The Impact of Early Childbearing on Child Health in Punjab

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Thesis submitted to the Lahore School of Economics in partial fulfillment of the requirements for the degree of M-Phil in Economics 2016

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Table of Contents

Abstract

Early Childbearing is a major social and public health concern. Empirical studies have focused on both the consequences and causes of early childbearing. Much of the empirical work has focused on the impact of early childbearing on children's developmental and academic outcomes. However, there is limited research pertaining to the effect of early childbearing on child health outcomes in Pakistan. Using the newly available data, Multiple Index Cluster Survey for Punjab 2014; the paper aims to test if early childbearing affects child health outcomes, both in the short and long term. In addition to this, studies have established that the decision of early childbearing is influenced by a wide array of factors which include individual and household level characteristics as well as social and cultural norms. The paper also deals with the issue of omitted variable bias concerning early childbearing.

As part of the estimation strategy, the paper employs ordinary least square, cluster fixed effects and household fixed effects. The empirical results shows that early childbearing exerts negative impact on child health outcomes. However; controlling for unobserved characteristics at household and cluster level shrinks the size of the coefficient of early childbearing compared to a simple ordinary least square estimate; indicating the influence of important household and cluster unobserved factors on early childbearing decision. The results of the paper also confirms that the analysis is robust to changing the specifications of early childbearing as well as the data set used in the analysis.

Introduction

Early Childbearing practices are common in the developing economies because of the prevalence of deep rooted social norms in the society. Such practices have important implications for population growth and fertility levels. Early Childbearing[1] refers to when women give birth in their adolescents as a consequence of early marriages. The higher fertility behavior and early family formation norm is driven by strong social values and norms in the society. In most developing countries, early childbearing continues to be a major social issue and public health concern as it poses risks to maternal and child health care.

Developing countries are characterized by higher fertility rates and increasing population levels. The data suggests that for the year 2015, Pakistan has one of the highest fertility rate of 3.6 % compared to India with 2.47 % and Sri Lanka with 2.0 %[2].The trends in the adolescent fertility rate shows that Pakistan, over the years have experienced a downward trend in the adolescent fertility rate from 1990 onwards. In addition to this, the regional comparisons suggests that; adolescent fertility rate is seen higher typically in South Asian countries like Bangladesh and Nepal while Siri Lanka[3]again have the lowest adolescent fertility rate in the South Asian region which partly explains there development scape as well (World Development Indicators, 2015).

Of utmost importance is the observation that higher income countries have significantly lower levels of fertility compared to developing countries. These trends in fertility levels are partly

[1]MICS define early child bearing if the live birth occurs before age 18 (Multiple Index Cluster Survey, 2014).
[2] See Graph 1 : Total Fertility Rates
[3] See Graph 2 : Adolescent fertility rate

driven by behavior of households in terms of fertility preferences and marital decisions. The main cause for most underdeveloped and developing countries for their lack of economic progress is mainly because of strict enforcement of social norms and values embedded in the society. Social norms and values shape the behavioral intentions and actions for various decisions including fertility decisions.

Demographic Researchers[4] have recently build up social theories to explain for the fertility behavior dominant in different societies which implies that behavioral attitudes have a significant role to play in determining childbearing decisions . These behavioral attitudes in turn tend to be influenced by social structures and networks in the society in the form of prevalent social and cultural norms.

The societies in developing countries are generally described by early marriages and consequently early childbearing decisions[5] primarily because of the social norms prevalent as well as the interplay of household structure dynamics with social pressure (Maertens, 2013). It is important to note that societies' in developing countries put great emphasis on "young brides" to start childbearing sooner as a proof to their fertility; young brides interestingly undertake these decisions to increase their relative bargaining power and status within the households**.** Thus, the household dynamics and structure influenced by social norms have substantial influence on private choices like childbearing decisions. The social cultural norms in Pakistan also expose women to early childbearing as women are expected to bear a child as soon as they are married. Since the norm of early marriage is a common practice in the Pakistani society; these young married women

[4] (Bernardi & Klärner, 2014) shows that social mechanisms play a significant role in determining the behavior of individuals pertaining to childbearing decisions . While the actual impact tends to depend on the structure of social interaction.

[5] (Westoff, 2003) shows that teenage child bearing is higher in Sub-Shahran African region as well as exceptionally higher in Bangladesh .

are under societal and family pressure to produce an offspring; so as to prove their fertility. This is demonstrated by the adolescent birth rate which was 39.2 % for the year 2014 for Pakistan (Word Development Indicators, 2014); while in Punjab for year 2014; 11.8 % of women age 20-24 years had at least one live birth before age 18 (MICS, 2014).

Early childbearing tend to have negative consequences on child and maternal health because young maternal age at first birth deters higher education acquisition as well as it tends to be associated with lower social and economic background[6]. Young maternal age is also adversely related with child health partly because of differential in health behavior adopted by young mothers.

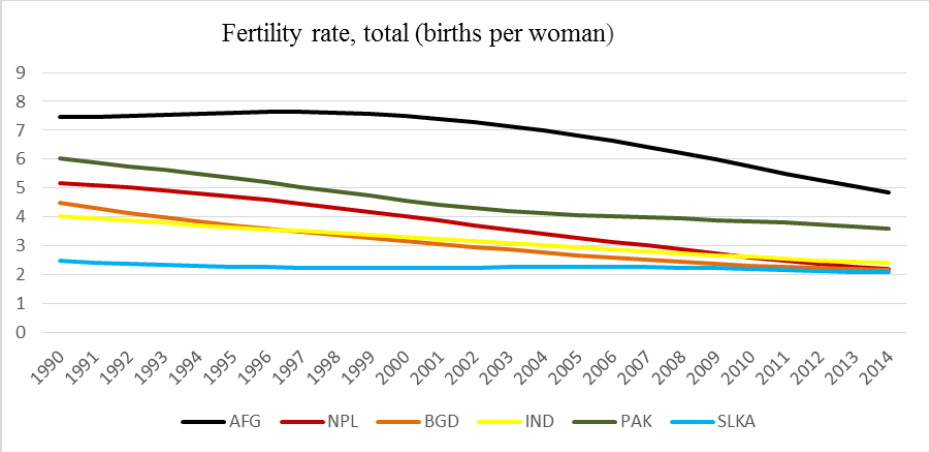
The data shows that the mean age at first birth in Pakistan is 22.2 years (Demographic Health Survey, 2013) . It is important to note that maternal characteristics in general are believed to have important role in determining the status of child health. The intra household model in literature both empirically and theoretically predicts that maternal behavior is more responsive to child health primarily because of differential preferences and behavior adopted by individuals in the household[7].

The child health status as of 2014 in Punjab suggests that 33 .7% of the children were moderate and severely underweight compared to 33% in 2011, while 33.5% of the children were moderate and sever stunt compare to 36% in 2011 ; and 17.5 % of wasting prevalence (moderate & sever) was observed compared to 16 %in 2011 (Multiple Index Cluster Survey, 2014). While child health indicators provide a bleak picture of child health status; it then becomes crucial to

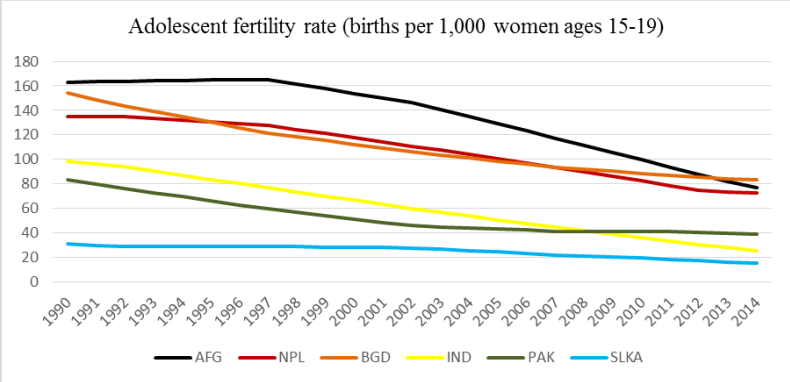
[6] (Ferré, 2009) shows empirically through instrumental variable approach that addition schooling tends to delay and shorten the reproductive fertility decisions. The study shows that an incremental year of schooling decreases the probability of giving birth in early age.

[7] Collective models of intra household bargaining power shows that there are differential preferences across household members compared to a unitary model which treats household as a unit (Chiappori, 1997).

explore how maternal characteristics can have an impact on child health and therefore if any possible policy implications can be adopted to improve child health outcomes.



Graph 1 : Total Fertility Rate
Source: World Bank



Graph 2: Adolescent fertility rate

Source: World Bank

The contribution of the paper is to test if there is an association between early childbearing and child health outcomes and to cater to unobserved heterogeneity associated with early childbearing decisions. In addition to this, the paper aims to test if early childbearing continues to have a significant impact on child health outcomes even after accounting for the possible set of observed characteristics as well as the unobserved factors pertaining to early child bearing.

Literature Review

The intra household literature put great emphasis on the role and behavior of maternal characteristics on contributing to child wellbeing outcomes. Literature suggests that early childbearing is negatively associated with child outcomes and economic wellbeing. This is because early family formation hinders higher educational levels for the mothers which have consequences for inadequate human capital accumulation for both the current and future generations.

Literature shows different mechanisms through which the impact of early childbearing is transmitted to child wellbeing. Teenage mothers are physically and psychologically less mature; they lack the necessary skills needed to efficiently uptake health care of children which results in adverse outcomes for child health. The results show that children born to teenage mothers are more likely to be shorter, stunted and underweight (Branson, Ardington, & Leibbrandt, 2011).

One strand of literature tests the impact of teenage pregnancy on child health care, mortality, feeding practices and birth weight. Young mothers also typically adopt to health behavior which is significantly different than their counterparts .The differential in health behavior adopted by teen age mothers explain much of the variation in child health. The study shows that teenage childbearing is negatively associated with prenatal care as well as vaccination behavior. In addition to this, the probability of receiving supplementary food by the age of 6 months is negatively and statistically significantly associated with teenage childbearing. The primary reason for such associations is because teenage mothers lack the maturity needed to nurture the child hence leading to adverse outcomes (LeGrand & Mbacke, 1993). (Maitra & Pal, 2007) also shows that adverse

impact of early childbearing on mortality which is significantly explained through health inputs[8]. This implies that young mothers are substantially different from old mothers in terms of their behavioral use of health inputs like vaccination and prenatal services[9]. (Miller, 1993) suggests that first born children of teenage mothers are likely to face health disadvantage compared to first born of non-teenage mothers. This is because teenage mothers are likely to belong to lower socioeconomic background, have lesser financial resources and health knowledge; and therefore likely to receive negligible prenatal care.

Teenage childbearing is associated with birth injuries and congenital abnormalities; the effect diminishes once all the possible set controls are taken into consideration. The paper suggests that the adverse impact of early childbearing on pregnancy outcomes are not because of age per say; which reflects physical immaturity; rather the underlying mechanism is the behavioral and socioeconomic factors experienced by teenage mothers (Letamo & Majelantle, 2001).

Another theme in the literature, tests the impact of teenage childbearing on academic and behavioral outcomes[10]. The results suggests that teen parenting is more strongly associated with behavioral outcomes compared to short term academic scores however the effect diminishes when fixed effects are employed. The reason for stronger impact on behavioral outcomes is primarily because teenage childbearing implies lack of parenting skills to shape the behavior of children. In

[8] (Conger, McCarty, Yang, Lahey, & Robert, 1984) also shows that chronological age and age at first birth have a negative influence on the behavior of mother in terms of child care activities.
[9] (LeGrand & Mbacke, 1993) have shown that both physiological and behavioral characteristic of young mothers adversely affect child health through poor feeding practices and prenatal care as well as vaccination behavior.
[10] The papers employ ordinary least squares, multiple regressions and cousins fixed effects to test the impact of teen age parenting on academic and behavioral outcomes. Teenage child bearing is measured through a set of four dummy variables of age at first birth (16 years and less, 17-18, 19 and 20-21 with greater than 21 as the base category) as compare to a single dummy of teen or non-teen variable. This kind of specification checks for the differentials as a result of early teens compared to later teens; as well as if childbearing after teens is associated with same outcomes (Levine, Pollack, & Comfort, 2001)

addition to this, the mothers may lack the appropriate social network and ties which consequently have an impact on the behavior of children, which is different from the socioeconomic background of mother rather it reflects the contextual social setup which is experienced by young mothers (Levine, Pollack, & Comfort, 2001).

(Mollborn & Dennis, 2012) also tests the impact of teenage childbearing on child's outcomes in terms of cognition, behavior and health. The paper suggests that while short term effects are nonexistent the impact is profoundly on long term indicators of behavior. (Turley, 2003) shows that children of teenage mothers are more likely to face behavioral problems and lower academic scores as a result of family background characteristics and not because of young maternal age. The paper also finds evidence for the systematic difference hypothesis which advocates the idea that maternal age at first birth has a more significant role to play in child health outcomes compared to maternal age at child's birth. This then implies, the existence of some important background characteristics rather than age per se.

Another strand of literature tests the impact of teenage childbearing on the economic consequences. (Fletcher & Wolfe, 2009) shows that teenage childbearing reduces the probability of higher education for the mother which consquently have a direct impact on the potential earnings that can be earned by the mother; however it increases the likelihood of reciving cash assistance[11]. (Hofferth & Moore, 1979) using a path analysis framework shows that later childbearing is associated with higher educational levels and earning potential which have an impact on economic wellbeing of the household. On the contrary, women who experience early childbearing have lower education levels and therefore lower earning potential. (Geronimus &

[11] The paper estimates the impact of early childbearing through community fixed effects in order to account for unobserved community level factors associated with early pregnancy outcomes

Korenman, 1992) uses a sister's comparison approach to test the association between socioeconomic wellbeing and teenage childbearing. While cross sectional analysis overstates the impact of teenage childbearing; the sister's comparison caters to one of the sources of unobserved heterogeneity associated with teenage childbearing in terms of unmeasured background characteristics. However; due to mixed results from different data sets the paper doesn't conclude that teenage childbearing contributes to significant differences in socioeconomic wellbeing. (Hoffman, Foster, & Jr., 1993) shows that even after accounting for unobserved family background characteristic doesn't diminish the impact of teenage childbearing on high school completion, family size and economic wellbeing.

Decisions pertaining to early childbearing are influenced by social norms and cultural values which exerts pressure on individuals to take undertake such behavior. A wide array of literature emphasizes the role of norms in determining the fertility behavior. Firstly, the social learning mechanism have its basis from the social learning theory which suggests that behaviors are learned through observation of models unveiling these behaviors (Bandura, 1977). This implies that individuals learn the behaviors by observing actions and decisions made by other members in the society. Observation learning allows ego (self-realization) to assess the consequence of a particular behavior without taking into consideration the risk of potential adverse consequences such as failure or social disapproval. The fertility decisions tend to be influenced by environment; as more members are in the network transiting into parenthood; the more ego and self-realization would adopt to the same behavior. Thus; the social learning hypothesis predicts a positive impact of social norms on the intention of entering parenthood and consequently on child bearing decisions.

The second mechanism is the social pressure from network member's which suggests that members in the networks acts as a channel to enforce norms through personal nature of network

ties (Keim, 2011). These networks members have the ability to sanction each other for behaviors which are not socially acceptable. Life course theorists believe that in every society there are social norms regarding each life stage in which normative evaluations are made for instance parenthood become due (Neugarten, 1979) Thus; these norms act as a social clock as soon as individual reaches a certain stage at which transition is expected; these network members serves as a way to ensure adherence to norms by social approval or sanction. Thus; theoretically it is expected that the stronger tightly connected the society is; the more self-realization is to comply by social expectations. In case of child bearing decisions; it is expected that if there are a dominant number of befriended couples with children; there is a societal pressure on couples without children to enter into parenthood.

The third mechanism is the social opportunity costs which suggests that while there is higher opportunity costs of entering into parenthood in terms of reduced leisure time. Individuals consider these opportunity costs in relation to society dynamics. If a society is characterized by child less society then the individuals would associate higher opportunity costs of child rearing while it holds true conversely (Bernardi, 2003).Theoretically; the literature suggests that inclusion of social norms in the fertility choice model[12] do explains the high fertility equilibrium in societies characterized by increasing population levels; primarily because they are historically coordinated on high fertility path ; because of the society dynamics in terms of higher preference on having children sooner this is observed typically in agro based societies (Bhattacharya & Chakraborty, 2011).

[12]Inclusion of social norms essentially assumes that individuals are conformists which implies that individual behavior pertaining to fertility is partly influenced by social norms where individuals tend to minimize their fertility distance from others in the society (AKERLOF, 1977) .

The empirical literature finds evidence for these channels and shows higher support for social learning view .Firstly, the empirical evidence suggests that self-realization acquires information from the couples with children pertaining to the aspects of parenthood. Secondly, the evidence also shows that parents without children feel pressurizes from other network members with children to start a family[13]. Thirdly, social opportunity costs mechanism shows that the loss of losing social ties is reduced if the society is characterized by network members with children (Lois & Becker, 2014)[14].Another similar theme in the literature tests for the prevalence for norm based theory of reproductive change which suggests that fertility choices are by enlarge determine by norms prevalent in the society. The intervention of contraceptive prevalence finds evidence for existence of norm based theory as the empirics suggests that individuals strongly respond to changes in contraceptive prevalence within their own religious group in the village while cross religion effects are entirely absent (Munshi & Myaux, 2006).

One of the issue in determining the causal effect of early childbearing is the self-selection; which implies that women who experience early childbearing tend to choose themselves into this behavior. This is mostly attributed as a result of background characteristics and pre-existing social disadvantage. (Gruber, 2009) shows strong associations between disadvantage background and teenage childbearing at the aggregate level then compared to individual level; however once state and year fixed effects estimates are employed the relationship between the two is greatly mitigated.

Econometrically, estimating the effects of early childbearing through a simple ordinary least squares is likely to give bias estimates; as women who experience early childbearing are more

[13] (Udry, 1980) shows that respondent were confronted with direct social pressure primarily from social circles as well as specifically from mothers and mothers in law as they are precarious in response to new pregnancy.
[14] (Barbanb, 2014) shows that increasing child bearing by friends in a network through observational learning and social pressure induces couples without children to start child bearing.

likely to come from disadvantage family background and have poorer outcomes compared to their counterparts. In addition to this, the estimated effect of early childbearing also suffers from omitted variable bias; as literature suggests that there are important neighborhood mechanisms and cultural pressures at play when decision conceiving a child is made. Simple regression estimates are thus likely to overstate the true impact of early childbearing on various outcomes of interest.

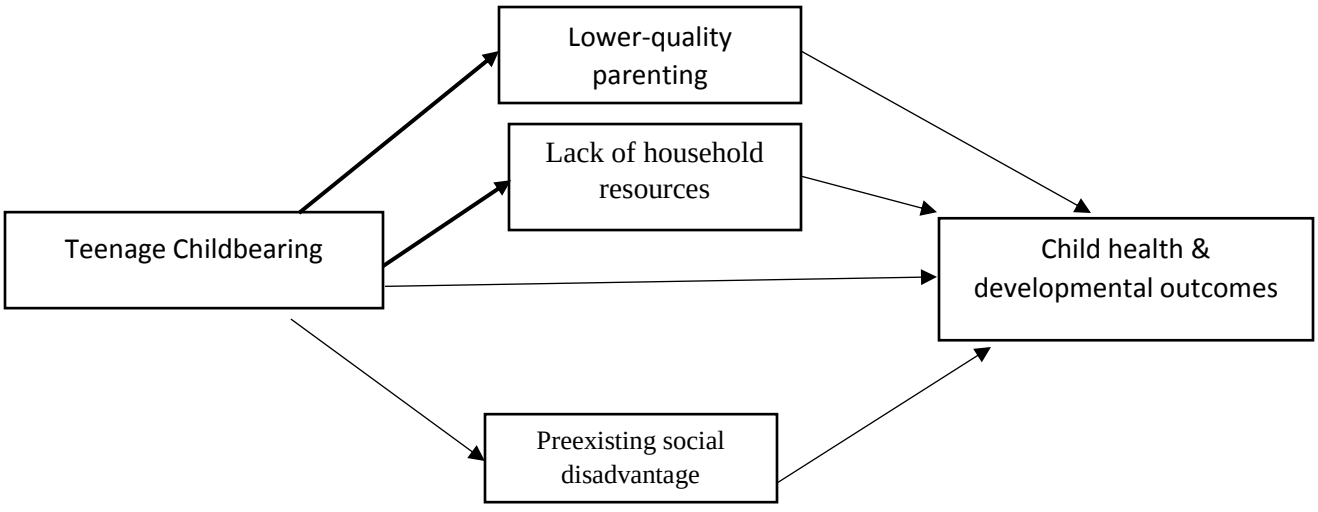
In order to deal with the unobserved heterogeneity associated with early childbearing; literature have used instrumental variable approach and fixed effects estimation; the within family estimates to test the impact of teenage childbearing on economic wellbeing; suggests that teenage sisters who experienced early childbearing have lower education level however the difference is not statistically significant which implies that much of the economic adversity associated is not because of the early childbearing itself but the disadvantage that precedes it.

Although the sister comparison approach caters to unmeasured family background characteristics; however, it assumes within family homogeneity in terms of same parental treatment for all children. In addition to this, siblings are also likely to differ in terms of their endowments and physical traits which is not considered in sister's comparison approach (East & Jacobson, 2000).

(Ribar, 1999) controls for omitted variable bias pertaining to early childbearing by employing sibling fixed effects which differences out family specific unobserved factors ;while simple regressions leads to larger estimates of the impact of early childbearing; the sibling fixed effect reduces the magnitude of early childbearing on socioeconomic outcomes.

Theoretical Framework

The theoretical framework is influenced by life course perspective which explains the link between teenage mothers and their child's health and developmental outcome. There are three possible channels that are widely discussed in literature as influencing child's health outcome. Firstly, the preexisting social disadvantage suggests that mothers who experience teenage pregnancies are more likely to belong to poorer socioeconomic and educational background. Through the intergenerational transmission these characteristics are accumulated over time and transferred to next generations. Secondly, the lack of household resources also influences child health developmental outcomes; as teenage childbearing puts pressures on the available resources by increasing the financial needs of the children. Thirdly the lower quality parenting influences child health outcomes primarily because young parents are not psychologically mature enough to uptake child health care efficiently. The children of teenage mothers are expected to experience different parenting styles which may be reflected in differential in developmental and health outcomes (Mollborn & Dennis, 2012).



Source : (Mollborn & Dennis, 2012)

Data & Descriptive Statistics

The paper aims to do a cross-sectional analysis by using newly available data Multiple Indicator Survey (MICS) 2014 which is a comprehensive survey for assessing child health status. MICS cover all 36 districts of Punjab covering both rural and urban areas. The dataset includes 2050 clusters; where each cluster comprises of 20 households which gives a total sample of 41,000 households in the data set. . The sampling design used in MICS 2014 incorporates two stages; in the first stage for urban and rural areas; is the selection of enumeration blocks and village respectively. From each of the first stage; a sample of 20 households are selected in rural and urban areas. The first stage units are selected by considering the probability proportional to size while for the second stage units; equal probabilities are assigned. The total Primary Sampling Units (PSUs) clusters are 2050 and the Secondary Sampling Units (SSUs) households are 41,000. The urban/rural split is 38 % and 62 % respectively (MICS, 2014).MICS provides a separate questionnaire for child under age of five which includes information pertaining to age, birth registration, early childhood development, breastfeeding and dietary intake, immunization, care of illness and anthropometry. The height for age and weight for age z-scores are provided for all the children under age five years in the child data file.

The focus of the analysis are children under age of 5 years; which constitutes 26,421 in the sample. Based on the newly available data MICS 2014, shows that the mean height for age is -1.48 in the sample which means that on average a child is 1.48 standard deviations below compared to a child in the reference population . While; the weight for age z-scores shows that a typical child in the sample weighs less than 1.57 standard deviations compared to a child with same age and sex in the reference population .The child health indicators shows that 33.7 % children under age five are moderately or severely underweight & 11.3% are classified as severely

underweight; while 33.5 % are moderately or severely stunted or too short for their age (MICS, 2014)

Table 1: Child Health Status in Punjab for children under age 5.

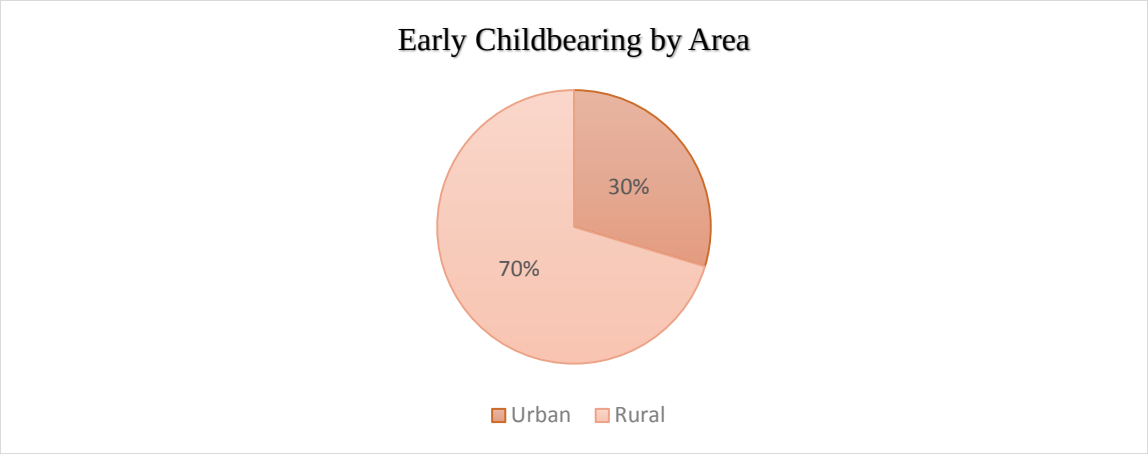
Variable	Observations	Mean	SD	Moderate	Severe
Height for Age	21809	-1.483408	1.445836	33.7 %	11.3 %
Weight for Age	21956	-1.571415	1.197375	33.5 %	13.3 %

Source: Based on author's own calculation

The role of maternal characteristics have a significant impact on child health outcomes. The data on maternal characteristics shows that the average age at marriage in the sample is 20 years; while on average the age at first birth is 22 years for a women who have ever married and given birth. In addition to this, in our sample 22.2 % of currently married women in the sample have experienced early childbearing[15]. The incidence of women who experienced early childbearing by area also give important insights in terms of the differentials associated with the area of residence. Figure 1 shows that among the women who have experienced early childbearing 70% of them belong to rural area compared to 30 % urban area which partly reflects how preferences governing such private decisions are shaped by the area of residence.

Figure 1: Early Childbearing by Area

[15] In the analysis, early childbearing is defined as if age at first birth is less than 20 years.



Source: Author's own calculation

Early childbearing tends to deter education acquisition for young mothers which in literature is considered as one of the primary channel through which it can have an impact on child wellbeing. The data suggests that, among women who have experienced early childbearing 62 % have no education compared to women who had postponed early childbearing with 50 %. More interestingly, there are important differences in all the levels of education. As among the mothers who have experienced early childbearing; 19% have primary education, 8% secondary and only 2 % have higher education compared to their counterparts with 17 %, 12% & 12 % respectively. These educational differences reflects the choices made by young mothers pertaining to educational acquisition at different levels. It is evident that young mothers have significantly lower educational levels especially secondary and higher as it engages them into other tasks of child care and upbringing.

Table 2: Early Childbearing by level of education

Variable	Young Mothers Sample	Old Mothers Sample
None/Pre-School	62%	50%
Primary Education	19%	17%
Middle Education	9%	9%
Secondary Education	8%	12%
Higher Education	2%	12%

Source: Author's own calculation

Table 3: Descriptive Statistics

Variable	Mean	Std. Dev.	Observations
Child Health Indicators			
Height for Age z-score	-1.483408	1.445836	21809
Weight for Age z-score	-1.571415	1.197375	21956
Maternal Characteristics			
Mother education none *	.4819155	.4996838	22782
Mother education primary*	.1872531	.3901231	22782
Mother education middle*	.094285	.2922312	22782
Mother education secondary*	.1237819	.3293398	22782
Mother education higher*	.1127645	.3163116	22782
Age at marriage	20.81025	4.173462	22703
Age at First Birth	22.74942	4.161384	22604
Short First Birth Interval *	.4796264	.4995957	22701
Early Childbearing*(age at first birth <20=1)	.2195593	.4139572	22782
Child Characteristics			

Child Gender(1=male ,Female=0)	.5004836	.5000108	22748
Age of child	2.558555	1.099449	22782
Child had diarrhea in past two weeks*	.166674	.3726928	22709
Health Knowledge/Practices			
Ever heard of aids*	.3864395	.486944	22772
Ever used any family planning method*	.109209	.3119081	22782
Salt Iodization *	.6877359	.4634271	22782

Household Characteristics			
Household head primary education*	.1792204	.3835452	22782
Household head middle education*	.1439294	.3510259	22782
Household head secondary education*	.1872531	.3901231	22782
Household head higher education*	.1078044	.31014	22782
Gender of Household Head (Male=1,Female=0**)**	.9472829	.223473	22782
Number of Household Members	7.872707	3.783835	22782

Household own agriculture land*	.2980862	.4574276	22782
Area(Urban=1,Rural=0)*	.3425511	.4745732	22782
Wealth Score	-.0823266	.996271	22782

Note: * indicates dummy variable.

Source: Author's own calculation.

The summary statistics shows the set of controls included in the analysis to assess the impact of early childbearing on child health. To cater to the maternal characteristics, the analysis takes into account the maternal level of education and age at which the mother starts childbearing. The descriptive statistics shows that 48 % of the mothers don't have any level of education while the average age at first birth in the sample taken into consideration is 22 years. In addition to this, the variable short first birth interval shows the spacing between marriage and first birth; the data shows that 47 % of the women have experienced a shorter first birth interval. The analysis also takes into account the child characteristics; which includes for the age and gender of child where the data shows that on average the sample is equally divided both gender child. In order to proxy for illness status; the child diarrhea has been taken the summary statistics indicates that 16 % of children have experienced diarrhea in the past two week.

To gauge the health knowledge and behavior of the household, the descriptive statistics shows that only 38 % are aware of aids; while the use of contraceptive method is only 10 %. In addition to this, the analysis also takes into account the household characteristics which includes for the gender and education of household head; while to proxy for household size; the analysis includes the number of household members; as well as to cater for the economic status the paper uses the measure of wealth score and ownership of agricultural land by the household provided

by Multiple Index Cluster Survey. The sample summary statistics shows that on average there is 29 % of agricultural land ownership.

The incidence of early childbearing also varies across different regions of Punjab. The data shows visible north south differences within Punjab pertaining to early childbearing. The data indicates that 25 % of the women have experienced early childbearing in the Southern Punjab compared to 21 % in the Northern as well Central Punjab[16] . These differences could possibly be because of variations in the culture and social norms concerning early childbearing behavior prevalent in different regions of Punjab as well as partly because of educational differences as well as variations in socioeconomic development[17] experienced in different regions within Punjab, all of these aspects have a substantial role to play in determining the attitudes and perceptions towards early family formation behavior. Literature also suggests that districts where socioeconomic development and literacy rates are lower have higher patterns of total fertility rates; indicative of the influence of these channels on fertility behavior (Khan, 2011).

[16] See Appendix : Table 1
[17] (Afzal, 2010)

Estimation Strategy

The paper econometrically aims to test the impact of early childbearing on child health outcomes. The empirical strategy rests upon eliminating the unobserved heterogeneity associated with early childbearing; given variations in culture and norms governing early childbearing decisions across communities and households. The equation for estimating the impact of early childbearing on child health takes the following form:

$$Child\ health = \beta o + \beta_1\ Early\ Childbearing + \beta_2\ Maternal\ Characteristics + \beta_3\ Child\ characteristics + \beta_4 Health\ Knowledge + \beta_5\ Household\ Characteristics + \varepsilon \qquad (Equation1)$$

Early Childbearing is defined as a dummy variable which takes a value of 1; if the mother's age at first birth is less than 20 years and zero otherwise. The usefulness of employing a dummy variable approach to directly estimate the impact of being born to a teenage mother on child health outcomes. Child health is measured through anthropometric indicators developed by the World Health Organization which includes height for age z-scores and weight for age z-scores. The height for age represents long term status of child health whereas weight for age is the short term indicator; which reflects the current status of child health. The analysis controls for the maternal characteristics; in terms of the level of education acquired by the mother, while the child characteristics controls for the gender and age of child ; as well as the illness status which is captured through if child had diarrhea in past two weeks.

The equation takes into account the set of characteristics that describes the household environment; which are captured through the gender of household head and education of the household head. While the economic status is accounted for through wealth score and status of agricultural landownership. The health knowledge is captured by household's awareness about

aids; salt iodization as well as the use of family planning method. The ε denotes the error term in the regression

An estimation of the given equation through ordinary least square will exaggerate the true impact of early childbearing on child health outcomes; since there are important unobserved factors that are correlated with both early childbearing and child health .For example; socio cultural values and norms in the society are likely to pressurize young brides to undertake the decision pertaining to early family formation so as to elevate their status in the household and society; however once such decisions is taken ; it limits the educational attainment as well as the earning potentials which then have implications for child health outcomes

In addition to this, early childbearing also suffer from self-selection bias which implies that women who experience early childbearing tend to choose themselves into this behavior. Young women who bear child early are substantially different from their counterparts intrinsically as they are likely to have lesser education as well as they also vary in terms of the knowledge and use of health inputs e.g. vaccination ,feeding behavior . This then implies that that unobserved factors in the error term are likely to impact both maternal behavior as well as child health outcomes. While much of the literature focuses on non-martial teenage childbearing which is not common in Pakistan given the cultural factors; the analysis in this paper considers teenage childbearing which occurs as a result of entering into a marriage; however the methodological issues of self-selection and omitted variable bias still remains because of strong social and cultural norms prevalent towards producing an offspring as soon as a couple gets married.

The data also suggests that differences exists in terms of various characteristics among the sample of mothers who experience teenage childbearing compared to their counterparts. The

descriptive statistics[18] shows that children of mothers who experienced early childbearing are on average shorter and weigh less compared to their counterparts. In addition to this, there also significant dissimilarities in terms of maternal characteristics; as the sample of women who experienced early childbearing on average have lower levels of education compare to women who post pone early childbearing.

The household environment also varies significantly among teenage and non-teenage mothers; the data shows that on average the household head education is higher among non-teenage mothers. In addition to this, there are also variations in terms of health knowledge; as only 27 % have awareness regarding aids compared to 41 % among non-teenage mothers. These differences in characteristics implies that women who experience teenage childbearing are substantially different from non-teenage mothers, indicative of background characteristics as well as the contextual environment which they experience .

In order to eliminate the unobserved factors which creates variations at community level, the estimation strategy relies upon employing cluster fixed effect so as to difference out the common unobserved factor that includes for social norms, culture and practices that induces women to bear child earlier as well as child health. The cluster fixed effects are estimated through following equation

$$Child\ Health = \beta o + \beta_1\ Early\ Childbearing + \beta_2 Maternal\ Characteristics + \beta_3 Child\ Characteristics + \beta_4 Health\ Knowledge + \beta_5\ Household\ Characteristics + \varphi + \varepsilon_i \qquad (Equation\ 2)$$

The unobserved variations are represented by φ; the unobserved factor which is common across clusters is differenced out as a result of employing cluster fixed effects; the coefficient of

[18] See Appendix : Table 2

early childbearing then gives the net impact after taking into account the unobserved cultural norms and practices.

Similarly, at the household level various characteristics induces women to bear child early as to proof their fertility as well as to elevate their status in the households. In order to account for the household level unobserved heterogeneity; the paper also estimates household fixed effects. The household fixed effects takes the following form:

$$Child\ health = \beta o + \beta_1\ Early\ Childbearing + \beta_2\ Maternal\ Characteristics + \beta_3 Child\ Characteristics + \beta_4 Health\ Knowledge + \delta + \varepsilon_i \qquad (Equation\ 3)$$

The unobserved heterogeneity at the household level is represented by δ which is assumed to be shared across households. Once the unobserved heterogeneity is taken into consideration; the coefficient of early childbearing then represents the impact adjusted for the unobserved heterogeneity.

Discussion of Results

As per the estimation strategy, the paper first estimates the proposed equation through a simple ordinary least square. The simple correlation of early childbearing with child health outcomes shows strong negative association. Table 4 shows the correlation of early child bearing with height for age z-score and weight for age z-scores. The result indicate that if the mother's age at first birth is less than 20, then it has a negative and statistically significant impact on child health outcomes. Table 4 gives the estimation results for children's height for age z-scores and weight for age z-scores. The estimates from ordinary least square regression indicates that early childbearing decreases height for age by 0.29 and weight for age by 0.22 standard deviations. This results suggest that early childbearing have negative impact on both long term and short term child health measures.

Table 4: Correlation of Early Childbearing with Child Health measures.

Dependent Variable :	**Height for Age (z-scores)**	**Weight for Age (z-scores)**
Early Childbearing (Age at first birth<20=1)	-0.296***	-0.229***
	(0.0436)	(0.0349)
Constant	-1.418***	-1.521***
	(0.0211)	(0.0173)
Observations	21,809	21,956
R-squared	0.007	0.006

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Ordinary Least Square Results

Table 5: Ordinary Least Square Results of the impact of early childbearing on child health

Dependent Variable	HAZ	WAZ
Maternal Characteristics:		
Early Childbearing (age at first birth<20=1)	-0.0907**	-0.0583*
	(0.0420)	(0.0336)
Mother educated up to primary level	0.0713	0.107***
	(0.0439)	(0.0362)
Mother educated up to secondary level	0.260***	0.212***
	(0.0570)	(0.0491)
Mother educated up to middle level	0.215***	0.189***
	(0.0593)	(0.0473)
Mother educated up to higher level	0.471***	0.409***
	(0.0657)	(0.0542)
Child Characteristics:		
Child Gender (1=Male;0=Female)	0.00980	-0.00655
	(0.0542)	(0.0155)
Age of child	0.123	0.147**
	(0.0780)	(0.0639)
Age of child square	-0.0305**	-0.0345***
	(0.0155)	(0.0127)

Child had diarrhea in past two weeks	-0.206***	-0.218***
	(0.0435)	(0.0348)
Health Knowledge/Health Practices:		
Ever Heard of Aids	0.108***	0.0241
	(0.0407)	(0.0344)
Ever used any family planning method	0.0371	0.0357
	(0.0482)	(0.0411)
Salt iodized	0.0495	0.0478*
	(0.0353)	(0.0288)
Household Characteristics:		
Household head educated up to primary level	0.0196	0.0360
	(0.0451)	(0.0368)
Household head educated up to secondary level	0.113**	0.129***
	(0.0481)	(0.0402)
Household head educated up to middle level	0.0898*	0.0788*
	(0.0484)	(0.0413)
Household head educated up to higher level	0.299***	0.218***
	(0.0623)	(0.0516)
Gender of household head	0.0676	0.0102
	(0.0664)	(0.0553)
Number of household members	0.00341	0.00151
	(0.00406)	0.00366)

Household owns agricultural land	0.168***	0.128***
	(0.0384)	(0.0316)
Urban	-0.0748*	-0.131***
	(0.0428)	(0.0359)
Combined wealth score	0.267***	0.253***
	(0.0255)	(0.0216)
Constant	-1.875***	-1.844***
	(0.114)	(0.0972)
Observations	21,758	21,905
R-squared	0.112	0.114

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5 shows the estimates from ordinary least square results by including the possible set of observable characteristics. The results suggest that early childbearing is negatively associated with child health for both height for age and weight for age z-scores. All the regression results are carried out by implementing robust standard errors at cluster level .The results suggests that being born to a teenage mother decreases the height by -0.09 SD and weight by -0.0583 SD even after controlling for other maternal ,child and household characteristics . In addition to this, the mother's education is found to have strong positive associations with height for age and weight for age z-scores; which has been well documented in the literature [19]as it suggests that maternal education have a stronger role to play in determining child health status as she is considered the primary care

[19] (Duncan Thomas & Henriques, 1991); (Desai & Alva, 1998) shows that mother's education have strong effects on height for age of children as well as on their immunization statuses.

taker of child health as well as maternal education can also enhance working and earning potential of the mother and consequently improving the nutrition uptake.

To proxy for child illness status, the paper takes into account if child had diarrhea in past two weeks, the results shows a very strong negative and statistically significant relationship between child diarrhea with both child height and weight. Moreover, health knowledge and practices have a substantial role to play in determining the child health status of the child. The estimates shows that awareness pertaining to aids as well as the use of contraceptive have a positive impact on the height and weight of child which stands consistent with literature; as parental practices pertaining to health have an influential impact on child health status.

To gauge the role of household characteristics, the analysis takes into account multiple variables; firstly the household head education at secondary and higher level have stronger explanatory power ; the height improves by 0.29 SD and weight improves by 0.21 if the household head is educated up to higher level. Wealth score [20]as provided by the Multiple Index Cluster Survey, shows positive and statistically significant relationship with both height for age and weight for age z-score

[20] Wealth scores are assigned on the basis of assets owned by the household which comprises of main material of the dwelling floor, main material of the roof, main material of the exterior walls, type of fuel used for cocking, household possessions (electricity, radio, television, non-mobile telephone, refrigerator/freezer, gas, computer, air conditioner, washing machine/dryer, air cooler/ fan, cooking range/micro wave, sewing/knitting machine, iron, water Filter and dunky pump/Turbine), utilities owned by household members (watch, mobile telephone, bicycle, motorcycle / scooter, animal drawn-cart, bus / truck, boat with motor, car / van, tractor/trolley), household ownership, ownership of land, having animals (cattle, milk cows, buffaloes or bulls, horses, donkeys, mules or camels, goats, sheep and chickens/ ducks/ turkey), possession of bank account, main source of drinking water and type of toilet. (MICS,2014)

Cluster Fixed Effects

In order to deal with the unobserved heterogeneity associated with early childbearing at the cluster level; the paper employs cluster fixed effects. The cluster fixed effects takes into account the component of the omitted variable bias that is common across clusters because households located within a cluster shared same neighborhood characteristics. These factors comprise of common cultural practices and shared norms and values in a specific community which exerts pressure on individual behavior towards early childbearing decision. The clusters are defined at primary sampling units[21]. On average there are approximately 20 households in each cluster. The cluster fixed effects show that even after controlling for the unobserved factors across clusters, the impact of early childbearing still holds strong explanatory power. If the age at first birth is less than 20, than after accounting for unobserved community factors; the height for age decreases by -0.0613 SD while weight for age decreases by -0.0438 SD. The results are suggestive of the fact that early childbearing exerts strong influence on both short term and long term child health outcomes.

Dependent Variable:	Height For Age (z-scores)	Weight for Age (z-scores)
Early Childbearing (age at first birth <20=1)	-0.0613**	-0.0438**
	(0.0248)	(0.0203)
Constant	-1.874***	-1.888***
	(0.0813)	(0.0667)

[21] Census enumeration areas are defined as Primary Sampling Units (PSUs) .In the sampling frame, enumeration blocks, both urban and rural, are considered as Primary Sampling Units.

Observations	21,758	21,905
R-squared	0.053	0.059
Number of cluster ID	2,018	2,020
Mother Controls	Yes	Yes
Child Controls	Yes	Yes
Community Controls	No	No
Household Controls	Yes	Yes

Table 6: Cluster Fixed Effects Estimation

Household Fixed Effects

The paper also employs household fixed effects model to eliminate the source of omitted variable bias which arises at the household level. The household fixed effects takes into account the unobservable factors at the household level which have an influence on early childbearing; these factors essentially comprises of the preferences within a household pertaining to early childbearing and towards the value of having a child earlier. Table 7 shows the household fixed effect estimations. The results shows that while early childbearing continues to exert negative impact on height for age; the impact is however not statistically significant. For the case of weight for age z-scores ; the results indicate that children born to teenage mothers have lower weight for age. This basically implies that after controlling for the unobserved household controls; early childbearing continues to have an impact on the short term measure of child health while the long term child health measure becomes insignificant. This implies that early childbearing has much more influence to play in the short term health status of the child.

Table 7: Household Fixed Effects Estimation

Dependent Variable:	**Height For Age (z-scores)**	**Weight for Age (z-scores)**
Early Childbearing(age at first birth <20=1)	-0.0170	-0.159***
	(0.0596)	(0.0473)
Constant	1.121**	-1.075**
	(0.544)	(0.433)
Observations	21,758	21,905
R-squared	0.017	0.019
Number of household ID	7,584	7,606
Mother Controls	Yes	Yes
Child Controls	Yes	Yes
Community Controls	Yes	Yes
Household Controls	No	No

Result Comparison across estimation strategies

Table 8 shows the coefficient comparison of early childbearing across different specification for height for age. The comparison yields that once the ordinary least square accounts for all the possible set of controls; the size of the coefficient decreases by 69 % which implies that only 31 % of the impact remains. The cluster fixed effects estimation reduces the size of the coefficient by 79 %; which infers that the estimation takes into account the unobserved cluster factors which influence early childbearing decisions. The coefficient of early childbearing also diminishes in terms of its magnitude as well as statistical significance once household fixed effects ae employed; as only 5% of the impact of early childbearing remains on height for age. Similar pattern holds true for weight for age regression results[22]; however the only difference arises when we employ the household fixed effects; as it shows that although the coefficient decrease in terms of its magnitude compared to a simple ordinary least square regression estimate but the variable still holds strong statistical power; which implies that early childbearing continues to remain important even when unobserved household characteristics are eliminated. This is only true for weight for age z-score results which suggests that early childbearing endures to have a major impact on short term measure of child health (WAZ) compared to long term measure (HAZ). The comparison of results across estimations suggests that early childbearing continues to influence the short term measure of child health even once household unobserved characteristics are accounted for.

[22] See Appendix Table 3

Table 8: Result Comparison across estimation strategies: Height for Age z-scores

Dependent Variable:				
Height for Age (z-scores)	**OLS**	**OLS**	**Cluster FE**	**Household FE**
Early Childbearing (age at first birth <20 =1)	-0.296*** (0.0436)	-0.0907** (0.0420)	-0.0613** (0.0248)	-0.0170 (0.0596)
Observations	21,809	21,758	21,758	21,758
R-squared	0.007	0.112	0.053	0.017
Community FE	No	No	Yes	No
Number of cluster id	-	-	2018	-
Household FE	No	No	No	Yes
Number of household id	-	-	-	7584
Mother Controls	No	Yes	Yes	Yes
Child Controls	No	Yes	Yes	Yes
Community Controls	No	Yes	No	Yes
Household Controls	No	Yes	Yes	No

Robustness Checks

In order to check for the robustness of our results, the paper uses different strategies to check the validity of the results.

Robustness Checks: Changing the Specification[23]

One of the strategy to check if the results still holds of importance is done by changing the specification of the key variable of interest that is early childbearing. Previously, early childbearing was specified through a dummy variable which took a value of one if the age at first birth was less than 20 years. In order to show that the results still holds true the specification is changed by introducing a categorical variable of age at first birth. The ordinary least square results for height for age shows that age at first birth is negatively associated with categories 17-18 and 19 at 5% and 10 % significance level respectively. However, once the unobserved cluster factors are taken into account only age at first birth at 19 years remains statistically significant; while household level fixed effect yields that mother's age at first birth 16 and less has strong explanatory power at 1 % significance level. The same set of results holds true for the weight for age z-scores. The ordinary least square results shows that mother's age at 19 years; is negatively and statistically significantly associated with weight for age across different estimation strategies. However, the household fixed effects shows that mother's age at first birth less than or equal to 16 holds of strong explanatory power. These results are in line with the previous specification; as the results

[23] See Appendix Table 4 & 5 for regression results.

shows that mother's age at first birth less than 20 years is negatively associated with both long term and short term measure of child health.

Robustness Checks: Alternative data set[24]

To check whether the results hold true for previous data set as well; the paper uses MICS 2011 Punjab data set .The comparison of results between 2011 and 2014 data sets shows similar results. The comparison yields that the sign of the coefficient of early childbearing remains same for both the data sets. The ordinary least square results for 2011 and 2014 remain statistically significant for both data sets at 5 % and 1 % respectively. However once the regressions takes into account the unobserved household characteristics; the coefficient of height for age doesn't remain statistically significant for both the data sets. This implies; that in the long run the impact of early childbearing doesn't hold of much explanatory power. The weight for age results comparison; shows that across different specifications the impact of early childbearing remains negative and statistically significant for both the data sets taken into consideration. This implies that teenage childbearing have negative influences in the short term compared to long term indicator of child health.

[24] See Appendix Table 6 & 7 for Regression Results

Conclusion

The study aims to test the impact of early childbearing on child health outcomes in Punjab. The analysis takes into account additional characteristics in terms of maternal education, health knowledge, household factors and child characteristics. The empirical analysis is based upon cluster and household fixed effects.

The role of early childbearing on child health measures; is partly explained for differential in maternal education acquired by teenage mothers compared to non-teenage mothers. In addition to this, the analysis shows that teenage mothers differ significantly from non-teenage mothers in terms of the household characteristics they experience; which are considered in terms of household head education, wealth score, agricultural land ownership as well as the locality of the residence. While much of the previous empirical studies have focused on the role of background characteristics in influencing early childbearing and consequently child outcomes; this paper takes into consideration the unobserved contextual set up experienced by mothers in face of social norms and cultural values to produce offspring as soon as they get married. Since it is difficult to quantify the cultural and household norms and preferences advocating such behavior; the empirical strategy relies on employing cluster and household fixed effects models.

The empirical analysis shows that once the ordinary least square regressions controls for household, child and health knowledge characteristic; approximately 31% of the impact remains for height for age . However once unobserved cluster and household factors are taken into account only 21 % and 5% of the impact remains for height for age .This basically shows that the size of the coefficient is greatly attenuated once unobserved characteristics are accounted for. The same set of pattern holds true for weight for age indicator as well. While it may be correct to say that

the empirical analysis carried does take into account the unobserved characteristics influencing early childbearing decisions; however the analysis doesn't take into consideration the practical knowledge of teenage mothers which may develop over time and hence improve child health seeking behavior in the long run. In addition to this, the analysis assumes the type of omitted variable bias that exist; while there may be unobserved characteristics at different levels such as the mother and child's unobserved characteristics ; this analysis is only confined to the issue of omitted variable bias existing at the household and cluster level.

The results are suggestive of the fact that besides nutrition and knowledge about health care; teenage pregnancy continues to have a significant impact on child health outcomes both short term and long term measures. Therefore policies that focus on enhancing nutrition and health knowledge alone might not effective; policies should rather focus on developing parenting skills of young mothers so that they can efficiently uptake child health care. Government on the other hand can focus on taking innovative initiatives like developing the mother-child care units while providing parenting skills to young mothers.

Future research in this area can focus on exploring the interlinkages between early childbearing, maternal empowerment and child health status; as well as improving the methodological approaches to assess the impact of early childbearing decisions on child health outcomes.

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Appendix

Table 1: Region Wise Distribution of Early Childbearing pattern within Punjab

Regions	**% of women who experienced early childbearing**
South Punjab	25%
North Punjab	21%
Central Punjab	21%

Note:

South Punjab includes the districts Bahawalpur; Bhawal Nagar; Rahimyar Khan; Dera Ghazi Khan; Layyah Muzaffargarh; Rajanpur; Multan; Khanewal; Vehari & Pakpattan.

North Punjab includes the districts Gujrat; Narowal; Sialkot; Nankana Sahib; Sheikhupura; Lodhran; Rawalpindi Attock; Chakwal; Jhelum; Sargodha; Bhakkar; Khushab & Mianwali

Central Punjab includes the district Faisalabad; Chiniot; Jhang; Toba Tek Singh; Gujranwala; Hafizabad;Mandi Bahaudin; Lahore; Kasur ;Sahiwal & Okara

Source: Author's own calculation

Table 2: Descriptive Statistics: Break Down by Early Childbearing

Variables	**Age at First Birth< 20**	**Age at First Birth ≥20**
Child Health Indicators		
Height for age (z-scores)	-1.714603	-1.418112
Weight for age (z-scores)	-1.749793	-1.520961
Maternal Characteristics		
Age at Marriage	16.01	22.14
Short First Birth Interval*	.5165934	.436108
Mother education primary*	.1941224	.1853206
Mother education middle*	.0931627	.0946007
Mother education secondary*	.0881647	.133802
Mother education higher*	.02499	.1374578
Child Characteristics		
Child Gender(Male=1,Female=0)	.4990998	.5008733
Age of Child	2.612355	2.54342
Child had diarrhea in past two weeks *	.1813991	.1625282

Health Knowledge/Practices		
Ever Heard of Aids *	.2760896	.4175014
Ever use any Family Planning Method *	.1135546	.1079865
Salt Iodization *	.6491403	.6985939
Household Characteristics		
Household head primary education*	.1945222	.1749156
Household head middle education*	.1321471	.1472441
Household head secondary education*	.1505398	.1975816
Household head higher education*	.0581767	.121766
Gender of Household Head (Male=1,Female=0)	.9528189	.9457255
Number of Household Members	8.159336	7.79207
Household own agriculture land*	.2714914	.3055681
Area(urban=1,rural=0)	.2856857	.3585489
Wealth Score	-.3612048	-.0038705

*indicates dummy variable

Source: Author's own calculation

Table 3: Result Comparison across estimation strategies: Weight for Age z-scores

Dependent Variable: **Weight for Age (z-scores)**	**OLS**	**OLS**	**Cluster FE**	**Household FE**
Early Childbearing (age at first birth <20 =1)	-0.229***	-0.0583*	-0.0438**	-0.159***
	(0.0349)	(0.0336)	(0.0203)	(0.0473)
Observations	21,809	21,905	21,905	21,905
R-squared	0.007	0.114	0.059	0.019
Community FE	No	No	Yes	No
Number of cluster id	-	-	2020	-
Household FE	No	No	No	Yes
Number of household id	-	-	-	7606
Mother Controls	No	Yes	Yes	Yes
Child Controls	No	Yes	Yes	Yes
Community Controls	No	Yes	No	Yes
Household Controls	No	Yes	Yes	No

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Author's own calculation

Table 4: Robustness Checks: Categorical Classification of Age at First Birth for Height for Age

Dependent Variable : Height for Age(z- scores)	OLS	Cluster FE	Household FE
Mother's Age at First Birth:			
≤ 16	-0.0435	-0.0586	-0.336***
	(0.0930)	(0.0507)	(0.116)
17-18	-0.121*	-0.0476	-0.00862
	(0.0623)	(0.0352)	(0.0862)
19	-0.123**	-0.0938**	-0.0737
	(0.0605)	(0.0388)	(0.0928)
20-21	-0.0590	-0.0175	-0.0822
	(0.0410)	(0.0263)	(0.0619)
Child Controls	Yes	Yes	Yes
Mother Controls	Yes	Yes	Yes
Household Controls	Yes	Yes	No
Observations	21,758	21,758	21,758
R-squared	0.112	0.054	0.018
Number of cluster id	-	2,018	-
Cluster FE	-	Yes	No
Number of household id	-	-	7584
Household FE	-	-	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Author's own calculation

Table 5: Robustness Checks: Categorical Classification of Age at First Birth for Weight for Age

Dependent Variable : Weight for Age(z- scores)	OLS	Cluster FE	Household FE
Mother's Age at First Birth:			
≤ 16	-0.0129	-0.00493	-0.462***
	(0.0706)	(0.0416)	(0.0928)
17-18	-0.0528	-0.00523	-0.0982
	(0.0501)	(0.0288)	(0.0682)
19	-0.117**	-0.128***	-0.260***
	(0.0493)	(0.0316)	(0.0736)
20-21	-0.0160	-0.0134	-0.213***
	(0.0334)	(0.0216)	(0.0491)
Constant	-1.843***	-1.888***	-0.967**
	(0.0971)	(0.0669)	(0.434)
Child Controls	Yes	Yes	Yes
Mother Controls	Yes	Yes	Yes
Household Controls	Yes	Yes	No

Observations	21,905	21,905	21,905
R-squared	0.114	0.059	0.021
Number of cluster id	-	2,020	-
Cluster FE	-	Yes	No
Number of household id	-	-	7,606
Household FE	-	-	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' own calculation

Table 6: Comparison of MICS 11 & MICS 14 data sets for Height for Age z-scores.

	OLS		**Cluster FE**		**Household FE**	
Dependent Variable : Height for Age(z- scores)	MICS 2011	MICS 2014	MICS 2011	MICS 2014	MICS 2011	MICS 2014
Early Childbearing (age at first birth<20=1)	-0.128*** (0.0237)	-0.0907** (0.0420)	-0.107*** (0.0264)	-0.0613** (0.0248)	-0.111 (0.108)	-0.0170 (0.0596)
Constant	-0.955***	-1.875*** (0.114)	-0.926*** (0.0578)	-1.874***	-0.171 (0.521)	1.121** (0.544)

	(0.0519)			(0.0813)		
Observations	25,250	21,758	25,250	21,758	25,250	21,758
R-squared	0.124	0.112	0.094	0.053	0.112	0.017
Number of cluster id	-	-	6,220	2,018	-	-
Cluster FE	-	-	Yes	Yes	-	-
Number of household id	-	-	-	-	16,015	7584
Household FE	-	-	-	-	Yes	-
Child Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mother Controls	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	No	No

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' own calculation

Table 7: Comparison of MICS 11 & MICS 14 data sets for Weight for Age z-scores

	OLS		**Cluster FE**		**Household FE**	
Dependent Variable : Weight for Age(z-scores)	MICS 2011	MICS 2014	MICS 2011	MICS 2014	MICS 2011	MICS 2014
Early Childbearing (ageatfirstbirth<20=1)	-0.0742***	-0.0583*	-0.0561***	-0.0438**	-0.0148	-0.159***
	(0.0196)	(0.0336)	(0.0213)	(0.0203)	(0.0867)	(0.0473)
Constant	-1.450***	-1.844***	-1.477***	-1.888***	-0.885**	-1.075**
	(0.0426)	(0.0972)	(0.0466)	(0.0667)	(0.421)	(0.433)
Observations	25,574	21,905	25,574	21,905	25,574	21,905
R-squared	0.102	0.114	0.048	0.059	0.019	0.019
Number of cluster id	-	-	6,235	2,020	-	-
Cluster FE	-	-	Yes	Yes	No	No
Number of household id	-	-	-	-	16,146	16,146
Household FE	-	-	-	-	Yes	Yes
Child Controls	Yes	Yes	Yes	Yes	Yes	Yes

Mother Controls	Yes	Yes	Yes	Yes	Yes	Yes
Household Controls	Yes	Yes	Yes	Yes	No	No

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' own calculation