

THE CONTRIBUTION OF MATERNAL EDUCATION TO CHILD
HEALTH

by

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Abstract

Using data from the Demographic and Health Surveys for Nigeria, we re-examine the intergenerational effect of maternal education on the child health measures: height-for-age, weight-for-age, and weight-for-height. The study finds a positive association between maternal education and child health. We contribute to the existing literature by analyzing the underlying mechanisms behind the association between maternal education and child health. Our analysis highlights that the impacts of maternal education on children's health can be partially explained by fertility behavior, access to health knowledge, characteristics of the husband, employment status, and empowerment of the mother.

We observe that by introducing socioeconomic status controls into our models, the impact of maternal education on child health diminishes as the education of the mother is correlated with higher socioeconomic status. Our findings highlight the significant differences between Nigerian regions as captured by region of residence fixed effects.

To maximize the benefits of maternal education, policymakers may benefit from understanding the underlying processes. Considering the persistent and long-term effects of early childhood health, our results emphasize the importance of the educational attainment of the mother for enhancing economic and social welfare in Nigeria.

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Chapter 1

Introduction

The effects of poor early-life health, such as malnutrition in infancy, may be seen throughout a person's life, including reduced educational achievement, increased susceptibility to chronic illnesses, and a decline in both productivity and wages [Martorell, 1999; Case et al., 2005; Briend and Berkley, 2016]. It is therefore important to investigate which elements determine child health and steps that could be taken to improve it. Numerous studies suggest that maternal education is an important determinant of the health of a child [Grossman, 1972; Thomas et al., 1991; Schultz, 1993; Schultz, 2002; Grossman, 2006; Chou et al., 2010; Keats, 2018]. Education might have direct and/or indirect effects on child health. As a direct effect, for example, education can increase the capacity of the mother to acquire, absorb, and process information, which may result in good parenting. Educated mothers may have a better understanding of medical practices and, as a result, be more aware of the advantages of medical treatment [Dincer et al., 2014]. As an indirect effect, for example, mothers with more education may earn higher incomes. A higher education may open doors to better-paying jobs that require more training and experience, and the extra money earned from these jobs can be used toward improving one's health and preparing for health-related emergencies. On the other hand, numerous studies have indicated that a mother's employment could have a negative effect on the child's health [Jakaria et al., 2022]. Another channel that may explain the favorable effects of a mother's education on child health could be assortative mating. Numerous studies report a strong association between female education and the educational attainments of the husband [Pencavel, 1998; Behrman and Rosenzweig, 2002; Fernandez et al., 2005; Anderberg and Zhu, 2014]. Previous research suggests that, if the husband is educated, his wife is more likely to utilize maternal health services [Jithesh and Ravindran, 2015; Singh et al., 2015; Sahoo et al., 2015]. Case et al. [2002] find that parents' long-term income has a significant impact on their children's health. Furthermore,

increased education may raise the potential cost of having children, causing people to reconsider their reproductive options or postpone having children. Education reduces fertility, as well as delays it because of the increased opportunity cost of childbirth for women [Barro and Becker, 1988]. Healthcare use and delivery in a health facility have been linked to better health outcomes for children [Karra et al., 2017], and we can learn from Nigerian research that better educated women are more likely to seek medical attention for their sick children [Adedokun et al., 2017] and to give birth in a health facility [Onah et al., 2006]. While all of these mechanisms might explain a favorable link between maternal education and child health, the empirical evidence to establish them is very limited.

There is a lack of consensus among researchers as to whether maternal education improves the health of children. Although previous studies have documented that maternal education plays an important role in improving the health of children, we can find contradictory empirical evidence on the relationship between maternal education and child health [Lindeboom et al., 2009; McCrary and Royer, 2011]. For example, Lindeboom et al. [2009] found that raising the school leaving age by one year had little impact on children’s health.

To address these concerns, we investigate the relationship between maternal education and child health by using several years of data that contain a rich set of potential contributing factors to child health. We contribute to the existing literature by examining the underlying mechanism behind the relationship between maternal education and child health. We use data from the Nigerian Demographic and Health Surveys (DHS). Nigeria is Africa’s most populous country and largest economy, with substantial variation in terms of living standards, the prevalence of poverty, levels of educational attainment, and child health [World Bank, 2020]. The DHS surveys collect extensive data on women, children, and men, as well as nutritional information on the children. Importantly, the DHS surveys also collect information on height-for-age, weight-for-height, and weight-for-age. We use an ordinary least squares model for our estimations. Due to regional variation and the rich dataset, we are able to control for region fixed effects. Each estimate shows the coefficient on maternal education when each child’s health outcome is regressed on the mother’s education. Controls include birth order number, mother’s age, child’s age, sex of child, residence, religion, wealth

index, household head's gender and household size.

We find that an increase in educational attainment of the mother is associated with an increase in height-for-age and weight-for-age by about 0.34 and 0.35 percentiles, respectively. Weight-for-height rises by 0.18 percentiles with each additional year of schooling for the mother. We explore the potential importance of unobserved geographic factors by incorporating fixed effects for Nigerian regions into the regression models and find that the results remain robust to region fixed effects. We investigate various potential pathways through which maternal education influences child health. We provide evidence that the effects of maternal education on children's health might be, at least in part, attributable to broad categories of mechanisms: the mother's fertility behavior, access to health knowledge, characteristics of the husband, employment status, and empowerment of the mother. We find evidence that mothers with higher levels of education are more likely to wait longer to have their first child, postpone marriage, marry men with higher levels of education, have certain occupation types, and have a lower desire for having children. More educated mothers also have a propensity to give birth in a formal medical facility and to get professional help with the delivery. Education also encourages mothers to obtain information through television, radio and the Internet. Educated mothers are more likely to adopt methods of contraception, to be the decision maker on money spending, as well as to participate in the labor market. It is interesting to compare our findings to those of two studies that were carried out in the US and the UK by McCrary and Royer [2011] and Lindeboom et al. [2009] respectively. In those studies, the researchers demonstrate that there is no such positive link between maternal education and child health. This appears to contrast with what we discovered. These two studies were carried out in developed countries like the US and the UK, which have highly established healthcare systems and typically greater levels of education. Our research, on the other hand, is being carried out in Nigeria, a developing nation with comparatively lower levels of maternal education, a worse healthcare system, and a growing population. In this context, maternal education will have a greater impact. This may help to partly explain why the results are so disparate.

Previous studies have shown that children's health is a key predictor of future socioeconomic outcomes later in life [Case et al., 2002, 2005; Black and Devereux,

2011]. Health outcomes, educational achievement, and earnings in adulthood have all been shown to be negatively impacted by poor childhood health [Currie 2009; Dewey and Begum 2011]. Consequently, our results highlight the significance of maternal education in improving economic and social circumstances for the next generation.

Our research contributes to our understanding of the link between intergenerational education transmission and child health in several ways. First, we begin by looking at Nigeria, which is one of the developing countries with a rapidly growing population, has a worse healthcare system in addition to relatively low levels of education. Therefore, there is a great scope for maternal education to have a considerable impact. Second, the information provided in the data used enables us to analyze the various pathways that could in part explain the favorable influence of maternal education on child health outcomes. Third, recognizing these potential channels, mainly fertility behavior, access to health knowledge, characteristics of the husband, employment status, and empowerment of the mother, may assist policymakers in developing more effective programs to amplify the positive impacts of maternal education. Finally, instead of comparing nations and using between country-level variations, we can do analyses using variation within countries which allows us to obtain more credible estimates of the relationship between the educations of the mother and child health by incorporating local geographic area fixed effects.

The remainder of this paper is organized as follows: A literature review is provided in the next section. Then we explain the data and the empirical approach. Next, we present our estimation findings. The final section concludes the paper.

Chapter 2

Literature Review

Past research has focused a significant amount of attention on maternal education as a potential factor leading to improvements in child health. The school building initiative in Indonesia was utilized by Breierova and Duflo [2004] to find that the mortality rate is lower for children who were born to parents with higher levels of education. Grepin and Bharadwaj [2015] found that there is a positive causal correlation between a mother's level of education and her child's death rate. They were able to draw this conclusion by utilizing the development of secondary schools in Zimbabwe. In the case of Indonesia and Bangladesh, Semba et al. [2008] discover that maternal education is an important determinant of child stunting. Aslam and Kingdon [2012] find, based on anthropometric measurements, that children born in Pakistan to mothers with higher levels of education had better health outcomes. The authors believe that a causal interpretation may be drawn from their association. Alderman and Headey [2017] investigate the possible causal connections between child nutrition and parental education. Using data from 56 developing countries, they found that the educational attainment of the mother was more important than that of the father in terms of improving child health. Their results show that the benefits of education are uncertain and vary, but the more strict models show that even if very ambitious education goals were met, stunting rates in high-burden countries would only go down by a small amount.

Using panel data from the 2008, 2010, 2014, and 2016 waves of the National Income Dynamic Research data, Ohonba et al. [2019] revisit the association between maternal education and child health in South Africa and conclude that maternal education appears to have a significant impact on child health outcomes. They discovered that maternal education has a crucial impact on the prevention of child malnutrition and stunting.

In the context of Nigeria, Ahmed and Iqbal [2007] evaluate the influence of maternal education on children's height-for-age using data that was collected in a cross-sectional fashion. Post-primary education, which refers to schooling beyond the first six years of formal education, was shown to have a significant influence on children's health, but primary education, which refers to the first six years of formal education, had no effect. Osili and Long [2007] evaluate the causal influence of female schooling on reproduction in Nigeria. The study uses the universal primary education (UPE) program in Nigeria and data from the 1999 Nigerian DHS to evaluate UPE's influence on fertility. The authors compare high and low UPE intensity states by enrolment rate. In high intensity states, educated women had fewer births than control group women. They decided UPE was a suitable factor for education, suggesting each extra year of schooling decreases births by 26%. Balogun et al. [2017] used data from the first wave of the Nigeria General Household Survey-Panel to come to the conclusion that children whose mothers had completed their education were more likely to receive a full course of vaccinations. This was found to be the case in part due to the benefits that literacy and improved health seeking behavior provide to mothers. This demonstrates the significance of the role that education plays in the explanation of the connection between maternal education and vaccine uptake. According to the findings of the study, another way in which maternal education impacts the rate of vaccination uptake is via the economic status of the family. Data from the Nigerian DHS of 2013 was utilized by Adewusi and Nwokocha [2018]. Despite the fact that other variables such as household size and religious affiliation, wealth index, and the gender of the head of household had a major impact on these women, they discovered that child mortality is higher among mothers with no formal education than among mothers with other levels of education. Fayehun and Asa [2020] used Nigeria's DHS birth recode file data to achieve the following conclusion. In Nigeria's north, low birth weight was more common than high birth weight, but in the south, it was the opposite. These inequalities could be explained by Nigeria's uneven urbanization. These disparities could be explained by the fact that different parts of Nigeria have experienced varying degrees of urbanization.

The association between the mother's education and the child's health raises a few issues. To begin with, despite the fact that a large number of studies indicate

a favorable correlation between a mother's level of education and the health of her children, other research suggests that this correlation does not exist [Lindeboom et al., 2009; McCrary and Royer, 2011]. McCrary and Royer [2011] use age-at-school-entry policies to determine the causal influence of female education on newborn health and reproductive outcomes. The authors used confidential data from the Departments of Health in Texas and California from 1989 to 2002. The authors discover that school entrance regulations affect female education but that their impacts on infant health and fertility are minimal and possibly heterogeneous. Based on information gathered from the National Institute of Child Development, Lindeboom et al. [2009] investigate the impact that parental education has on the health of children. The authors take advantage of the education reform that occurred in 1947 and increased the minimum age at which students in the UK are required to graduate from high school. According to the findings of the research, raising the minimum age for dropping out of school by one year had very little effect on the children's overall health. We note that studies by McCrary and Royer [2011] and Lindeboom et al. [2009], conducted in the US and the UK, respectively, are representative of developed countries with well-developed healthcare systems and generally higher levels of education.

The second issue is that only a few studies look at the mechanisms through which maternal education improves the health of children. Using data from the Demographic and Health Surveys and the Global Administrative Areas database, Burroway and Hargrove [2018] demonstrate that not all Nigerians benefit from economic growth. This is shown by the large regional differences in vaccination coverage. Even after adjusting for a wide variety of other household and community characteristics, the multi-level models demonstrate that the education level of women has a high link with the number of people who get immunized at both the individual and community levels. According to their findings, a rise in the number of women attending school leads to better health for the entire community as well as for the children of those women. According to the findings of the study, another way in which maternal education impacts the rate of vaccination uptake is via the economic status of the family. Gunes [2015] discovers the positive causal impacts of a mother's education on child health by implementing Turkey's obligatory schooling reform. The author discovers that the positive impact of the mother's education on child health is due to

the increasing age at first delivery and a lower desire for having children. Keats [2018] investigates the connection between a mother's level of education and the health of her children by using the abolition of school fees in Uganda's elementary schools. The author reveals that higher levels of education for mothers are associated with better health outcomes for their offspring. In addition, the author demonstrates that work possibilities and better use of contraception are two processes that contribute to the positive effect that is caused by maternal education.

The third issue that arises in relation to the connection between a mother's education and her child's health is that very few studies examine the relationship in a developing country with relatively lower levels of maternal education, a worse health-care system, and a growing population, where maternal education will make more of a difference on the margin. This is why we are concentrating on Nigeria, since it fulfills these criteria. Given Nigeria's overall economic progress and the prevailing assumption that economic development is the most significant pathway for generating greater health and welfare, the country has not experienced the broad improvements in well-being that are frequently linked to higher GDP, making it a fascinating case study.

Our paper seeks to address these concerns by controlling for important cofounders across time, as well as controlling for local time invariant effects with the inclusion of Nigerian region fixed effects. Our study makes important contributions to our knowledge of how intergenerational education transmission and child health are related. As a developing nation with a fast expanding population and relatively low levels of maternal education, Nigeria is an intriguing country to examine since maternal education will have a stronger influence. Second, we are able to investigate the numerous paths that may help to partially explain the positive impact of educated mothers' advantages on child health outcomes because we employ a wide coverage of data. Third, by identifying these possible routes, policymakers may be better able to create programs that will magnify the benefits of maternal education. By concentrating on only one nation, Nigeria, rather than comparing data from several nations, we are able to include local geographic regions of residence as well as a variety of factors that could vary across countries and be related to education and child health outcomes in our calculation.

Chapter 3

Data and Empirical Framework

Our data comes from the DHS, which gives rich socioeconomic and demographic information on women and children. The DHS ¹ are conducted in more than 90 developing nations and cover a broad variety of themes, including population, health, and nutrition.

The DHS provides four types of questionnaires, which include Household, Woman, Man, and Biomarker. The Woman's Questionnaire includes women during their reproductive ages (15–49) and gathers information on a woman's background characteristics, the husband's background, health behaviors, the child's health and nutrition status, and fertility patterns. The Biomarker Questionnaire collects information on the child's anthropometry (height and weight), and HIV test results. The Man's Questionnaire collects information on background characteristics and health behaviors among men. Typically, eligible household members include children under the age of 5 and women and men aged 15 to 49.

The DHS Program's fundamental strategy is to gather international data that can be compared across countries. To this end, standard model questionnaires have been created together with documented justifications for the inclusion of certain questions or parts. The questionnaires used in each nation are based on these sample forms, which have been reviewed and improved during each of the DHS Program's six stages. A nation is often invited to accept the model questionnaire as a whole, with the option to add items that are of specific relevance. However, if a question is inappropriate in a given nation, it may be removed from the model. Model questionnaires are used to gather data, which is then processed into standardized data formats known as Recode Files. All countries utilize the same recode definitions to create recode files that specify variables and their values, and then use those definitions to create their own recode files based on the most frequently used variables. Because the data

¹For more information on DHS you may visit the DHS webpage at <https://dhsprogram.com/data/> or <https://dhsprogram.com/publications/Recommended-Citations.cfm>

required for our analysis was not available prior to 1990, our data begins in 1990 and we use subsequent waves in 2003, 2008, 2010, 2013, 2015 and 2018. The cross sectional data has been pooled and models with region fixed effects are estimated. Table 3.1 displays summary statistics for selected variables. Overall, the sample contains data on 428,959 observations.

Table 3.1: Summary Statistics of Main Variables

Variable	Obs	Mean	Std. Dev.
Mother's Education	428,959	4.004	5.495
Birth Order Number	428,959	3.524	2.398
Mother's Age	428,959	35.408	8.068
Child's Age	356,183	9.710	7.533
Household Size	428,959	7.564	3.940
Child Health Outcomes			
Height-for-Age	72,686	33.669	37.894
Weight-for-Age	72,686	31.085	35.795
Weight-for-Height	73,179	43.577	34.972
Fertility Behavior			
Number of Children	428,959	6.011	2.889
Age at First Birth	422,435	18.523	4.082
Age at First Marriage	399,156	17.029	4.458
Access to Information			
Using the Internet	127,545	0.052	0.222
Listening to Radio	374,197	0.378	0.485
Watching TV	374,143	0.258	0.438
Characteristics of the Husband			
Husband's Education	388,700	6.817	12.651
Husband's Desire for Children	371,289	0.400	0.489
Employment Status			
Mother Currently Working	402,058	0.745	0.509
Mother Worked in Last 12 Months	374,447	0.741	0.437
Empowerment of the Mother			
Delivery at Health Facility	107,548	0.348	0.476
Decision Maker on Money Spending	224,125	0.900	0.298
Decision maker for Using Contraception	50,465	0.845	0.361
Received Vitamin Dose After Delivery	41,769	0.266	0.442

We also use other indicator variables as controls. These include the sex of the child, residence, religion, wealth index, household's head gender, and husband's occupation type.

3.1 Characteristics of the Mother

One important advantage of using the DHS Women file is that we can obtain a wide variety of characteristics of the mother. For our purpose, the key explanatory variable is the mother's education. We use education in single years completed. As we investigate the processes underlying our predicted impacts, we rely on data containing information on fertility behavior, access to health knowledge, characteristics of the husband, employment status, and empowerment of the mother. The mother may have more than one child in the data.

3.2 Model Specification

We estimate the relationship between maternal education and child health with an ordinary least square (OLS) model given by,

$$Health_{jit} = \alpha_0 + \alpha_1 Education_{jit} + \alpha_2 X_{jit} + \epsilon_{jit}, \quad (3.1)$$

where j, i, t refers to child, mother and time. $Health_{jit}$ is the dependent variable, and captures one of the following child health outcomes: height-for-age, weight-for-age, weight-for-height percentiles. These variables show how the child's anthropometric measurements compared to those of the reference population.

The key explanatory variable is the mother's education in single years, denoted by $Education_{jit}$. The error term is ϵ_{jit} . We control for observable factors affecting the mother's education and child health by incorporating different sets of controls into our models denoted by X_{jit} . To deal with endogeneity issues arising from omitted variables and measurement errors such as family endowments, we use a pooled cross-sectional analysis with a fixed effects technique. We also adjust for time trend, using linear time trend as well as quadratic time trend in our model.

Next, we study the possible pathways that could explain why children to more educated mothers might have better health outcomes. As a result, the following equation is estimated:

$$Pathway_{jit} = \beta_0 + \beta_1 Education_{jit} + \beta_2 X_{jit} + \epsilon_{jit}, \quad (3.2)$$

where the $Pathway_{jit}$ presents the possible ways in which maternal education may have an impact on child health. The additional control variables have already been

specified above. We take into account a variety of factors that have been hypothesized by previous research to be connected with child health quality, including fertility behavior, access to health knowledge, characteristics of the husband, employment status, and empowerment of the mother as dependent variables.

We measure a mother's fertility by the number of children she has ever had, her age at first birth, and her age at first marriage. We evaluate the mother's access to health information based on whether she obtains information through the Internet, television or radio. We control the characteristics of the husband, including the husband's education, the husband's type of occupation, as well as the husband's desire to have children. For the husband's type of occupation, we use whether the husband's type of occupation includes professor, technician, management, skilled manual or not. For employment status, we use whether the mother is currently working or whether she worked in the past 12 months. Finally, empowerment of the mother is measured by whether mother delivered her child in a health facility, whether she is the decision maker on money spending, whether she is the decision maker for using contraception, as well as whether she took vitamins after giving birth (more details are provided in Section 4.2).

3.3 Independent Variables

The main independent variable of interest is the mother's education, which is assessed in years. We also use other variables, including birth order number, mother's age, child's age, sex of child, residence, religion, wealth index, household head gender, and household size. We explore the potential importance of the role of unobserved geographic factors by including fixed effects for Nigerian regions in the regression models. Given the significant regional and cultural differences/inequities in Nigeria, controlling for region fixed effects helps to account for any time invariant regional and cultural differences related to both maternal education and child health. Therefore, the comparison is between women living in the same regions. We control for birth order number since firstborns outperform their laterborn siblings in human capital outcomes, according to studies on birth order [Becker and Lewis, 1973; Galor and Weil, 2000]. Household size is another variable that is incorporated in the regression

models since a large household is associated with limited financial resources that potentially negatively impact a child's health [Heaton et al., 2005]. The wealth index is a composite measurement of a household's total wealth. The wealth index is computed utilizing easily obtained information on a household's ownership of specific items, such as radio, electricity, refrigerator, motorcycle, car, telephone, TVs and bicycles, as well as home building materials and various kinds of water access and sanitation services. For developing nations, relatively few demographic surveys collect information on income or consumer expenditures, hence asset-based metrics of wealth are often employed to reflect socioeconomic position [Bollen et al., 2001]. Using principal component analysis, each family is assigned to a continuum of relative wealth. To assess the impact of wealth on numerous demographic, health, and nutrition metrics, the DHS divides all families questioned into five wealth quintiles. Since male children are more likely to be provided with health care services when preferences for a son are particularly strong [Parashar, 2005], we also include an indicator for whether the child is a male. This is also important since the child health literature finds that, at young ages, females tend to be healthier [Kraemer, 2000]. Even if these factors could account for some of the correlation between a mother's education and her children's health outcomes, they are unlikely to fully account for all of the positive effects of maternal education.

Chapter 4

Results

4.1 Main Findings

Estimates of the impact of the mother's education on child health are presented in Tables 4.1, 4.2 and 4.3. In each table, our first model, Columns 1 and 2, contains only variables for maternal education, child's birth order, child's age, mother's age, and sex of child. Fixed-effects models using the same set of variables reveal further declines in the impact of the educational attainment of the mother on child health outcomes. In the next model, Columns 3 and 4, we proceed to add another set of controls, including type of place of residence (urban/rural), and religion.² The final model, Columns 5 and 6, is our most comprehensive specification where we incorporate a full set of potential controls, making it our most detailed model. Consistent with other studies, all three models in all three tables show a positive relationship between maternal education and child health measured by height-for-age, weight-for-age, and weight-for-height percentile. In every instance, the patterns of statistical significance remain unchanged regardless of the variable controlled for. The percentiles for height-for-age, weight-for-height, and weight-for-age represent the position of the child's anthropometric measurements among the reference population. More precisely, an additional year of maternal education raises a child's height-for-age by 0.34 percentiles, weight-for-age by 0.35 percentiles, and weight-for-height by 0.18 percentiles. After controlling for extensive sets of potential controls, we find that our models still demonstrate a statistically significant and positive effect of mother education on child health. Even though potential control variables may partially explain the association between a mother's education and her child's health outcomes, they could barely account for all of the favorable impacts of maternal education. Our estimated benefits of maternal education on child health are similar to those seen in

²We do not use ethnicity as one of our controls for two different reasons. First regions also serve as a proxy for ethnicity. Second, data pertaining to ethnicity was unavailable for two cycles.

a number of other studies. According to the findings of the study that evaluated the intergenerational impacts of maternal education on child health using 68 developing countries over the course of roughly three decades, an increase of one year in maternal education leads to an increase of 0.55 percentiles in the child's height-for-age, 0.74 percentiles in the child's weight-for-age, and 0.51 percentiles in the child's weight-for-height [Le and Nguyen 2019]. Alderman and Headey [2017] discover that children who are born to mothers who have completed 13 or more years of schooling have a height that is nearly half a standard deviation higher than children who are born to mothers who have not completed any education. Keats [2018] finds that the return on investment for one additional year of a mother's schooling is represented by an increase in a child's height-for-age z-score of 0.43 standard deviations. The study was conducted on women in Uganda. According to Desai and Alva [1998], children whose mothers had secondary education have a height-for-age z-score that is approximately 0.23 standard deviations higher than children whose mothers did not have secondary education.

Table 4.1: Impacts of Maternal Education in Single Years on Height-for-Age

	(1)	(2)	(3)	(4)	(5)	(6)
Height-for-Age Percentile						
Mother's Education	1.113*** (44.23)	0.838*** (29.76)	0.752*** (24.78)	0.661*** (21.38)	0.407*** (11.40)	0.396*** (11.07)
Birth Order Number	-1.039*** (-13.93)	-0.837*** (-11.11)	-0.832*** (-11.08)	-0.765*** (-10.14)	-0.693*** (-8.40)	-0.656*** (-7.92)
Mother's Age	0.531*** (19.85)	0.437*** (16.10)	0.430*** (15.80)	0.398*** (14.59)	0.384*** (13.29)	0.365*** (12.57)
Child's Age	-4.050*** (-46.74)	-4.001*** (-46.54)	-4.000*** (-46.20)	-3.997*** (-46.48)	-3.843*** (-42.11)	-3.811*** (-42.03)
Sex of Child						
Male	-3.058*** (-12.91)	-3.066*** (-13.07)	-3.074*** (-13.00)	-3.069*** (-13.08)	-3.207*** (-12.91)	-3.211*** (-13.01)
Residence						
Urban			3.874*** (14.19)	4.082*** (14.80)	1.755*** (5.49)	1.721*** (5.31)
Religion						
Protestant			-0.299 (-0.72)	-1.098* (-2.54)	-2.978*** (-6.38)	-1.961*** (-4.05)
Other Christian			-4.792*** (-11.67)	-2.460*** (-5.39)	-7.628*** (-16.10)	-3.058*** (-5.65)
Islam			-7.313*** (-11.17)	-5.088*** (-6.33)	-10.90*** (-15.44)	-6.098*** (-7.02)
Wealth Index					2.490*** (18.74)	2.180*** (16.10)
Male Household's Head					0.440 (1.05)	1.060* (2.54)
Household Size					-0.101*	-0.105**
Region Fixed Effects	.	✓	.	✓	.	✓
Observations	64717	64717	64400	64400	58893	58893
R-squared	0.080	0.061	0.090	0.064	0.093	0.061

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.2: Impacts of Maternal Education in Single Years on Weight-for-Age

	(1)	(2)	(3)	(4)	(5)	(6)
Weight-for-Age Percentile						
Mother's Education	0.996*** (44.57)	0.746*** (29.85)	0.639*** (23.74)	0.566*** (20.61)	0.389*** (12.35)	0.377*** (11.91)
Birth Order Number	-0.763*** (-11.52)	-0.552*** (-8.26)	-0.582*** (-8.73)	-0.490*** (-7.32)	-0.466*** (-6.39)	-0.396*** (-5.40)
Mother's Age	0.392*** (16.50)	0.304*** (12.60)	0.300*** (12.44)	0.267*** (11.01)	0.263*** (10.32)	0.235*** (9.16)
Child's Age	-3.131*** (-40.71)	-3.078*** (-40.32)	-3.081*** (-40.15)	-3.070*** (-40.21)	-2.891*** (-35.86)	-2.865*** (-35.70)
Sex of Child						
Male	-1.811*** (-8.61)	-1.815*** (-8.71)	-1.839*** (-8.77)	-1.841*** (-8.83)	-1.920*** (-8.75)	-1.930*** (-8.84)
Residence						
Urban			2.152*** (8.89)	2.389*** (9.76)	0.425 (1.50)	0.670* (2.34)
Religion						
Protestant			-0.618 (-1.67)	-1.101** (-2.86)	-2.841*** (-6.89)	-2.309*** (-5.39)
Other Christian			-7.105*** (-19.52)	-4.645*** (-11.46)	-9.591*** (-22.91)	-5.884*** (-12.30)
Islam			-6.996***	-6.401***	-9.799***	-7.538***
Wealth Index					1.915*** (16.31)	1.580*** (13.18)
Male Household's Head					0.732* (1.98)	1.090** (2.96)
Household Size					-0.081* (-2.34)	-0.061 (-1.76)
Region Fixed Effects	.	✓	.	✓	.	✓
Observations	64717	64717	64400	64400	58893	58893
R-squared	0.070	0.050	0.080	0.050	0.090	0.047

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.3: Impacts of Maternal Education in Single Years on Weight-for-Height

	(1)	(2)	(3)	(4)	(5)	(6)
Weight-for-Height Percentile						
Mother's Education	0.300*** (11.85)	0.257*** (9.08)	0.169*** (5.53)	0.172*** (5.52)	0.136*** (3.77)	0.174*** (4.83)
Birth Order Number	-0.161* (-2.15)	-0.088 (-1.17)	-0.121 (-1.60)	-0.070 (-0.93)	-0.074 (-0.89)	-0.022 (-0.27)
Mother's Age	0.070** (2.62)	0.050 (1.85)	0.045 (1.67)	0.035 (1.29)	0.036 (1.26)	0.022 (0.75)
Child's Age	0.069 (0.80)	0.072 (0.84)	0.087 (1.00)	0.079 (0.92)	0.187* (2.02)	0.182* (2.00)
Sex of Child						
Male	-0.537* (-2.26)	-0.520* (-2.20)	-0.545* (-2.29)	-0.540* (-2.29)	-0.560* (-2.23)	-0.557* (-2.24)
Residence						
Urban			-1.270*** (-4.62)	-0.866** (-3.13)	-1.452*** (-4.50)	-0.832* (-2.55)
Religion						
Protestant			0.096 (0.23)	-0.211 (-0.48)	-0.900 (-1.91)	-1.193* (-2.44)
Other Christian			-4.954*** (-12.00)	-4.387*** (-9.59)	-6.433*** (-13.44)	-5.842*** (-10.71)
Islam			-2.050** (-3.14)	-3.895*** (-4.85)	-3.181*** (-4.50)	-4.426*** (-5.07)
Wealth Index					0.200 (1.49)	-0.054 (-0.40)
Male Household's Head					1.112** (2.63)	0.909* (2.16)
Household Size					-0.043 (-1.09)	-0.001 (-0.03)
Region Fixed Effects	.	✓	.	✓	.	✓
Observations	65178	65178	64860	64860	59025	59025
R-squared	0.003	0.017	0.009	0.012	0.010	0.021

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In Table 4.4 we compare the results of the impact of maternal education on child health for height-for-age, weight-for-age, and weight-for-height. In terms of household size, we anticipate finding a negative association between health and household size since a child's health requirements might be jeopardized in big homes when few resources are divided among many [Heaton et al., 2005]. We find a significant negative association between household size and height-for-age but this negative relationship is not statistically significant for the other two categories mainly, weight-for-age and weight-for-height. Because living in an urban region provides easier access to educational opportunities and medical treatment [Brady et al., 2007], we anticipate seeing a favorable correlation between an urban area of residence and a child's health. Our findings do not provide credence to this hypothesis as we observe both positive and negative associations between urban household and child health measures. Our findings reveal in Columns 1 and 2 a substantial, positive, and sizable link between children's health and wealth index. The research on birth order stresses the relevance of parental investments in explaining why firstborns outperform their laterborn siblings in terms of human capital outcomes. According to the literature, maintaining the same "quality" children, with the same level of education or health, becomes more costly with each new child, suggesting that parents spend less on laterborn children [Becker and Lewis, 1973; Galor and Weil, 2000]. Our findings support this theory since we can find an inverse correlation between the birth order number and health, which can be observed in Columns 1 and 2. Measures of child health and the mother's age seem to have a beneficial relationship, which can be observed in Columns 1 and 2. This might be because, according to primary data from District Bahawalpur, empowerment is heavily impacted by age [Khan and Noreen, 2012]. Our findings reveal a negative association between being a male and child health for all three measures of child health. In the literature on child health, it is widely accepted that female children are healthier. We see a favorable correlation between a male household head and child health. Buvinic and Gupta [1997] found that female-headed families are more likely to be poor than those led by men. This implies that they may not be able to afford health care.

Table 4.4: Impacts of Maternal Education in Single Years on Child's Health

	(1)	(2)	(3)
	Height-for-Age Percentile	Weight-for-Age Percentile	Weight-for-Height Percentile
Mother's Education	0.336*** (9.28)	0.350*** (10.91)	0.184*** (5.04)
Birth Order Number	-0.591*** (-7.12)	-0.364*** (-4.96)	-0.024 (-0.29)
Mother's Age	0.331*** (11.36)	0.219*** (8.48)	0.024 (0.83)
Child's Age	-3.792*** (-41.85)	-2.856*** (-35.59)	0.185* (2.02)
Sex of Child			
Male	-3.206*** (-13.00)	-1.927*** (-8.83)	-0.557* (-2.24)
Residence			
Urban	1.398*** (4.28)	0.534 (1.85)	-0.681* (-2.07)
Religion			
Protestant	-1.811*** (-3.75)	-2.235*** (-5.22)	-1.222* (-2.50)
Other Christian	-3.108*** (-5.75)	-5.892*** (-12.30)	-5.835*** (-10.68)
Islam	-5.981*** (-6.89)	-7.468*** (-9.72)	-4.295*** (-4.90)
Wealth Index			
Poorest	-1.963*** (-4.74)	-2.208*** (-6.02)	-0.723 (-1.73)
Poorer	-1.220** (-3.10)	-1.223*** (-3.51)	-0.155 (-0.39)
Richer	2.512*** (6.11)	1.431*** (3.94)	-0.833* (-2.01)
Richest	8.479*** (17.27)	5.009*** (11.52)	-0.950 (-1.92)
Male Household's Head	0.672 (1.61)	0.914* (2.47)	0.990* (2.35)
Household Size	-0.084* (-2.15)	-0.051 (-1.48)	-0.002 (-0.07)
Region Fixed Effects	✓	✓	✓
Observations	58893	58893	58893
R-squared	0.063	0.050	0.021

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.2 Potential Pathways

There are potential mechanisms that could explain the positive impact that educational attainment of the mother has on child health outcomes. In this section, we study those channels, including: fertility behavior, access to health knowledge, characteristics of the husband, employment status, and empowerment of the mother.

Fertility Behavior

Lower educational achievement is associated with higher fertility [Paranjothy et al., 2009; Lavy and Zablotsky, 2015; Keats, 2018]. An increase in educational achievement may lead to a woman's empowerment and, in return, result in lower fertility through gains in women's decision making. Compared to uneducated women, educated women tend to delay childbearing [Grepin and Bharadwaj, 2015; Neels et al., 2017]. Women who have completed more schooling are more likely to postpone marriage due to the fact that they remain in school for longer periods of time. Child health might possibly suffer as a result of postponing childbirth. Delayed child-bearing could be linked to an increased risk of infertility, pregnancy complications, and adverse pregnancy outcomes [Johnson et al., 2012]. Conversely, having a child at a younger age may inhibit educational attainment. However, because the age of first birth is 18, delaying child birth does not necessarily increase the age of first birth to a level where it might become detrimental to child health.

For fertility behavior, we use the number of children ever born, the age of the mother when she had her first child and the age at first marriage. We see from Column 1 of Table 4.5, that an additional one-year increase in a mother's education results in a very small and statistically insignificant decrease of 0.0002 births. We see from Column 2 of Table 4.5, that an extra year of maternal education adds 0.08 years to the mother's age at first birth. An additional one-year increase in a mother's education also results in an increase in age at first marriage by 0.13 years, see Column 3 of Table 4.5. These estimates imply that positive effects of maternal education on child health could be partially explained by fertility behavior.

Table 4.5: Fertility Behavior Pathway

	(1)	(2)	(3)
	Number of Children Born	Age at First Birth	Age at First Marriage
Mother's Education	-0.0002 (-0.64)	0.076*** (35.07)	0.127*** (45.49)
Birth Order Number	0.982*** (1043.34)	-1.731*** (-343.37)	-1.274*** (-195.98)
Mother's Age	-0.007*** (-22.20)	0.688*** (389.72)	0.528*** (230.32)
Child's Age	0.247*** (236.66)	-0.651*** (-118.24)	-0.511*** (-72.32)
Sex of Child			
Male	-0.001 (-0.39)	-0.013 (-0.91)	0.010 (0.54)
Residence			
Urban	-0.001 (-0.46)	0.020 (1.02)	0.112*** (4.39)
Religion			
Protestant	-0.003 (-0.66)	-0.086** (-3.03)	-0.050 (-1.28)
Other Christian	0.017** (2.75)	-0.032 (-0.97)	-0.566*** (-12.94)
Islam	0.006 (0.55)	-0.010 (-0.17)	-0.574*** (-7.79)
Wealth Index	-0.001 (-0.99)	0.045*** (5.55)	0.185*** (17.43)
Male Household's Head	0.058*** (11.62)	0.332*** (12.64)	0.232*** (6.67)
Household Size	0.016*** (35.02)	0.005* (2.40)	-0.024*** (-7.97)
Region Fixed Effects	✓	✓	✓
Observations	100949	94689	87678
R-squared	0.967	0.660	0.466

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Access to Health Knowledge

Next, we examine if an increase in a mother's access to information and health awareness could be a potential mechanism for the effects on child health. We argue that educated mothers may have better access to health knowledge. Parents are better able to make decisions regarding their children's health and nutrition when they have more health knowledge. It has an effect on health-related behaviors such as lifestyles, and it influences the health behaviors and lifestyles of parents, particularly mothers, which in turn has an effect on the health of their children [Dincer et al., 2014].

They can learn more by using the Internet, listening to the radio, and watching television, and they will have a higher understanding of the advantages of medical childcare in general. Maternal education may, in fact, boost a person's capacity to absorb and process information about health issues. This may lead to potential positive effects on child health [Gipson et al., 2008; Agüero and Bharadwaj, 2014; Dincer et al., 2014].

In general, Health Information Seeking Behavior (HISB) refers to the ways in which people receive information regarding health, sickness, health promotion, and health hazards [Lambert and Loiselle, 2007]. There are numerous studies that investigate the access to health knowledge through watching TV, listening to the radio, reading newspapers, and using the Internet. Using data from 24 countries that was gathered using a rigorous and trustworthy web-based questionnaire, Lagan et al. [2010] conclude that the Internet significantly influenced the respondents' decisions regarding their pregnancy-related health information needs. Hence, health practitioners should be prepared to assist pregnant women with online data retrieval, interpretation, and application, according to the authors. Gavgani et al. [2013], investigated the HISB in Iran to conclude that TV and discussions with others were the most popular sources of health information. Another study conducted in Brazil found that the Internet is an important source of health information for the population [Moretti et al., 2012]. Cutilli [2010] studied the HISB and concluded that in addition to the information supplied by healthcare experts, people utilize additional sources of health information such as TV, radio, newspapers, magazines, the Internet, etc.

Jensen and Oster [2009] examine how viewing cable television affects perceptions of women in India. They uncover that the introduction of cable television increases female school enrollment and women's autonomy while decreasing fertility, son preference, and the perceived tolerance of beating.

Whether mother uses the Internet, watches television or listens to the radio may capture access to health knowledge. We create three dummy variables to investigate access to health information. The first dummy variable is one if the mother uses the Internet and zero otherwise; the second is one if the mother gets information from the radio; and the third dummy variable is one if the mother gets information from television. For binary variables, we use linear probability model regressions. We see from Column 1 Table 4.6, that the probability that mothers use the Internet to obtain information increases by 1.2 percentage points with each additional year of schooling. Moreover, we see from Columns 2 and 3, an additional year of education rises the probability of mothers obtaining information by listening to the radio as well as watching television by 0.5 and 0.9 percentage points, respectively. The results imply that access to health knowledge is another potential pathway that contributes to the positive impacts of maternal education on child health.

Table 4.6: Access to Health Knowledge Pathway

	(1)	(2)	(3)
	Using the Internet	Listening to the Radio	Watching TV
Mother's Education	0.012*** (33.57)	0.005*** (10.49)	0.009*** (15.66)
Birth Order Number	-0.014*** (-15.25)	-0.001 (-1.01)	-0.002 (-1.35)
Mother's Age	0.004*** (15.00)	0.002*** (3.84)	-0.0006 (-1.26)
Child's Age	-0.004*** (-3.90)	0.0008 (0.55)	-0.0008 (-0.50)
Sex of Child			
Male	-0.004 (-1.41)	0.001 (0.41)	0.006 (1.43)
Residence			
Urban	0.017*** (5.36)	0.011* (2.16)	0.015** (2.89)
Religion			
Protestant	0.005 (1.04)	0.005 (0.66)	0.040*** (5.50)
Other Christian	0.042*** (8.41)	0.079*** (10.65)	0.070*** (8.96)
Islam	0.063** (2.86)	0.073*** (4.96)	0.109*** (5.82)
Wealth Index	0.028*** (20.56)	0.039*** (18.37)	0.111*** (42.26)
Male Household's Head	-0.001 (-0.24)	0.008 (1.26)	-0.0002 (-0.03)
Household Size	-0.0003 (-0.79)	-0.0007 (-1.03)	0.0002 (0.28)
Region Fixed Effects	✓	✓	✓
Observations	30559	51835	37842
R-squared	0.181	0.070	0.124

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Characteristics of the Husband

Siow [2015], argues that there is assortative mating with highly educated men and women being more likely to marry each other. Education increases social connections with potential partners, hence improving the probability of finding someone with comparable educational levels [Anderberg and Zhu, 2014; Mansour and McKinnish, 2014]. A higher level of education usually results in working in occupations that pay more. The additional money generated from these positions may be utilized to improve one's health and to prepare for any health-related crisis that may arise. Case et al. [2002] observe that the income of the parents has long-term effects on the health of the children.

In return, the endowments of the parents lead to better child health outcomes through the effect of parental education on the families' financial resources [Lindeboom et al., 2009; Chou et al., 2010]. We capture the characteristics of the husband by the husband's education, the husband's type of occupation, as well as the husband's desire to have children. We generate two dummy variables, the first takes the value of one if the husband's type of occupation includes professor, technician, management, or skilled manual, and zero otherwise. The second dummy variable takes the value of one if the husband desires having children and zero otherwise. We see from Column 1 Table 4.7, that an additional one-year increase in the mother's education results in an increase in the husband's educational attainment by 0.50 years, demonstrating that assortative matching may help to explain why maternal education has positive effects on children's health. Furthermore, if the mother has an additional year of education, the likelihood of the husband being employed as a professor, technician, management, or skilled manual increases by 1.2 percentage points, see Column 2. This demonstrates that women with higher levels of education often marry men with higher levels of education and better-paying jobs. We also observe from Column 3, Table 4.7, that the mother's education decreases the likelihood of the husband's desire to have children by 0.9 percentage points. The findings suggest that the husband's education may play a role in explaining the favorable effects of maternal education on child health.

Table 4.7: Characteristics of the Husband Pathway

	(1)	(2)	(3)
	Husband's Education	Husband Occupation	Husband's Desire for Children
Mother's Education	0.503*** (127.92)	0.012*** (32.89)	-0.009*** (-19.77)
Birth Order Number	-0.03** (-3.21)	-0.004*** (-4.40)	0.005*** (4.52)
Mother's Age	-0.026*** (-8.23)	0.002*** (8.02)	-0.002*** (-5.65)
Child's Age	-0.022* (-2.23)	-0.001* (-1.96)	0.001 (1.60)
Sex of Child			
Male	0.023 (0.85)	0.002 (0.79)	-0.002 (-0.92)
Residence			
Urban	-0.128*** (-3.60)	0.044*** (12.75)	-0.011** (-2.70)
Religion			
Protestant	0.412*** (7.77)	0.059*** (11.30)	0.005 (0.79)
Other Christian	-0.659*** (-12.26)	0.101*** (19.26)	0.184*** (29.69)
Islam	-0.953*** (-9.49) (3.58)	0.052*** (5.39) (-0.08)	0.146*** (12.67) (2.45)
Wealth Index	1.238*** (84.85)	0.063*** (44.69)	-0.023*** (-13.67)
Male Household's Head	-0.543*** (-10.84)	-0.033*** (-6.93)	-0.007 (-1.25)
Household Size	0.027*** (6.17)	0.001*** (3.49)	0.015*** (30.76)
Region Fixed Effects	✓	✓	✓
Observations	85125	86365	84847
R-squared	0.537	0.156	0.131

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.8: Employment Status Pathway

	(1)	(2)
	Currently Working	Worked in the Last 12 Months
Mother's Education	0.007*** (15.32)	0.007*** (15.66)
Birth Order Number	0.009*** (8.94)	0.010*** (10.23)
Mother's Age	0.009*** (26.10)	0.009*** (26.17)
Child's Age	0.012*** (11.20)	0.012*** (11.22)
Sex of Child		
Male	-0.001 (-0.41)	-0.001 (-0.38)
Residence		
Urban	-0.0005 (-0.13)	0.0004 (0.11)
Religion		
Protestant	-0.009 (-1.68)	-0.017** (-2.99)
Other Christian	-0.151*** (-25.56)	-0.164*** (-28.15)
Islam	-0.116*** (-10.52)	-0.133*** (-12.24)
Wealth Index	0.006*** (3.90)	0.003 (1.78)
Male Household's Head	-0.027*** (-5.15)	-0.024*** (-4.81)
Household Size	-0.0007 (-1.50)	0.00008 (0.17)
Region Fixed Effects	✓	✓
Observations	89106	86753
R-squared	0.078	0.083

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment Status

Educated women are better equipped to work in the formal economy and participate in productive activities, so we expect educated women to be more successful in finding employment and, in return obtaining an income [Oyitso and Olomukoro, 2012; Idris and Agbim, 2015]. In particular, a higher level of education is associated with higher earnings, and this improvement in financial resources can be used to invest in the health of children [Case et al., 2002]. However, a number of studies have shown that a mother's employment may also have detrimental impacts on the health of her children since they have less time to devote to the children [Jakaria et al., 2022]. Since working mothers spend less time with their families, it is possible that they provide less attentive or watchful care of their children [Cawley and Liu, 2012; Desai et al., 1989; Glick and Sahn, 1998; Smith et al., 2003].

Employment status can be captured by whether the mother is currently working or whether she worked in the last 12 months. We see from Columns 1 and 2 of Table 4.8, that an additional one-year increase in a mother's education can increase the likelihood that she is currently working as well as having worked in the last 12 months by 0.7 percentage points. We provide evidence that the effect of maternal education on labor market outcomes is another possible avenue that explains the impacts of maternal education on child health.

Empowerment of the Mother

Angel-Urdinola and Wodon [2010] reveal that higher income is associated with greater decision-making power within the household. This gives educated women a higher value and status in households and society. Educated women are therefore able to make more timely decisions on utilizing health care services and allocating more resources to their children's health whenever it is required [Smith et al., 2003; Fawole and Adeoye, 2015]. Several researchers have looked at the major factors influencing maternal service usage, for example, choice of place of delivery. Education has been widely discussed as one of those factors [Peru, 1992; Goldman and Pebley, 1994; Hamal et al., 2020].

The empowerment of the mother can be proxied by whether the mother delivered her child in a health facility, whether she is the decision maker on money spending, whether she is the decision maker on using contraception, as well as whether she took vitamins after giving birth. For all these variables, we generate a set of dummy variables. According to Column 1 of Table 4.9, a one-year increase in a mother's education is connected with an increase in the likelihood that she delivered the baby at a hospital or other medical institution. Furthermore, improved maternal education is also linked to a higher likelihood of the mother making financial decisions, using contraception, and receiving vitamins after birth. The results can be observed in Columns 2, 3, and 4 from Table 4.9. We present evidence that the influence of maternal education on the empowerment of the mother is another plausible pathway that explains the positive effects of maternal education on child health.

Table 4.9: Empowerment of the Mother Pathway

	(1)	(2)	(3)	(4)
	Delivery at Health Facility	Decision Maker on Money Spending	Decision Maker for Using Contraception	Received Vitamin After Delivery
Mother's Education	0.025*** (67.63)	0.001** (3.19)	0.002* (2.54)	0.015*** (24.96)
Birth Order Number	-0.020*** (-24.53)	0.001 (1.52)	0.004 (1.80)	-0.009*** (-7.54)
Mother's Age	0.008*** (28.15)	0.001*** (3.52)	0.002** (3.06)	0.005*** (12.11)
Child's Age	-0.008*** (-8.15)	0.001 (1.17)	0.0006 (0.26)	0.013*** (7.54)
Sex of Child				
Male	0.006* (2.33)	-0.0008 (-0.29)	0.004 (0.67)	-0.004 (-1.08)
Residence				
Urban	0.075*** (22.94)	0.010** (3.04)	0.001 (0.17)	0.037*** (6.93)
Religion				
Protestant	-0.115*** (-23.39)	0.058*** (10.97)	0.00003 (0.00)	-0.004 (-0.54)
Other Christian	-0.172*** (-34.55)	0.113*** (21.08)	-0.030** (-2.93)	-0.072*** (-8.97)
Islam	-0.261*** (-27.85)	0.062*** (6.11)	-0.074** (-3.06)	-0.143*** (-10.87)
Wealth Index	0.079*** (59.04)	0.012*** (8.45)	0.004 (1.37)	0.060*** (27.58)
Male Household's Head	-0.020*** (-4.71)	-0.026*** (-5.30)	-0.012 (-1.13)	-0.009 (-1.43)
Household Size	-0.005*** (-12.10)	-0.0005 (-1.24)	-0.004*** (-3.34)	-0.003*** (-5.91)
Region Fixed Effects	✓	✓	✓	
Observations	89079	50473	12725	38218
R-squared	0.368	0.020	0.015	0.193

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.3 Results Based on Potential Pathways

Tables 4.10, 4.11, and 4.12 report the step-by-step relationships between maternal education and child health metrics for each of the possible pathways. Beginning with the empowerment of the mother path, we add a new pathway to our calculations with each successive step. For each potential pathway, we only pick the one with the largest impact in our potential pathway tables.³ Table 4.5 reveals, for example, that the mother's age at first birth and her age at first marriage are possible paths to account for fertility behavior. Among them, the age at first marriage variable has the largest impact, 0.13, and hence we pick only the age at first marriage. The models are arranged in a certain order to investigate potential mediating effects. Model 1 examines empowerment. Model 2 studies fertility behavior. Model 3 examines maternal employment. Model 4 studies the characteristics of the husband. Model 5 studies access to information. Our final model reveals that an additional year of educational attainment by the mother increases the child's height-for-age by 0.19 percentiles, the child's weight-for-age by 0.26 percentiles, and the child's weight-for-height by 0.17 percentiles. The magnitude of the mother's education coefficient decreases gradually when additional mediating variables are added. This suggests that the possible paths mentioned in the preceding section are important channels that transmit the beneficial effects of a mother's education on her child's health. Furthermore, the positive impact of a mother's education is robust, and it is only partly mediated by the other channels. The investigation focused on how the inclusion of each hypothesized pathway changed the education coefficients. Starting with Table 4.10, we are interested in how the coefficient on maternal education has changed as we proceed from one column to the next.

Height-for-age: We start with the child's height-for-age, Column 1, where we provide the results controlling for empowerment of the mother pathway. An additional year of maternal education is associated with an increase in a child's height-for-age by 0.35 percentiles. In Column 2 we introduce the fertility behavior pathway, age at first marriage. We can see that by adding this pathway, the impact of maternal education

³If we combine all of the possible pathways, we will lose the majority of the data since each prospective route comprises numerous variables, each of which has its own set of missing data. This will eventually result in a reduction in the statistical power of the research.

on height-for-age slightly increased to 0.37 percentiles since age at first marriage has a negative coefficient. The analysis then added employment status to the model, see Column 3. The effect of maternal education on height-for-age increased slightly to 0.38 percentiles, once again as a result of the employment status' negative coefficient. In Column 4 we introduce the characteristics of the husband. The effect of maternal education on height-for-age decreased to 0.35 percentiles, not as a result of the positive coefficient of the characteristics of the husband but as a result of a smaller negative coefficient of employment status. The results of the final column reveal that the impact of maternal education on height-for-age is further attenuated, which highlights the correlation between maternal education and hypothesized pathways. We observe that the mother's fertility behavior, employment status, and empowerment of the mother as well as access to information are important pathways to the impact of maternal education on child health considering that each of these pathways has a significant positive or negative coefficient in one of the columns. Next, we study Table 4.11, which presents the estimated impacts of maternal education on a child's weight-for-age.

Weight-for-age: We see from Column 1 that an additional year of maternal education is associated with an increase in a child's weight-for-age by 0.33 percentiles. We see from Column 2 that the influence of maternal education on weight-for-age slightly increased to 0.34 percentiles, not as a result of the negative coefficient of age at first marriage but as a consequence of changes in other coefficients, including birth order number. As a consequence of the negative coefficient of employment status, the impact of maternal education on weight-for-age increased marginally to 0.35 percentiles, as seen in Column 3. The influence of the mother's education on weight-for-age dropped in Column 4 to 0.35 percentiles as a result of the presence of a positive coefficient associated with the characteristics of the husband. We see from the last column that the effect of maternal education on weight-for-age is more diminished, notably as a consequence of the large and positive coefficient of access to information. We note that crucial paths to the effect of maternal education on child health include empowerment of the mother, employment status, characteristics of the husband, and access to information. Finally, we study Table 4.12 that presents the estimated impacts of maternal education on a child's weight-for-height.

Weight-for-height: The estimates in Column 1 suggest that there exists a positive association between maternal education and weight-for-height. In particular, an additional year of maternal education is associated with an increase in a child's weight-for-height by 0.15 percentiles. We see in Column 2 that changes in other coefficients, such as the child's age, reduced the impact of maternal education on weight-for-height percentile to 0.14 percentiles. As a result of the negative coefficient of employment status, the effect of maternal education on weight-to-height slightly increased in Column 3 to 0.15 percentiles. We see from Column 4 that the effect of maternal education on weight-for-height dropped to 0.12 percentiles not because of the positive coefficient of the characteristics of the husband but as a result of changes in other coefficients, including empowerment of the mother. The influence of maternal education on weight-for-height slightly increased in Column 5 to 0.17 percentiles as a consequence of changes in other coefficients, including residence. We see from the last column that the effect of maternal education on weight-for-height is more diminished, notably as a consequence of the large and positive coefficient of access to information. We find that important pathways to the effect of maternal education on child health include empowerment of the mother and employment status. Collectively, our results show that empowerment of the mother and employment status are two common mechanisms among height-for-age, weight-for-age, and weight-for-height that help to explain the impacts of maternal education on child health.

Table 4.13 compares the results of the impacts of maternal education on all of the three measures of child health, height-for-age, weight-for-age, and weight-for-height, by controlling for potential pathways. This table further demonstrates that the effects of education are consistent. Starting with the empowerment of the mother, in Column 1, we detect a positive link between empowerment of the mother and child health. In terms of employment status, we see from Column 2, that a negative relationship exists between employment status and child health. It is abundantly clear that there is a beneficial connection between the availability of health information and children's health, although Internet access may partially capture the effects of other omitted variables, see Columns 1 and 2.

Table 4.10: Stepwise Regressions of Height-for-Age on Potential Pathways

	(1)	(2)	(3)	(4)	(5)
Height-for-Age Percentile	Empowerment of the Mother	Fertility Behavior	Employment Status	Characteristics of the Husband	Access to Health Information
Mother's Education	0.347*** (9.47)	0.369*** (9.85)	0.375*** (9.88)	0.350*** (8.38)	0.192* (2.38)
Birth Order Number	-0.621*** (-7.48)	-0.761*** (-7.58)	-0.729*** (-7.11)	-0.746*** (-7.17)	-0.723*** (-3.32)
Mother's Age	0.351*** (12.03)	0.393*** (10.54)	0.401*** (10.52)	0.405*** (10.45)	0.382*** (4.73)
Child's Age	-3.796*** (-41.76)	-3.885*** (-41.19)	-3.842*** (-39.99)	-3.877*** (-39.86)	-1.728*** (-8.88)
Sex of Child					
Male	-3.228*** (-13.05)	-3.201*** (-12.83)	-3.222*** (-12.70)	-3.227*** (-12.57)	-2.398*** (-4.71)
Residence					
Urban	1.630*** (5.01)	1.653*** (5.03)	1.739*** (5.21)	1.779*** (5.27)	2.265*** (3.55)
Religion					
Protestant	-1.836*** (-3.79)	-1.880*** (-3.81)	-1.867*** (-3.73)	-1.856*** (-3.67)	-3.701*** (-3.85)
Other Christian	-2.936*** (-5.42)	-3.142*** (-5.71)	-3.288*** (-5.89)	-3.185*** (-5.63)	-7.240*** (-6.40)
Islam	-5.778*** (-6.64)	-6.105*** (-6.93)	-6.378*** (-7.17)	-6.317*** (-7.01)	-8.852* (-2.02)
Wealth Index	2.034*** (14.75)	2.010*** (14.39)	2.001*** (14.09)	1.965*** (13.19)	1.984*** (6.85)
Male Household Head	1.060* (2.54)	1.161** (2.69)	1.079* (2.47)	1.102* (2.46)	0.700 (0.80)
Household Size	-0.099* (-2.51)	-0.088* (-2.21)	-0.082* (-2.02)	-0.084* (-2.04)	-0.099 (-1.18)
Empowerment of the Mother					
Delivery at Health Facility	2.089*** (6.31)	2.008*** (5.99)	1.967*** (5.78)	1.922*** (5.57)	1.629* (2.47)
Fertility Behavior					
Age at First Marriage		-0.098* (-2.26)	-0.101* (-2.27)	-0.112* (-2.49)	-0.033 (-0.38)
Employment Status					
Worked in Last 12 Months			-1.508*** (-5.12)	-1.492*** (-5.00)	-1.184 (-1.93)
Characteristics of the Husband					
Husband Education				0.047 (1.45)	0.006 (0.10)
Access to Health Information					
Using the Internet					6.568*** (6.18)
Region Fixed Effects	✓	✓	✓	✓	✓
Observations	58670	57603	55860	54603	10189
R-squared	0.062	0.063	0.063	0.063	0.053

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.11: Stepwise Regressions of Weight-for-Age on Potential Pathways

	(1)	(2)	(3)	(4)	(5)
Weight-for-Age Percentile	Empowerment of the Mother	Fertility Behavior	Employment Status	Characteristics of the Husband	Access to Health Information
Mother's Education	0.333*** (10.28)	0.343*** (10.37)	0.351*** (10.47)	0.317*** (8.59)	0.263*** (3.43)
Birth Order Number	-0.366*** (-4.98)	-0.435*** (-4.90)	-0.411*** (-4.54)	-0.422*** (-4.59)	-0.416* (-2.01)
Mother's Age	0.223*** (8.65)	0.240*** (7.26)	0.249*** (7.40)	0.251*** (7.35)	0.241** (3.13)
Child's Age	-2.862*** (-35.58)	-2.909*** (-34.87)	-2.865*** (-33.73)	-2.892*** (-33.66)	-2.177*** (-11.74)
Sex of Child					
Male	-1.949*** (-8.91)	-1.950*** (-8.84)	-1.922*** (-8.57)	-1.898*** (-8.37)	-1.652*** (-3.41)
Residence					
Urban	0.557 (1.94)	0.544 (1.87)	0.620* (2.10)	0.654* (2.19)	0.891 (1.47)
Religion					
Protestant	-2.193*** (-5.11)	-2.203*** (-5.05)	-2.228*** (-5.04)	-2.164*** (-4.85)	-3.106*** (-3.40)
Other Christian	-5.780*** (-12.06)	-5.874*** (-12.08)	-6.026*** (-12.21)	-5.845*** (-11.70)	-8.005*** (-7.43)
Islam	-7.232*** (-9.39)	-7.317*** (-9.40)	-7.581*** (-9.64)	-7.440*** (-9.34)	-11.26** (-2.69)
Wealth Index	1.430*** (11.73)	1.409*** (11.41)	1.378*** (10.98)	1.304*** (9.92)	1.529*** (5.54)
Male Household Head	1.090** (2.95)	0.987** (2.59)	0.932* (2.41)	1.040** (2.63)	0.426 (0.51)
Household Size	-0.053 (-1.52)	-0.045 (-1.30)	-0.042 (-1.19)	-0.046 (-1.28)	0.003 (0.04)
Empowerment of the Mother					
Delivery at Health Facility	2.003*** (6.83)	2.022*** (6.82)	2.045*** (6.80)	2.018*** (6.62)	0.822 (1.31)
Fertility Behavior					
Age at First Marriage		-0.048 (-1.26)	-0.046 (-1.18)	-0.058 (-1.48)	-0.059 (-0.72)
Employment Status					
Worked in Last 12 Months			-1.500*** (-5.76)	-1.476*** (-5.60)	-1.306* (-2.23)
Characteristics of the Husband					
Husband Education				0.077** (2.66)	0.095 (1.57)
Access to Health Information					
Using the Internet					3.757*** (3.71)
Region Fixed Effects	✓	✓	✓	✓	✓
Observations	58670	57603	55860	54603	10189
R-squared	0.050	0.050	0.050	0.050	0.050

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.12: Stepwise Regressions of Weight-for-Height on Potential Pathways

	(1)	(2)	(3)	(4)	(5)
Weight-for-Height Percentile	Empowerment of the Mother	Fertility Behavior	Employment Status	Characteristics of the Husband	Access to Health Information
Mother's Education	0.154*** (4.16)	0.139*** (3.69)	0.147*** (3.86)	0.124** (2.95)	0.167* (2.00)
Birth Order Number	-0.0006 (-0.01)	0.096 (0.95)	0.110 (1.07)	0.113 (1.08)	-0.113 (-0.50)
Mother's Age	0.014 (0.49)	-0.027 (-0.72)	-0.015 (-0.40)	-0.016 (-0.43)	0.097 (1.15)
Child's Age	0.178 (1.95)	0.219* (2.30)	0.222* (2.30)	0.216* (2.21)	-0.282 (-1.39)
Sex of Child					
Male	-0.571* (-2.29)	-0.636* (-2.53)	-0.592* (-2.32)	-0.581* (-2.25)	-0.815 (-1.53)
Residence					
Urban	-0.922** (-2.81)	-0.982** (-2.96)	-0.972** (-2.90)	-0.978** (-2.88)	-1.548* (-2.33)
Religion					
Protestant	-1.142* (-2.33)	-1.154* (-2.32)	-1.235* (-2.46)	-1.145* (-2.25)	-1.216 (-1.21)
Other Christian	-5.808*** (-10.63)	-5.767*** (-10.40)	-6.020*** (-10.72)	-5.877*** (-10.34)	-5.797*** (-4.92)
Islam	-4.231*** (-4.84)	-4.210*** (-4.76)	-4.477*** (-5.02)	-4.265*** (-4.72)	-10.14* (-2.22)
Wealth Index	-0.138 (-0.99)	-0.139 (-0.99)	-0.174 (-1.22)	-0.206 (-1.38)	0.351 (1.16)
Male Household Head	0.920* (2.19)	0.826 (1.90)	0.812 (1.84)	0.969* (2.15)	0.069 (0.08)
Household Size	0.003 (0.10)	0.002 (0.07)	0.003 (0.07)	0.003 (0.07)	0.119 (1.35)
Empowerment of the Mother					
Delivery at Health Facility	1.123*** (3.36)	1.231*** (3.64)	1.301*** (3.80)	1.334*** (3.85)	-0.072 (-0.10)
Fertility Behavior					
Age at First Marriage		0.076 (1.73)	0.076 (1.71)	0.078 (1.73)	-0.117 (-1.29)
Employment Status					
Worked in Last 12 Months			-1.147*** (-3.87)	-1.205*** (-4.02)	-0.797 (-1.25)
Characteristics of the Husband					
Husband Education				0.050 (1.55)	0.118 (1.78)
Access to Health Information					
Using the Internet					0.454 (0.41)
Region Fixed Effects	✓	✓	✓	✓	✓
Observations	58802	57735	55992	54732	10195
R-squared	0.022	0.022	0.022	0.023	0.006

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.13: Child's Anthropometric Measures on Potential Pathways

	(1)	(2)	(3)
	Height-for-Age Percentile	Weight-for-Age Percentile	Weight-for-Height Percentile
Mother's Education	0.192* (2.38)	0.263*** (3.43)	0.167* (2.00)
Birth Order Number	-0.723*** (-3.32)	-0.416* (-2.01)	-0.113 (-0.50)
Mother's Age	0.382*** (4.73)	0.241** (3.13)	0.0971 (1.15)
Child's Age	-1.728*** (-8.88)	-2.177*** (-11.74)	-0.282 (-1.39)
Sex of Child			
Male	-2.398*** (-4.71)	-1.652*** (-3.41)	-0.815 (-1.53)
Residence			
Urban	2.265*** (3.55)	0.891 (1.47)	-1.548* (-2.33)
Religion			
Protestant	-3.701*** (-3.85)	-3.106*** (-3.40)	-1.216 (-1.21)
Other Christian	-7.240*** (-6.40)	-8.005*** (-7.43)	-5.797*** (-4.92)
Islam	-8.852* (-2.02)	-11.26** (-2.69)	-10.14* (-2.22)
Wealth Index	1.984*** (6.85)	1.529*** (5.54)	0.351 (1.16)
Male Household Head	0.700 (0.80)	0.426 (0.51)	0.070 (0.08)
Household Size	-0.099 (-1.18)	0.003 (0.04)	0.119 (1.35)
Empowerment of the Mother			
Delivery at Health Facility	1.629* (2.47)	0.822 (1.31)	-0.072 (-0.10)
Fertility Behavior			
Age at First Marriage	-0.033 (-0.38)	-0.059 (-0.72)	-0.117 (-1.29)
Employment Status			
Worked in Last 12 Months	-1.184 (-1.93)	-1.306* (-2.23)	-0.797 (-1.25)
Characteristics of the Husband			
Husband Education	0.006 (0.10)	0.095 (1.57)	0.118 (1.78)
Access to Health Information			
Using the Internet	6.568*** (6.18)	3.757*** (3.71)	0.454 (0.41)
Region Fixed Effects	✓	✓	✓
Observations	10189	10189	10195
R-squared	0.053	0.050	0.006

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Chapter 5

Discussion and Conclusion

We evaluate the intergenerational effects of maternal education on child health by looking at a wide coverage of data over time and location for Nigerian regions. We have been able to control for a number of characteristics that are known to be linked with both educational and health-related outcomes, the most important of which is the income/wealth index. Although maternal education is strongly correlated with markers of child health, once controls for other socioeconomic characteristics and community effects are introduced, this relationship is significantly attenuated. This happens because a mother's education is related to socioeconomic status and geographic location. Hence, controlling for socioeconomic factors reduces the impact of a mother's education on child health. We find positive impacts of a mother's education on child health as evaluated by the three most widely used indices: height-for-age, weight-for-height, and weight-for-age. In particular, one extra year of maternal education increases the child's weight-for-height by 0.18, height-for-age by 0.34, and weight-for-age by 0.35 percentiles.

Further, we analyzed possible pathways that may contribute to the influence of maternal education on child health. We demonstrate that a mother's education benefits the child's health through several channels, including fertility behavior, access to health knowledge, characteristics of the husband, employment status, and empowerment of the mother. Our results suggest that education allows women to delay their first birth as well as their first marriage. A greater understanding of knowledge and attitudes towards contraceptives among more educated mothers may also lead to a decreased pregnancy rate. More educated mothers are more likely to marry well-educated men with better occupations and earning prospects.

Education increases social connections with possible spouses, boosting the chances of finding someone with comparable educational levels at a low cost of search. Because of this, couples with more educated parents are more likely to see improvements in

their children's health than families with lower levels of education. Higher educated women have access to more health knowledge and tend to be more informed about nutrition and healthcare, which proves to be another important channel through which a mother's education can positively impact child health. Health knowledge can be learned through watching television, listening to the radio, using the Internet, etc. A mother's education is positively linked to decision-making power. Our results imply that more educated mothers can make more timely decisions on using health care services and the allocation of additional resources to their children's health when necessary. Therefore, education helps mothers to make better-educated choices about contraception, whether they are the household's chief financial decision-maker, and whether they take vitamin supplements after giving birth.

Our estimation findings bring to light the significance of maternal education in strengthening economic and social circumstances. This is particularly relevant in view of the fact that the benefits of childhood health continue to be seen throughout an individual's life. As a result, those policies that seek to increase women's educational opportunities might have a positive impact on both their own health and the economy, as healthy children will grow up to be educated and productive people.

Bibliography

- [1] Adedokun, S. T., Adekanmbi, V. T., Uthman, O.A., & Lilford, R. J. (2017). Contextual factors associated with health care service utilization for children with acute childhood illnesses in Nigeria. *PLoS One* 12 (3), e0173578.
- [2] Adewusi A. O., & Nwokocho, E. E. (2018). Maternal education and child mortality in Nigeria. *The Nigerian Journal of Sociology*.
- [3] Ahmed, M. & Iqbal, K. (2007). Is There Any Threshold in Mother's Education and Child Health Relationship? Evidence from Nigeria. Carleton College Department of Economics. Working Series.
- [4] Alderman, H., & Headey, D. D. (2017). How important is parental education for child nutrition?. *World Development*, 94, 448-464.
- [5] Aslam, M., & Kingdon, G. G. (2012). Parental education and child health—understanding the pathways of impact in Pakistan. *World Development*, 40(10), 2014-2032.
- [6] Anderberg D., & Zhu Y. (2014). What a Difference a Term Makes: The Effect of Educational Attainment on Marital Outcomes in the UK. *Journal of Population Economics*, 27(2), 387–419.
- [7] Balogun S. A., Yusuff H. A., & Yusuf K. Q., et al. (2017). Maternal education and child immunization: the mediating roles of maternal literacy and socioeconomic status. *The Pan African Medical Journal*.
- [8] Becker, G. S., & Barro R. J. (1988). A Reformulation of the Economic Theory of Fertility. *The Quarterly Journal of Economics*, vol. 103, 1–25.
- [9] Becker, G. S., & Lewis, H. G. (1973). On the Interaction between the Quantity and Quality of Children. *Journal of Political Economy*, 81(2), S279–S288.
- [10] Behrman J. R., & Rosenzweig M. R. (2002). Does Increasing Women's Schooling Raise the Schooling of the Next Generation? *American Economic Review*, 92(1), 323–334.
- [11] Black, S. & Devereux, P. J. (2011). Recent Developments in Intergenerational Mobility. In: *Handbook of Labor Economics*, vol. IVb, 1487-1541.
- [12] Brady, D., Kaya, Y., & Beckfield, J. (2007). Reassessing the effect of economic growth on well-being in less-developed countries, 1980–2003. *Stud. Comp. Int. Dev*, 42, 1–35.

- [13] Breierova, L., & Duflo, E. (2004). The impact of education on fertility and child mortality: do fathers really matter less than mothers? National Bureau of Economic Research.
- [14] Briend, A., & Berkley, J. A. (2016). Long term health status of children recovering from severe acute malnutrition. *The Lancet Global Health*, 4 (9), e590-e591.
- [15] Burroway, R. & Hargrove, A. (2018). Education is the antidote: Individual- and community-level effects of maternal education on child immunizations in Nigeria. *Soc. Sci. Med.* , 213, 63–71.
- [16] Buvinić, M., & Gupta, G. R. (1997). Female-headed households and female-maintained families: are they worth targeting to reduce poverty in developing countries?. *Economic development and cultural change*, 45(2), 259-280.
- [17] Case, A., Lubotsky, D. & Paxson, C. (2002). Economic status and health in childhood: The origins of the gradient. *The American Economic Review*, 92(5), 1308-1334
- [18] Cawley, J., & Liu, F. (2012). Maternal employment and childhood obesity: A search for mechanisms in time use data. *Economics & Human Biology*, 10(4), 352-364.
- [19] Chou, S. Y., Liu, J. T., Grossman, M., & Joyce, T. (2010). Parental education and child health: evidence from a natural experiment in Taiwan. *American Economic Journal: Applied Economics*, 2(1), 33-61.
- [20] Currie, J., & Moretti, E. (2003). Mother's education and the intergenerational transmission of human capital: Evidence from college openings. *The Quarterly journal of economics*, 118(4), 1495-1532.
- [21] Currie, J. (2009). Healthy, wealthy, and wise: Socioeconomic status, poor health in childhood, and human capital development. *Journal of Economic Literature*, 47 (1), 87-122.
- [22] Chou, S. Y., Liu, J. T., Grossman, M., & Joyce, T. (2010). Parental education and child health: evidence from a natural experiment in Taiwan. *American Economic Journal: Applied Economics*, 2(1), 33-61.
- [23] Chowdhury, F. D. (2010). Dowry, women, and law in Bangladesh. *International Journal of Law, Policy and the Family*, 24(2), 198–221.
- [24] Cutilli, C. C. (2010). Seeking health information: what sources do your patients use?. *Orthopaedic nursing*, 29(3), 214-219.
- [25] Desai, S., & Alva, S. (1998). Maternal education and child health: is there a strong causal relationship?. *Demography*, 35(1), 71-81.

- [26] Dewey, K. G., & Begum, K. (2011). Long-term consequences of stunting in early life. *Maternal & Child Nutrition*, 7, 5-18.
- [27] Dinçer, M. A., Kaushal, N., & Grossman, M. (2014). Women's education: Harbinger of another spring? Evidence from a natural experiment in Turkey. *World Development*, 64, 243-258.
- [28] Elo, I. T. (1992). Utilization of maternal health-care services in Peru: the role of women's education. *Health transition review*, 49-69.
- [29] Fayehun O., & Asa S. (2020). Abnormal birth weight in urban Nigeria: An examination of related factors. *PloS one*.
- [30] Fernandez R., & Guner N., Knowles J. (2005). Love and Money: Inequality, Education, and Marital Sorting. *Quarterly Journal of Economics*, 120(1), 273-344
- [31] Galor, O., & Weil, D. N. (2000). Population, Technology, and Growth: From Malthusian Stagnation to the Demographic Transition and Beyond. *American Economic Review*, 90(4), 806-828.
- [32] Gavgani, V. Z., Qeisari, E., & Jafarabadi, M. A. (2013). Health information seeking behavior (HISB): a study of a developing country. *Health*, 2, 1-2013.
- [33] Goldman N., & Pebley A. R. (1994). Childhood immunization and pregnancy related services in Guatemala. *Health Transit Rev*, 4, 29-44.
- [34] Grantham-McGregor, S., Cheung, Y. B., Cueto, S., Glewwe, P., Richter, L., Strupp, B., & International Child Development Steering Group. (2007). Developmental potential in the first 5 years for children in developing countries. *The Lancet*, 369 (9555), 60-70.
- [35] Grepin, K. A., & Bharadwaj, P. (2015). Maternal education and child mortality in Zimbabwe. *Journal of Health Economics*, 44, 97-117.
- [36] Grytten, J., Skau, I., & Sorensen, R. J. (2014). Educated mothers, healthy infants. The impact of a school reform on the birth weight of Norwegian infants 1967-2005. *Social Science & Medicine*, 105, 84-92.
- [37] Gunes, P. M. (2015). The role of maternal education in child health: evidence from a compulsory schooling law. *Economics of Education Review*, 47, 1-16.
- [38] Hamal, M., Dieleman, M., De Brouwere, V., & de Cock Buning, T. (2020). Social determinants of maternal health: A scoping review of factors influencing maternal mortality and maternal health service use in India. *Public Health Rev*.
- [39] Heaton, T. B., Forste, R., Hoffmann, J. P., & Flake, D. (2005). Cross-national variation in family influences on child health. *Soc. Sci. Med.* 60, 97-108.

- [40] Idris, A. J., & Agbim, K. C. (2015). Micro-credit as a strategy for poverty alleviation among women entrepreneurs in Nasarawa State, Nigeria. *Journal of Business Studies Quarterly*, 6(3), 122.
- [41] Jensen, R., & Oster, E. (2009). The power of TV: Cable television and women's status in India. *The Quarterly Journal of Economics*, 124(3), 1057-1094.
- [42] Jithesh V., & Ravindran T. S. (2015). Social and health system factors contributing to maternal deaths in a less-developed district of Kerala, India. *J Reprod Health Med*, 2, 26-32.
- [43] Keats, A. (2018). Women's schooling, fertility, and child health outcomes: Evidence from Uganda's free primary education program. *Journal of Development Economics*, 135, 142-159.
- [44] Karra, M., Subramanian, S. V., & Fink, G. (2017). Height in healthy children in low- and middle-income countries: an assessment. *Am. J. Clin. Nutr.* 105, 121-126.
- [45] Keats, A. (2018). Women's schooling, fertility, and child health outcomes: Evidence from Uganda's free primary education program. *Journal of Development Economics*, 135, 142-159.
- [46] Kraemer, S. (2000). The fragile male. *Bmj*, 321(7276), 1609-1612.
- [47] Lagan, B. M., Sinclair, M., & George Kernohan, W. (2010). Internet use in pregnancy informs women's decision making: a web-based survey. *Birth*, 37(2), 106-115.
- [48] Lavy, V., & Zablotsky, A. (2015). Women's schooling and fertility under low female labor force participation: Evidence from mobility restrictions in Israel. *Journal of Public Economics*, 124, 105-121.
- [49] Le, K., & Nguyen, M. (2020). Shedding light on maternal education and child health in developing countries. *World Development*, 133, 105005.
- [50] Lindeboom, M., Llena-Nozal, A., & van Der Klaauw, B. (2009). Parental education and child health: Evidence from a schooling reform. *Journal of Health Economics*, 28 (1), 109-131.
- [51] Mansour H., & McKinnish T. (2014). Who Marries Differently Aged Spouses? Ability, Education, Occupation, Earnings, and Appearance. *Review of Economics and Statistics* 96(3), 577-580.
- [52] Martorell, R., & Habicht, J. P. (1986). Growth in early childhood in developing countries.

- [53] McCrary, J., & Royer, H. (2011). The effect of female education on fertility and infant health: evidence from school entry policies using exact date of birth. *American Economic Review*, 101 (1), 158-95.
- [54] Moretti, F. A., Oliveira, V. E. D., & Silva, E. M. K. D. (2012). Access to health information on the internet: a public health issue?. *Revista da Associação Médica Brasileira*, 58, 650-658.
- [55] Ohonba, A., Ngepah, N. & Simo-Kengne, B. (2019). Maternal education and child health outcomes in South Africa: A panel data analysis. *Development Southern Africa*, 36(1), 33-49.
- [56] Onah, H. E., Ikeako, L. C., & Iloabachie, G. C. (2006). Factors associated with the use of maternity services in Enugu, Southeastern Nigeria. *Soc. Sci. Med.* 63 (7), 1870–1878.
- [57] Osili U. O., & Long B. T., (2008). Does female schooling reduce fertility? Evidence from Nigeria. *J. Dev. Econ.*
- [58] Oyitso, M., & Olomukoro, C. O. (2012). Enhancing women's development through literacy education in nigeria. *Rev. Eur. Stud.*, 4, 66.
- [59] Paranjothy, S., Broughton, H., Adappa, R., & Fone, D. (2009). Teenage pregnancy: who suffers?. *Archives of Disease in Childhood*, 94 (3), 239-245
- [60] Pencavel J. (1998). Assortative Mating by Schooling and the Work Behavior of Wives and Husbands. *American Economic Review* 88(2):326–329.
- [61] Rana, E. A. K., & Sara, N. (2012). Microfinance and women empowerment: A case study of District Bahawalpur (Pakistan). *African Journal of Business Management*, 6(12), 4514-4521
- [62] Sahoo J., Singh S., Gupta V. K., Garg S., & Kishore J. (2015). Do sociodemographic factors still predict the choice of place of delivery: a cross-sectional study in rural North India. *J Epidemiol Glob Health*.
- [63] Semba, R. D., de Pee, S., Sun, K., Sari, M., Akhter, N., & Bloem, M. W. (2008). Effect of parental formal education on risk of child stunting in Indonesia and Bangladesh: a cross-sectional study. *The Lancet*, 371 (9609), 322-328
- [64] Schultz, T. P. (1993). Returns to women's education. E.M. King and M.A. Hill, eds., *Women's Education in Developing Countries: Barriers, Benefits, and Policies* (Johns Hopkins University Press, Baltimore, MD), 51-99.
- [65] Schultz, Paul T. P. (2002). Why governments should invest more to educate girls. *World Development* 30, 207–225.
- [66] Singh A., Kumar A., & Pranjali P. (2015). Utilization of maternal healthcare among adolescent mothers in urban India: evidence from DLHS-3. *PeerJ*, 2, e592.

- [67] Thomas, D., Strauss, J., & Henriques, M. (1991). How does mother's education affect child height? *Journal of Human Resources*, 26 (2), 183–211.
- [68] World Bank, (2020). World Development Indicators.