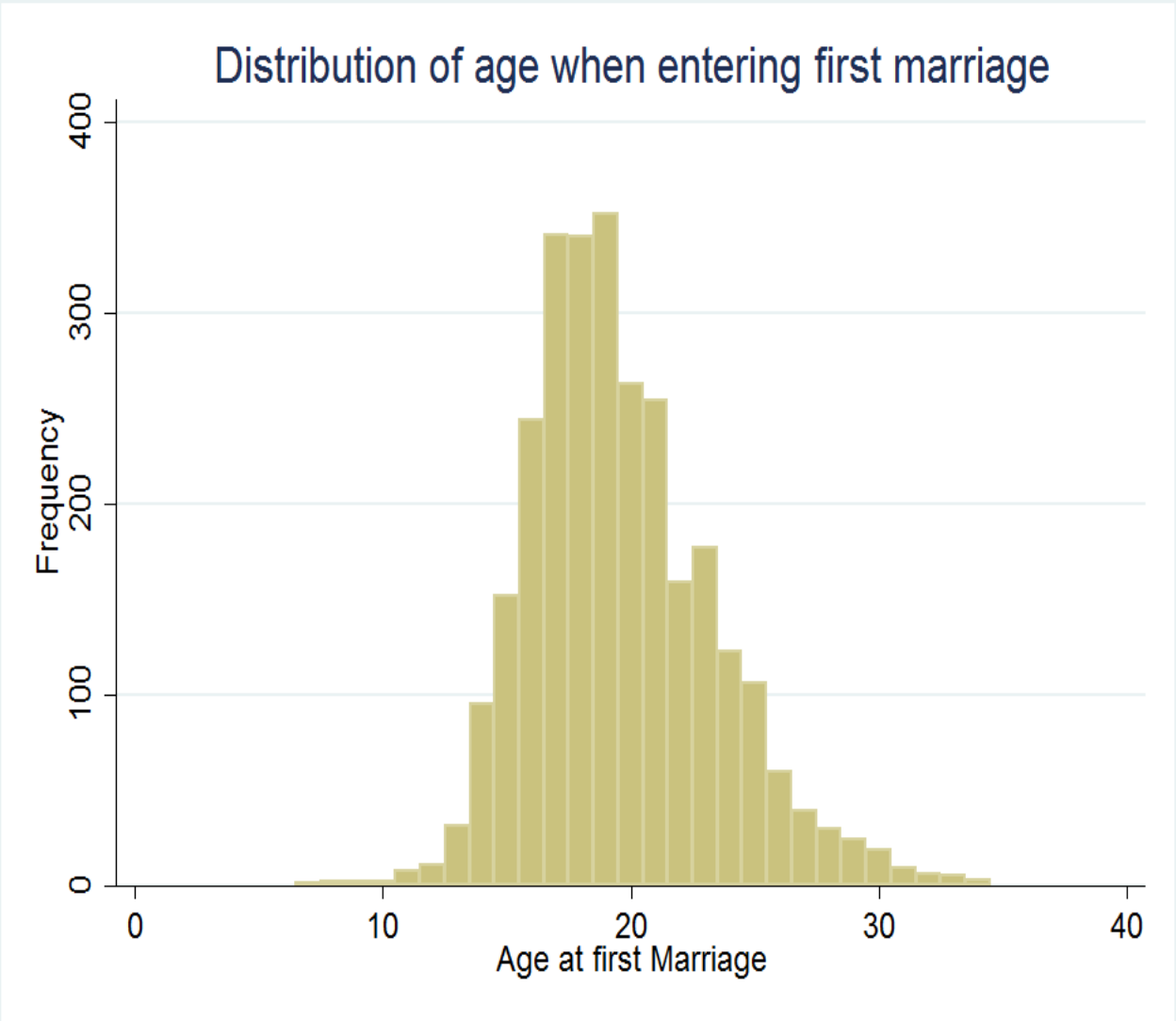
Figure 3: Percentage of women married by age in Zimbabwe



Source: DHS Zimbabwe 2010-2011

Figure 3 shows the percentage of women who are married by age in Zimbabwe. This figure is created using women from the sample who are between the age 15 and 49. Figure 3 suggests that 5% of 15 year olds are married. By the time these women reach 26 years over 88% of them are married. Figure 3 does not reach 100% of women married because not every woman wants to get or will get married. The probability of getting married declines with age and can be seen in the decline after the age 36 were 85% of women are married but only 68% of 49 year olds are married. Thus it is expected the older adolescents are, the more likely they are to get married up until an age they do not desire marriage as shown in figure 3

Figure 4: Distribution of age when a woman entered her first marriage

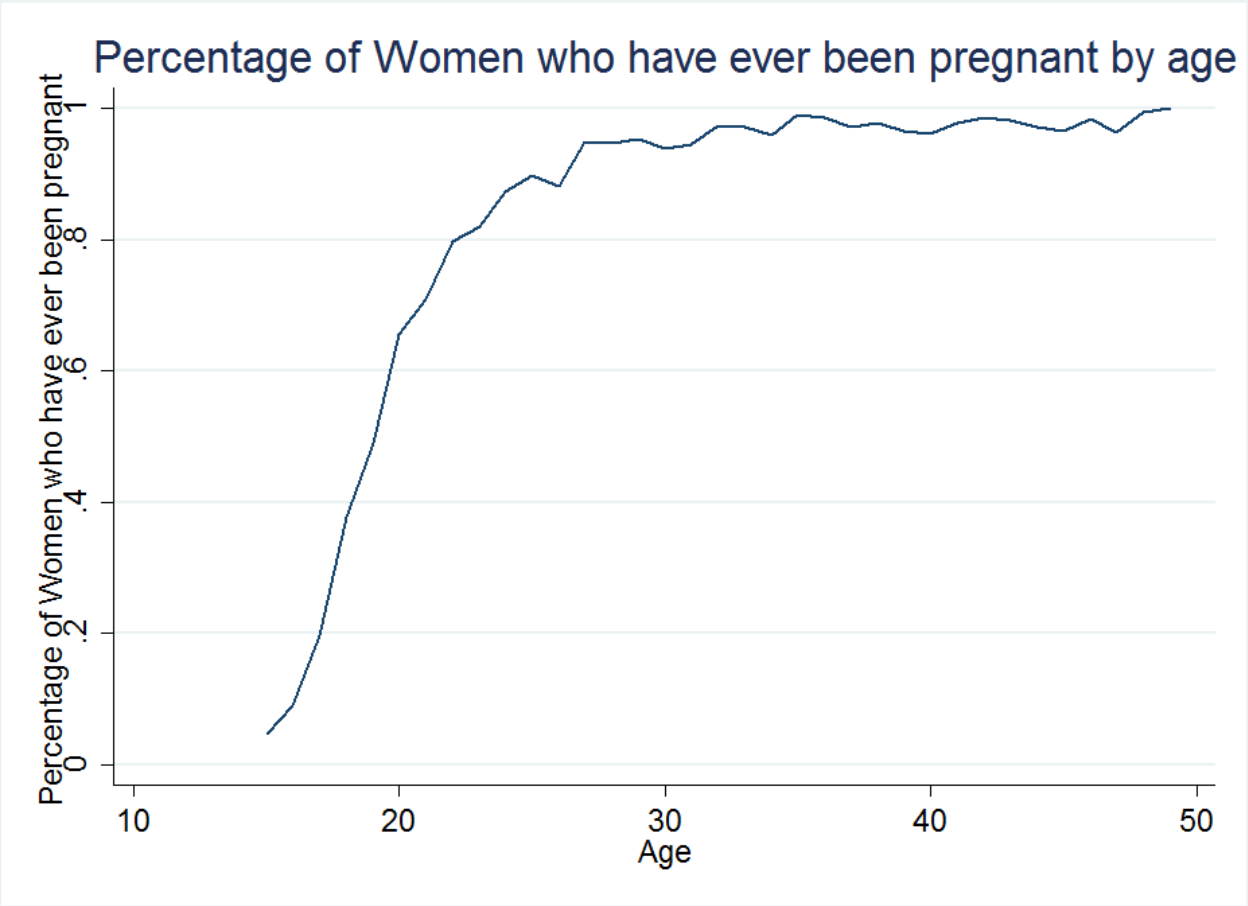


Source: DHS Zimbabwe 2010-2011

***Note**: Samples are weighted using weights that were provided by DHS*

Figure 4 shows for women aged 25 to 35 years, the distribution of the age when a woman entered her first marriage in Zimbabwe. From figure 4 it is observed that Zimbabwean women between the age 25 and 35 tend to get married when they are between the ages of 17 and 21. The median age of first marriage is 19 years and while the average of age at which Zimbabwean women get married is 19.64 years. Thus it can be inferred that any marriage before the age of 18 can be considered early, as the majority of Zimbabwean women are unmarried before the age of 18. It must be noted however that there were 2 women who got married at the age of 5. These observations should be considered outliers as this is an implausibly young age to get married and further analysis would be needed to determine why they got married at young age.

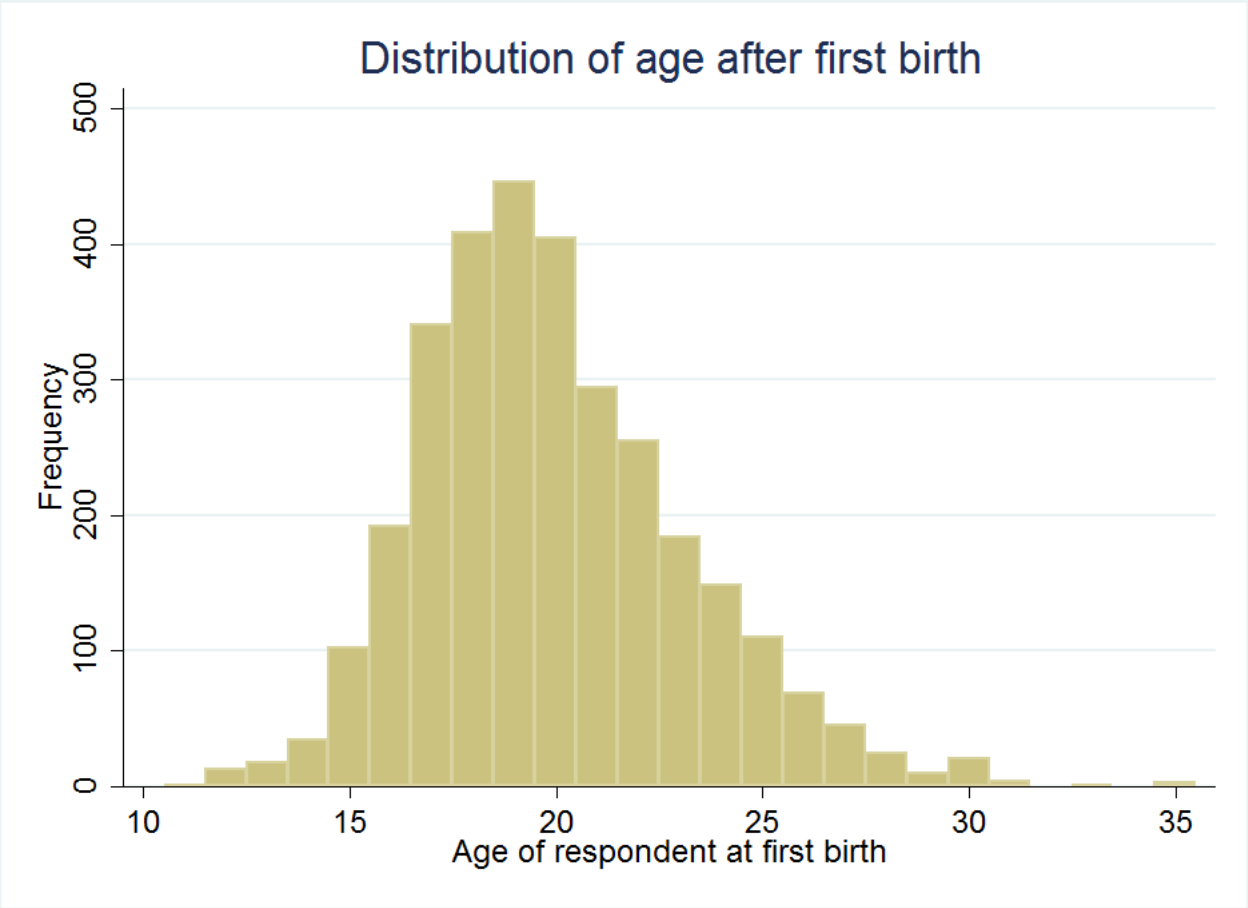
Figure 5: Percentage of women who have experienced pregnancy by age



Source: DHS Zimbabwe 2010-2011

Figure 5 shows the percentage of Zimbabwean women who have experienced pregnancy by age. Pregnancy includes, women who are currently pregnant, or women who have given birth or women who have experienced stillbirths, miscarriage and abortions. The sample used to draw figure 5 included Zimbabwean women between the ages of 15-49 who answered the relevant questions. We observe a steep increase in the percentage of women who have experienced pregnancy after the age of 16 till age of 25. After the age of 25 the growth seen in figure 5 slows down until the curve is nearly flat and reaches 100% of women at the age of 48. As women get older, it is expected that higher percentage of women will have experienced child birth, pregnancy, stillbirths, miscarriage and abortions as they become more sexually active.

Figure 6: Distribution of the age of first birth



Source: DHS Zimbabwe 2010-2011

***Note**: This figure is weighted using weights that are provided by DHS*

Figure 6 shows, for women aged 25 to 35 years, the distribution of the age that 25 to 35-year-old women experienced their first birth. Most women experience their first child birth around the ages of 18,19 and 20 years. The median age of Zimbabwean women's first birth is 20 years and this is also the average age that women experience their first birth. More women experience their first birth at 19, than at any other age. Thus it can be inferred that most women fall pregnant at the of 18 and 19 to give an average age of first birth as 20. Furthermore, this figure suggests that almost all women would have experienced their first birth by the age of 30 with a couple of other women experience their first birth at the age of 35. These women could be considered outliers as they are 15 years away from the average. Although this figure fails to take into account miscarriages, stillbirths and abortions, it can be deduced that any pregnancy or child birth before the age of 18 can be considered early for the Zimbabwean population.

The findings shown in figure 2,4 and 6 help establish the age that can be considered early in this analysis for sexual debut, marriage and pregnancy for Zimbabwean girls. The next section turns to investigate the relationship between orphan status and these early transitions.

V. Orphan status and early transitions

TABLE 1 Percentage of girls aged 15-17 and their sexual and reproductive outcomes according to orphan status

Dependent Variable

Orphan Status	Ever had Sex	Ever married	Ever Pregnant	N
Non Orphan	15.26%	10.48%	8.75%	644
Paternal Orphan	22.75%	18.14%	14.34%	250
Maternal Orphan	25.82%	17.05%	17.69%	71
Double Orphan	25.45%	14.61%	14.83%	228
Total	19.39%	13.30%	11.61%	1,193

Source: DHS Zimbabwe 2010-2011

Note: *Samples are weighted using sample weights that were provided by DHS framework. Clustering and stratification were controlled for in the creation of this table*

Table 1 shows the percentage of girls aged 15 to 17 who have experienced their sexual debut or have been married or have ever been pregnant. The sample is weighted to representation the Zimbabwean population who between the ages of 15 and 17. Columns two to four represent the dependent variables used in this analysis and the column represented by N shows the numbers of non-orphans, paternal, maternal and double orphans in the sample. Table 1 shows that there are significantly less maternal orphans, compared to either double or paternal orphans. Furthermore, more than half the sample in this age group is consists of non-orphans. Looking at the dependent variables a quarter of all double and maternal orphans between 15 and 17 years have already experienced their sexual debut. A lower proportion of paternal orphans and non-orphans are sexually active when compared to maternal and double orphans. In total 19.39% of this population has experienced their sexual debut. Paternal orphans have the highest proportion of girls married, followed by the maternal orphans. Table 1 shows that maternal orphans have the largest percentage of girls who have been pregnant. Non-orphans have the lowest percentage of girls who are sexually active, married and pregnant. The low number of maternal orphans in our sample means that our estimates of the association between maternal orphans and early transitions will be less precise than that for paternal and double orphans

Table 2: OLS linear probability regression for sexual debut of Zimbabwean adolescent girls aged 15- 17 by selected characteristics.

Characteristic	**Ever had sex**					
Orphan Status						
Orphanhood of any type	0.090***	0.080***	0.055**	0.058**	0.058**	0.057**
	(0.025)	(0.024)	(0.023)	(0.023)	(0.023)	(0.023)
Age in Years						
16		0.057**	0.070***	0.069***	0.068***	0.068***
		(0.026)	(0.023)	(0.023)	(0.023)	(0.023)
17		0.222***	0.230***	0.238***	0.229***	0.231***
		(0.031)	(0.029)	(0.029)	(0.029)	(0.028)
Education						
No Education			-0.102	-0.090	-0.257	-0.270
			(0.389)	(0.366)	(0.394)	(0.392)
Incomplete Primary			0.146	0.126	0.082	0.058
			(0.356)	(0.329)	(0.363)	(0.361)
Completed Primary			-0.014	-0.037	-0.080	-0.097
			(0.352)	(0.325)	(0.359)	(0.357)
Incomplete Secondary			-0.209	-0.217	-0.250	-0.263
			(0.351)	(0.323)	(0.358)	(0.356)
Urban- Rural Residence						
Urban				-0.080***	-0.058**	-0.023
				(0.026)	(0.026)	(0.041)
Religion						
Catholic					-0.316***	-0.308***
					(0.072)	(0.073)
Protestant					-0.276***	-0.271***
					(0.071)	(0.072)

Pentecostal					-0.348***	-0.344***
					(0.067)	(0.068)
Apostolic					-0.247***	-0.247***
					(0.071)	(0.072)
Other					-0.272***	-0.269***
					(0.076)	(0.076)
Wealth Quintiles						
Second						-0.000
						(0.041)
Third						-0.000
						(0.041)
Fourth						-0.024
						(0.048)
Fifth						-0.063
						(0.050)
Constant	0.153***	0.068***	0.220	0.256	0.560	0.580
	(0.016)	(0.018)	(0.351)	(0.323)	(0.365)	(0.363)
Observations	1,193	1,193	1,193	1,193	1,193	1,193
R-squared	0.013	0.067	0.153	0.162	0.193	0.195

Source: DHS Zimbabwe 2010-2011

Note: *The regression is weighted using sample weights that are provided by DHS framework. Clustering and stratification are also controlled for in this regression.*

Standard errors in parentheses.

*** Significant at p<0.01, ** p<0.05, * p<0.1

Using the results from figure 2, we observe that the norm for the Zimbabwean women is to experience their sexual debut around the age of 18. Thus any sexual activity from the 15 to 17-year age cohort can be can be considered early. Table 2 presents the results of six regressions that explore the relationship between any type of orphanhood and ever having sex. The results show that on average the indicator of any type of orphanhood is statistically significant with early sexual debut, all else equal. Column one shows that on average without controlling for any other characteristics, orphanhood increases the risk of sexual debut by 9 percentage points compared to non-orphans. As expected column two shows that coefficient on age either 16 or 17 positive and significant. This means that 16-year-old girls on average are 5.7 percentage points more likely than 15 year olds to have experienced their sexual debut and 17-year-old girls on average 22.2 percentage points more likely to have experienced their sexual debut, all else equal. Education was surprising in that it was highly insignificant and had large standard errors in determining early sexual debut. The results from table 2 column four suggest that when wealth is not controlled for, geographical location of the adolescent girl is highly significant in predicting sexual debut. On average staying in the urban areas decreases the probability of an adolescent girl ever having sex by 8 percentage points. Also as expected the coefficient on religion is negative and significant when compared to those girls that are part of no religion. Most religions preach abstinence therefore if the teenage girl is religious, it is likely she will follow the preaching. But when wealth is included in the regression as shown in column six the geographical location becomes insignificant and wealth is also insignificant because they have the same effect on the ever having sex. After controlling for these individual and household characteristics, orphanhood increases the likelihood of early sexual debut by 5.7 percentage points.

Table 3 shows the results from the six regressions run on ever married, orphan status and the other control variables. On average orphanhood makes adolescent girls more likely than non-orphans to ever be married as seen in column one. Table 3 suggests orphanhood increases the probability of ever being married for a Zimbabwean girl by 6.1 percentage points compared to a non-orphan. Column two and three show that coefficients on age and education are positive and highly significant. As one expects, the older a girl is, the higher the probability of her getting married. The coefficient on no education changes sign when we control for religion in the regression and becomes negative and losses its significance in column five. This can be explained by the fact that a very small percentage of the Zimbabwean population in this age cohort has no education (as seen

in the descriptive statistics shown in table 8 in the appendix), therefore no education is imprecisely measured and thus losses its significance in the presences of other control variables. The coefficient on religion as seen in Table 3 in column five is large, negative and significant. For example, as seen with the last regression in table 3 being a Roman catholic on average reduces the probability of a girl adolescent ever married by 25 percentage points compared to someone who doesn't follow any religion, all else equal. Geographical location is significant in predicting whether a Zimbabwean adolescent girl is married until wealth is controlled for in column six. It is surprising to see the coefficient of wealth as insignificant as the literature suggested wealth would be a significant factor for marriage for the adolescents. The coefficient on an urban adolescent girl ever being married compared to a rural adolescent decreases from 7 percentage points to 1 percentage point once wealth is controlled for in column six. This implies that the association of the geographical location of a household and ever being married can also be explained by the association between wealth and ever being married. After controlling for wealth, location of the household, age, education and religion, orphanhood is statistically significant with ever being married albeit at the 10% level.

Table 4 shows the six regression results that explore the relationship between teen pregnancy and orphanhood. As predicted the coefficient on the indicator of any type of orphanhood is significant and positive in all six regressions, showing that orphan status is highly significant in increasing the probability of teen pregnancy for the 15 to 17 age cohort. In addition, column two shows that an increase in age is highly associated teen pregnancy. The estimated coefficients for education shown in column three are large and significant when compared to the base category of completed secondary education. The probability of association between orphanhood and teen pregnancy decreases from 6.1 percentage points to 3.2 percentage points once education is included in the regression in column three. Table 4 shows that religion is negatively related to teen pregnancy, for example religion is associated with a lower probability of a Zimbabwean adolescent girl falling pregnant. Column 6 reveals that adolescent girls who are in 5^{th} or the richest quintile predicted to be less likely to fall pregnant compared to those adolescents in the 1^{st} or poorest quintile. After taking into account individual and household characteristics, orphanhood on average increases the probability of teen pregnancy by 3.7 percentage points compared to non-orphans, as seen in column six. This study now investigates whether the risk of early transitions differs by type of orphan.

Table 3: OLS linear probability regression for early marriage of Zimbabwean adolescent girls aged 15- 17 by selected characteristics.

Characteristic	**Ever married**					
Orphan Status						
Orphanhood of any type	0.061***	0.054**	0.032	0.034*	0.037*	0.035*
	(0.022)	(0.021)	(0.020)	(0.020)	(0.020)	(0.020)
Age in Years						
16		0.054**	0.065***	0.065***	0.063***	0.061***
		(0.026)	(0.023)	(0.024)	(0.023)	(0.022)
17		0.150***	0.158***	0.166***	0.155***	0.155***
		(0.029)	(0.027)	(0.027)	(0.026)	(0.026)
Education						
No Education			0.100***	0.111**	-0.040	-0.046
			(0.037)	(0.048)	(0.112)	(0.115)
Incomplete Primary			0.464***	0.445***	0.386***	0.365***
			(0.070)	(0.078)	(0.071)	(0.071)
Completed Primary			0.332***	0.311***	0.254***	0.237***
			(0.047)	(0.052)	(0.047)	(0.050)
Incomplete Secondary			0.150***	0.142***	0.098***	0.081***
			(0.024)	(0.035)	(0.028)	(0.029)
Urban- Rural Residence						
Urban				-0.076***	-0.055**	-0.016
				(0.025)	(0.026)	(0.042)
Religion						
Catholic					-0.260***	-0.257***
					(0.074)	(0.076)
Protestant					-0.222***	-0.221***
					(0.073)	(0.075)

Pentecostal					-0.262***	-0.262***
					(0.070)	(0.072)
Apostolic					-0.168**	-0.174**
					(0.076)	(0.077)
Other					-0.241***	-0.240***
					(0.076)	(0.077)
Wealth Quintiles						
Second						0.045
						(0.039)
Third						0.051
						(0.039)
Fourth						-0.005
						(0.047)
Fifth						-0.032
						(0.048)
Constant	0.105***	0.042**	-0.158***	-0.124***	0.126	0.123
	(0.015)	(0.017)	(0.027)	(0.039)	(0.079)	(0.081)
Observations	1,193	1,193	1,193	1,193	1,193	1,193
R-squared	0.008	0.040	0.135	0.146	0.175	0.181

Source: DHS Zimbabwe 2010-2011

Note: *The regression is weighted using sample weights that are provided by DHS framework. Clustering and stratification are also controlled for in this regression.*

Standard errors in parentheses.

*** Significant at p<0.01, ** p<0.05, * p<0.1

Table 4: OLS regression for teen pregnancy of adolescent girls aged 15- 17 by selected characteristics.

Characteristic	**Ever been pregnant**					
Orphan Status						
Orphanhood of any type	0.062***	0.055***	0.036**	0.038**	0.038**	0.037**
	(0.019)	(0.018)	(0.019)	(0.018)	(0.019)	(0.019)
Age in Years						
16		0.057**	0.066***	0.066***	0.065***	0.065***
		(0.024)	(0.021)	(0.021)	(0.021)	(0.020)
17		0.158***	0.166***	0.171***	0.165***	0.167***
		(0.027)	(0.027)	(0.027)	(0.027)	(0.027)
Education						
No Education			0.312*	0.320*	0.198	0.179
			(0.181)	(0.186)	(0.172)	(0.175)
Incomplete Primary			0.401***	0.388***	0.351***	0.321***
			(0.068)	(0.073)	(0.066)	(0.070)
Completed Primary			0.287***	0.272***	0.237***	0.218***
			(0.045)	(0.047)	(0.044)	(0.050)
Incomplete Secondary			0.146***	0.141***	0.113***	0.098***
			(0.024)	(0.029)	(0.025)	(0.029)
Urban- Rural Residence						
Urban				-0.053**	-0.041	-0.005
				(0.024)	(0.025)	(0.040)
Religion						
Catholic					-0.201***	-0.190***
					(0.069)	(0.070)
Protestant					-0.192***	-0.185**

					(0.072)	(0.072)
Pentecostal					-0.225***	-0.218***
					(0.065)	(0.065)
Apostolic					-0.167**	-0.164**
					(0.069)	(0.069)
Other					-0.201***	-0.198***
					(0.069)	(0.070)
Wealth Quintiles						
Second						-0.029
						(0.033)
Third						-0.012
						(0.036)
Fourth						-0.046
						(0.044)
Fifth						-0.075*
						(0.044)
Constant	0.088***	0.021	-0.166***	-0.142***	0.070	0.105
	(0.014)	(0.014)	(0.027)	(0.033)	(0.070)	(0.075)
Observations	1,193	1,193	1,193	1,193	1,193	1,193
R-squared	0.009	0.049	0.118	0.124	0.143	0.147

Source: DHS Zimbabwe 2010-2011

Note: *The regression is weighted using sample weights that are provided by DHS framework. Clustering and stratification are also controlled for in this regression. Standard errors in parentheses.*

*** Significant at p<0.01, ** p<0.05, * p<0.1

Table 5 shows the results of the six regressions run on the probability of having had sex and the different orphan types for Zimbabwean girls aged between 15-17. From table 5, it is observed that at the 5% level being a paternal orphan is significantly associated with ever having sex in four out of the six regressions run. In the other two regressions seen in column three and four, education and geographical location of the household reduce the significance of the relationship between paternal orphans and ever having sex. But when wealth and religion are taken into account the insignificant effect of education and geographical location on ever having sex for this age cohort, no longer affects the association of paternal orphans and sexual activity. Looking column six of table 5, it is observed that on average paternal orphans are 5.7 percentage points more likely to have had sex compared to non-orphans after taking into household and individual characteristics. Although maternal orphans and double orphans have an insignificant association with ever having sex, point estimates are similar to that for paternal orphans. Column six of table 5 reveals that on average maternal orphans have a 6.7 percentage point increased probability of having had sex compared to non-orphans whereas double orphans have a 5.4 percentage point increased probability of having had sex.

Table 6 presents the results of the 6 regressions run on the probability of being married with respect to the different orphan types for girls aged 15 to 17. The relationship with paternal orphanhood and being married before the age of 18 is significant for girls. All six regressions in Table 6 show that on average paternal orphans have a significantly higher the probability of being married compared to non-orphans. Unexpectedly the coefficient on double orphans becomes negative and decreases to 0.1 percentage points after education and age are included in the regression model. This suggests that the association between double orphan status and early marriage can be explained by their joint association with education. Amongst the different orphan types, paternal orphans in Table 6 are shown to have the largest estimated effect on the probability of a girl below the age of 18 being married in six regressions. After controlling for age, education, geographical location of the household, religion and wealth, on average paternal orphanhood increases the probability of early marriage by 5.7 percentage points compared to non-orphans.

Table 7 presents results from the six regressions that explore the relationship between teen pregnancy and type of orphanhood. Paternal orphanhood is seen to be associated with teen pregnancy at the 10% level of significance in five out the six regressions run. When the regression

model for teen pregnancy is run on just the type of orphanhood, age and education shown in column three of table 7, paternal orphans lose their significance in predicting teen pregnancy. The relationship between teen pregnancy and education is strong enough to also explain the variation in teen pregnancy that is previously explained by paternal and maternal orphanhood. Table 7 also reveals that on average maternal orphans are predicted to have a larger probability of falling pregnant than any other orphan type but this is seen to be statistically insignificant. The association between education teen pregnancy seen in column three could be due to girls with lower education being at higher risk for teen pregnancy, or because the teen pregnancy results in child birth, and thus the girls have to take time off school to raise their children. After controlling for individual and household characteristics in column six, it is observed that on average paternal orphanhood increases the probability of teen pregnancy by 4.1 percentage points compared to non-orphans

Table 5, 6 and 7 show that the association between maternal orphans and all 3 dependent variables is statistically insignificant once household and individual characteristics are controlled for. The low number of Zimbabwean female maternal orphans leads to the effect of maternal orphans to be imprecisely measured and thus losses its significance in the presences of other control variables. To account for the low number of maternal orphans, all the regressions are rerun using an indicator that the mother is deceased (i.e. combining maternal and double orphans) and an indicator that the father is deceased, to check if the death of mother has any effect on sexual debut, marriage and teen pregnancy for adolescent girls. The results (not shown) from these regressions show that the mother's death has an insignificant effect on average on ever having sex, marriage and teen pregnancy for adolescent girls.

Table 5: OLS linear probability regression for sexual debut of Zimbabwean adolescent girls aged 15- 17 by orphan type and selected characteristics.

Characteristic	**Ever had sex**					
Orphan Status						
Maternal Orphan	0.106*	0.103*	0.077	0.082	0.069	0.067
	(0.058)	(0.055)	(0.050)	(0.050)	(0.050)	(0.050)
Paternal Orphan	0.075**	0.070**	0.053*	0.055*	0.059**	0.057**
	(0.034)	(0.033)	(0.029)	(0.029)	(0.029)	(0.029)
Double Orphans	0.102***	0.083**	0.051	0.052	0.053	0.054
	(0.037)	(0.035)	(0.034)	(0.034)	(0.033)	(0.033)
Age in Years						
16		0.057**	0.069***	0.069***	0.068***	0.068***
		(0.026)	(0.023)	(0.023)	(0.023)	(0.023)
17		0.222***	0.231***	0.239***	0.229***	0.231***
		(0.031)	(0.029)	(0.029)	(0.028)	(0.028)
Education						
No Education			-0.098	-0.086	-0.252	-0.267
			(0.389)	(0.367)	(0.395)	(0.393)
Incomplete Primary			0.146	0.126	0.082	0.058
			(0.356)	(0.329)	(0.363)	(0.361)
Completed Primary			-0.013	-0.036	-0.079	-0.096
			(0.352)	(0.325)	(0.359)	(0.357)
Incomplete Secondary			-0.209	-0.217	-0.249	-0.263
			(0.351)	(0.323)	(0.358)	(0.356)
Urban- Rural Residence						
Urban				-0.080***	-0.059**	-0.023
				(0.026)	(0.026)	(0.041)
Religion						
Catholic					-0.316***	-0.308***

					(0.072)	(0.073)
Protestant					-0.276***	-0.271***
					(0.071)	(0.072)
Pentecostal					-0.348***	-0.343***
					(0.068)	(0.069)
Apostolic					-0.246***	-0.246***
					(0.071)	(0.072)
Other					-0.271***	-0.268***
					(0.076)	(0.076)
Wealth Quintiles						
Second						-0.000
						(0.041)
Third						-0.000
						(0.041)
Fourth						-0.024
						(0.048)
Fifth						-0.062
						(0.050)
Constant	0.153***	0.068***	0.220	0.256	0.559	0.579
	(0.016)	(0.018)	(0.351)	(0.323)	(0.365)	(0.363)
Observations	1,193	1,193	1,193	1,193	1,193	1,193
R-squared	0.013	0.067	0.154	0.163	0.193	0.195

Source: DHS Zimbabwe 2010-2011

Note: *The regression is weighted using sample weights that are provided by DHS framework. Clustering and stratification are also controlled for in this regression.*

Standard errors in parentheses.

*** Significant at p<0.01, ** p<0.05, * p<0.1

Table 6: OLS linear probability regression on marriage of Zimbabwean adolescent girls aged 15- 17 by orphan type and selected characteristics.

Characteristic	**Ever married**					
Orphan Status						
Maternal Orphan	0.066	0.063	0.039	0.043	0.040	0.037
	(0.052)	(0.051)	(0.049)	(0.049)	(0.048)	(0.048)
Paternal Orphan	0.077**	0.072**	0.057**	0.059**	0.062**	0.059**
	(0.031)	(0.030)	(0.027)	(0.027)	(0.026)	(0.026)
Double Orphans	0.041	0.029	-0.001	0.000	0.004	0.004
	(0.032)	(0.030)	(0.030)	(0.030)	(0.029)	(0.029)
Age in Years						
16		0.053**	0.063***	0.063***	0.061***	0.059***
		(0.025)	(0.023)	(0.023)	(0.023)	(0.022)
17		0.152***	0.160***	0.168***	0.157***	0.157***
		(0.029)	(0.027)	(0.027)	(0.026)	(0.026)
Education						
No Education			0.127***	0.139**	-0.011	-0.019
			(0.047)	(0.055)	(0.118)	(0.120)
Incomplete Primary			0.465***	0.446***	0.389***	0.369***
			(0.069)	(0.078)	(0.070)	(0.071)
Completed Primary			0.338***	0.317***	0.261***	0.244***
			(0.048)	(0.053)	(0.047)	(0.051)
Incomplete Secondary			0.151***	0.143***	0.101***	0.085***
			(0.023)	(0.035)	(0.027)	(0.028)
Urban- Rural Residence						
Urban				-0.077***	-0.055**	-0.018
				(0.025)	(0.025)	(0.041)
Religion						

Catholic					-0.261***	-0.258***
					(0.073)	(0.075)
Protestant					-0.224***	-0.224***
					(0.072)	(0.074)
Pentecostal					-0.264***	-0.263***
					(0.070)	(0.072)
Apostolic					-0.170**	-0.175**
					(0.075)	(0.076)
Other					-0.238***	-0.237***
					(0.076)	(0.077)
Wealth Quintiles						
Second						0.044
						(0.039)
Third						0.051
						(0.039)
Fourth						-0.004
						(0.046)
Fifth						-0.029
						(0.048)
Constant	0.105***	0.042**	-0.160***	-0.126***	0.123	0.120
	(0.015)	(0.017)	(0.027)	(0.039)	(0.079)	(0.081)
Observations	1,193	1,193	1,193	1,193	1,193	1,193
R-squared	0.009	0.042	0.138	0.149	0.178	0.183

Source: DHS Zimbabwe 2010-2011

Note: *The regression is weighted using sample weights that are provided by DHS framework. Clustering and stratification are also controlled for in this regression.*

Standard errors in parentheses.

*** Significant at p<0.01, ** p<0.05, * p<0.1

Table 7: OLS linear probability regression on pregnancy of Zimbabwean adolescent girls aged 15- 17 by orphan type and selected characteristics.

Characteristic	**Ever been pregnant**					
Orphan Status						
Maternal Orphan	0.089*	0.087*	0.067	0.070	0.063	0.060
	(0.051)	(0.049)	(0.045)	(0.045)	(0.044)	(0.044)
Paternal Orphan	0.056**	0.052**	0.039	0.040*	0.042*	0.041*
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
Double Orphans	0.061*	0.048	0.023	0.024	0.025	0.026
	(0.032)	(0.030)	(0.031)	(0.031)	(0.030)	(0.030)
Age in Years						
16		0.056**	0.066***	0.065***	0.065***	0.065***
		(0.023)	(0.020)	(0.021)	(0.020)	(0.020)
17		0.159***	0.166***	0.172***	0.165***	0.167***
		(0.027)	(0.027)	(0.027)	(0.027)	(0.027)
Education						
No Education			0.323*	0.331*	0.210	0.190
			(0.181)	(0.185)	(0.173)	(0.176)
Incomplete Primary			0.401***	0.388***	0.352***	0.323***
			(0.068)	(0.073)	(0.067)	(0.070)
Completed Primary			0.289***	0.274***	0.240***	0.220***
			(0.046)	(0.047)	(0.045)	(0.051)
Incomplete Secondary			0.146***	0.141***	0.114***	0.099***
			(0.024)	(0.030)	(0.025)	(0.029)
Urban- Rural Residence						
Urban				-0.054**	-0.041	-0.005
				(0.024)	(0.025)	(0.040)
Religion						

Catholic					-0.200***	-0.190***
					(0.069)	(0.070)
Protestant					-0.193***	-0.185**
					(0.072)	(0.072)
Pentecostal					-0.223***	-0.216***
					(0.065)	(0.065)
Apostolic					-0.165**	-0.162**
					(0.069)	(0.069)
Other					-0.199***	-0.196***
					(0.070)	(0.070)
Wealth Quintiles						
Second						-0.029
						(0.033)
Third						-0.012
						(0.036)
Fourth						-0.045
						(0.044)
Fifth						-0.074*
						(0.044)
Constant	0.088***	0.021	-0.166***	-0.142***	0.067	0.102
	(0.014)	(0.014)	(0.027)	(0.033)	(0.071)	(0.075)
Observations	1,193	1,193	1,193	1,193	1,193	1,193
R-squared	0.010	0.050	0.119	0.125	0.144	0.147

Source: DHS Zimbabwe 2010-2011

Note: *The regression is weighted using sample weights that are provided by DHS framework. Clustering and stratification are also controlled for in this regression.*

Standard errors in parentheses.

*** Significant at p<0.01, ** p<0.05, * p<0.10

VI. Discussion and Limitations of the model

The norm in Zimbabwe as shown in the figures 2,4 and 6 allude to the fact that sexual debut before the age 18 is early, marriage before the age of 19 is early and pregnancy before the age of 20 is early. The findings from this analysis suggest that orphanhood is associated with increased risk of early sexual debut and early pregnancy for female adolescents. The evidence to support the hypothesis that orphanhood is associated with increased risk of an early marriage for Zimbabwean adolescent females is not as strong as the evidence for the other two outcomes.

Palermo and Peterman (2009) suggest that orphans may struggle to find a relative or representative to represent the orphans in a traditional marriage and this could be a factor that reduces the significance of the association between orphanhood and early marriage. Walker (2012) believes that bride price is enough incentive for families to marry off their daughters especially double orphans. The findings of this analysis suggest otherwise, as both wealth and double orphans are insignificant determinants of early marriage. This could suggest that political and economic crisis in Zimbabwe may diminish the effect of wealth on early marriage as less people are able to afford the high bride prices. Other studies also found wealth to be insignificant in 2011 for Zimbabwe in their analyses. In 2013 Shamu and her colleagues found wealth to be insignificant and hypothesized that it was due to the current political and economic situation in Zimbabwe in their analysis of violence during pregnancy for women between 15 and 48 years in Zimbabwe (Shamu, et al., 2013). Furthermore, in 2008 Birdthistle found that Zimbabwean maternal orphans were more at risk of early marriage as compared to non-orphans (Birdthistle, et al., 2008). This analysis found contrary results, with maternal orphans and non-orphans facing the same risk of early marriage. The difference between the two studies is that, Birdthistle looked at females aged between 15 and 19, whereas this analysis only concentrated on the 15 to 17 years' age group. The increase in the age sample could have had an effect on the risk of association of maternal orphans and early marriage.

The findings of this analysis are in line with the study conducted in Kenya that suggested that high school orphans faced an increased risk of an early sexual debut due to their older partners (Mojola, 2011). In this particular analysis it is observed that orphanhood increases the risk of an early sexual debut a similar age group as the Kenyan study, although the age of the partner is not taken into consideration. In connection to the significance of the association between orphanhood and early

sexual debut, Nyamukapa *et al* (2008) believe the reason for this association is caused by the greater psychosocial distress adolescent suffer from compared to non-orphans (Nyamukapa, et al., 2008). Paternal orphans are seen to have a significant association with an increased risk for early sexual debut. This can be explained by the fact some men in the community may view orphans as lacking protection therefore become "easy targets" to coerce into sexual activities. This view is particularly strong when the father is absent or dead (Thurman, et al., 2006). Orphaned adolescents are more susceptible to an early sexual debut through a various number of mechanisms (Mmbaga, et al., 2012). For example, most single orphans end up staying with relatives instead of staying with their surviving parent. It is reported that children that stay and are raised by relatives experience an early sexual debut due to lack of supervision or affection that often leads to sexual experimentation (Nyamukapa, et al., 2008).

Orphanhood is found to be significantly associated with an increased risk for early pregnancy for Zimbabwean adolescents. Although orphanhood is seen to increase the risk for an adolescent engaging in early sexual activity, it does not mean that orphans engage in regular sexual acts. Thus as seen in the findings of this analysis the risk of ever being pregnant as an adolescent increase marginally by orphanhood. Primarily the increased risk that orphans face for teen pregnancy arises from the early onset of marriage and sexual activity (Gregson, et al., 2005). Childbearing is an expected outcome in a marriage, thus since orphanhood is linked to an early marriage as seen in the findings, orphans are marginally more likely to be pregnant.

There are many limitations to the model conducted in this analysis. The first major limitation to this model is the sample selection bias that occurred in the DHS survey. The survey did not include institutionalised orphans or street children or refugees who maybe at more risk to the 3 outcomes. Furthermore, this analysis only examines female adolescents between the age of 15 and 17 and this limits the overall sample size to a small number of adolescents, which resulted in a low number of maternal orphans. The cross sectional aspect of the data does not allow for this analysis to take the timing of parental death into account when running the regression model. Parental death could happen before or after sexual debut, marriage or pregnancy. If the parental death occurred after sexual debut had occurred then orphanhood would not have been a factor but in the model used in this analysis, these individuals would have been coded as an orphan and would have added to the effect of orphanhood. Thus there is no way to distinguish those adolescents apart in the regression

model. Even if the parental death precedes the early transition, we could be observing a spurious correlation rather than a casual effect. We attempted to control for wealth but there could be other factors that are related to both the risk of orphanhood and early transitions.

Another limitation of this model it is subject to measurement error. In the overall sample of women who answered the DHS questionnaires, irregularities were observed in their responses. For example, 461 women reported a different marital status in the household compared to the one they reported in the individual questionnaire. Furthermore, 562 women reported an age of first sex that was greater than the age of first birth. Two individuals who were included in the regression models conducted in this analysis reported an age of sexual debut that was greater than their age. These measurement errors could have an effect on the results.

The model used in this analysis is also subject to omitted variable bias. This model fails to take into account whether the decision to engage sexual activities was by choice or whether it was forced. Distinguishing whether the sexual debut is wanted or is forced will help determine whether orphans are more at risk for forced sexual debut or whether orphanhood leads to sexual exploration. Furthermore, sexual debut, early marriage and teen pregnancy are linked and therefore help explain or predict one another. If a female adolescent is already married by the age of 15 or 16, she already faces an increased risk for an early sexual debut and teen pregnancy. Thus marital status should also be controlled for to see, if orphanhood is still significant for an early sexual debut and teen pregnancy.

VII. Conclusion and Policy Implications

There is a growing concern that a number of orphans transitioning into adulthood are subject to adverse human capital outcomes. There is evidence from this analysis to suggest that Zimbabwean female orphans are at higher risk for early sexual debut and teen pregnancy and to an extent early marriage. The OLS linear probability model that is used in this analysis shows that orphanhood is associated with a higher probability of experiencing an early sexual debut, an early marriage and teen pregnancy contrary to the Palermo and Peterman study. A challenge for both researchers and policy makers is determining whether orphanhood has a causal impact on female adolescent transitions. This research has shown that paternal orphans in particular are at higher risk for early sexual debut, an early marriage and teen pregnancy ever after controlling for individual and household characteristics.

Education is seen to have a significant association with decreasing the risk that orphans face to experience any of the hypothesized outcomes and thus education can be used as a policy mechanism. Encouraging female adolescents to stay in school by providing the promise of future employment or by providing financial incentives for completion of secondary education may delay the onset of early marriage and child bearing. Financial incentives such as providing food in schools, may reduce the cost on relatives of taking care of orphans and therefore keep orphans in school. Increased sexual education in class, school clubs and community centres across Zimbabwe could be effective in raising awareness and changing attitudes towards sex. In addition, policy makers could provide free psychological counselling to orphans in community centres in order to help orphans deal with the distress of losing their parents to reduce the need to deal with the distress through sexual exploration. This counselling could also take place in shelters or safe spaces, where non-orphans can come as well if they feel vulnerable to threats to perform sexual acts and this may reduce the incidence of forced sexual encounters.

Future studies can focus on institutionalised orphans, refugees and street kids and analyse whether these orphans face increased risk for early sexual debut, teen pregnancy and early marriage. Policy makers may need to have more policies targeted at this demographic to address the potential adverse outcomes. In addition, there exists a need for policy makers to research the drivers of the association between orphanhood and early sexual debut, teen pregnancy and early marriage. For example, are psychological factors the cause of early sexual debut or is the lack supervision the cause of early sexual debut. The results of this future research could help formulate the correct policies to address the association between orphanhood and these three outcomes. Other future studies can be based on panel data for non-orphans and orphans to determine whether orphanhood has a casual impact on sexual health outcomes and educational outcomes.

Appendix

Table 8: Percentage of adolescent girls aged 15-17, by selected variables, according to orphan status

Variable	Non Orphan	Paternal Orphan	Maternal Orphan	Double Orphan	Total
Age					
15	35.8	30.2	28.8	29.3	33.0
16	36.2	41.4	42.5	30.2	36.6
17	28.0	28.4	28.8	40.4	30.4
Education					
No Education	0.0	0.0	0.0	0.9	0.2
Incomplete Primary	7.6	10.8	12.3	11.1	9.3
Completed Primary	11.6	11.6	15.1	21.8	13.7
Incomplete Secondary	80.4	77.6	72.6	66.2	76.7
Completed Secondary	0.3	0.0	0.0	0.0	0.2
Urban Rural Residence					
Urban	33.5	36.6	39.7	34.7	34.8
Religion					
Catholic	8.0	8.6	11.0	8.4	8.4
Protestant	16.4	19.4	32.9	13.8	17.5
Apostolic	39.3	34.0	21.9	32.4	35.8
Pentecostal	20.8	25.4	12.3	24.0	21.9
Other	12.1	8.6	12.3	14.7	11.8
Wealth Quintiles					
First	16.8	15.7	16.4	18.2	16.8
Second	19.1	21.6	11.0	19.6	19.3
Third	19.3	19.0	26.0	19.1	19.6
Fourth	18.0	20.1	17.8	15.6	18.0
Fifth	26.8	23.5	28.8	27.6	26.3

Source: DHS Zimbabwe 2010-2011

Note: *Samples are weighted using sample weights that were provided by DHS framework*

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