Mother Schooling and Malnutrition among Children of Rural-Urban Pakistan

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ABSTRACT

Background: Although many causes of malnutrition are discussed in previous studies, the impact of mother schooling on malnutrition among children of rural-urban Pakistan and mediating factors is not posited in case of Pakistan. Hence, this study examine the effect of mother schooling and intervening linkages on acute and chronic malnutrition.
Methods: The prior empirical relationship is examined by calculating adjusted risk-ratio with the help of binary logistic regression analyses using a sample size of 3184 rural-urban mothers retrieved from the latest Pakistan Demographic and Health Survey 2012-13 (PDHS).
Results: The urban mothers without education are more likely to have stunted and underweighted infants as compared to rural ones. Rural (urban) mothers with poor (moderate) economic position have more chances of having stunted infants than urban (rural) mothers. However, only urban mothers with poor status have more chances of having underweight kids relative to mothers with rich class. The rural mothers with empowerment and with seeking for medical services are less likelihood to have stunted infants than urban ones.
Value of the Study: The impact of mediating factors arising from education on rural infants' health is higher than that on urban infants.

Key words: Mother formal schooling; stunted; underweighted; economic status; Pakistan

INTRODUCTION

Economic growth and better life quality in any country is achieved by improved child health. Physical capital like wheels, infrastructure and computer etc. is not a source of development. In fact, human by self is an actual capital. A healthy and intelligent population force is a preferred energy to utilize and run physical capital. Therefore, developing nations are working hard to build human capital. Therefore, reducing infant mortality rate by 2/3 till 2015 is one of the Millennium Development Goals (MDGs). Good nutrition can reduce poverty as well as can enhance the economic growth. Conversely, malnourished children are less productive than well-nourished ones [1]. In spite of interventions, the malnutrition rate is unacceptably high in Pakistan relative to the developed nations [2]. In

Pakistan, urban infants with 10%, 24 % and 37 % are less wasted, underweighted and stunted than rural infants with 11 %, 33%, and 48% respectively [3]. Thus, this situation of stunting and underweighting is alarming in both regions. Still, 14 less developed nations including Pakistan are suffering from 80% burden of the world child stunting. Even, 9.6 million infants in Pakistan are under the pressure of chronic malnutrition in their childhood resulting from inappropriate nutrients in the long run [4]. The figures of World Health Organization underline a burden of diseases contributed by underweight in the developing nations. Even 1/3 of the total infants are under weighted in South Asian region [5]. The underweight i.e. composite index of wasting and stunting is caused by continuous reduction in food intake and sudden illness over the short period. An underweighted infant with less weight for his age implies stunting or wasting. Overall, wasting, underweight and stunting outcomes are recorded at 11% ,30% and 45% respectively in Pakistan [3]. The prior two measures show acute malnutrition. Moreover, stunting (chronic malnutrition) indicates a long term child health breakdown relative to wasting and underweight (acute malnutrition) which outline short term child growth failure. Stunting is a meaningful measure to achieve the millennium development goals (MDGs) of 1 and 4 (poverty and child health). Furthermore, acute malnutrition can easily be treated by raising nutrition level, but stunting can be permeative because it damages vital organs i.e. brain and kidneys which ultimately causes IQ, learning ability and results in poverty [6].

Conceptual model

Malnutrition reduction among children aged between 0-59 months has been a major concern of Pakistan and several global agencies working in Pakistan. Thus, identification of the predictors of infant malnutrition is imperative for the researchers in order to underline practical guidelines [7]. The past studies linked mother schooling, her nutritional level, health seeking and reproductive mind-set, economic status, breast feeding, environment, other socioeconomic and demographic predictors to child malnutrition [8,9]. The most common studies on developing nations i.e. India, Bangladesh and Pakistan etc. confirmed lower schooling of mother and poor economic status, region, less health knowledge and poor environment condition as the sources of infant malnutrition [10–13]. Firstly, [14] resulted that better mother schooling led to healthier infants. They could decide quickly in case of health problems [15] and in birth spacing [16]. Negative impact of mother schooling on infant mortality was predicted by [17]. Though, some empirical works fail to express the effect of mother education on child survival [18]. Considering the significance of mother schooling, it is imperative to know the linkages by which her schooling influence infant survival.

Many past studies have modeled the effect of maternal schooling on child health. A study hypothesized many linkages connecting female education to infant mortality [19]. She included her reproductive attitude, autonomy and socioeconomic status as prospective pathways. Another study estimated the mediating impacts of socioeconomic status, knowledge, and attitudes on fertility [20]. Many studies expressed potential mechanisms connecting mother schooling to child health like [21] (1) health-related information; (2) numeracy skills i.e. diagnosing and facing health problems; and (3) exposure to up to date society that made women more responsive to modern medicines. A study finalized that an improvement of child health was directly based on health knowledge [22]. Instead, numeracy and literacy talents learned in schools promoted the attainment of health knowledge taught inside the society. Thus, effect of mother literacy level on child health was elaborated at both individual and community levels [23]. Communities having educated females had better sanitation and medical services [18,19,24]. Finally, five pathways connecting maternal education to child health are as follow: (1) modern mind-sets towards health care [22,25]; (2) health information [20,21,24]; (3) better socioeconomic condition [13,18,19]; (4) reproductive behavior [24,26]; and (5) female autonomy [19,20]. This is the foremost empirical study that combines the prior pathways linking mother literacy level to infant health, including her nutritional rank. A detailed literature on prior pathways is as given:

The Pathways

Wealth and Environment Status

Wealth status is the prime pathway between mother schooling and child health. Its connection with infant health has mainly been elaborated by the link between literacy and greater purchasing power [15]. Furthermore, more money can provide warm clothing, medicine, nutritional food, and health care facilities which can directly cause children's health [27]. Some empirical studies exhibited a strong impact of economic status on infant health [17,28]. A lower level of child mortality was connected with flush toilets, safe piped water, clean floors, and radio possession [29]. In short, wealth and environment status constantly stated half/ more impact of maternal schooling on infant health in previous researches [18,30]. In this study, protected water and wealth index are taken as proxy variables for her environment and wealth status respectively.

Knowledge

Education gives mothers better thought and greater exposure of health significance and suggestions via mass media/other sources [16,30]. Education assists mothers

to learn about prevention, causation, recognition, and treatment of diseases that can consequently change their health attitude [30,31]. We find limited studies which link formal education and health knowledge to infant survival and describe an inconclusive empirical impact of knowledge on health attitude. Some studies counted knowledge as a mediating factor between mother schooling and infant health [21] while others expressed little or no relationship between formal schooling and knowledge [30]. The effect of health knowledge on child health exhibits that the knowledge about health directly changes the earlier attitude of health to keep up better health. According to another study, the risk of transmissible diseases could be minimized via health knowledge, easy approach to latest medicines, better nutritious and hygiene food. In our study, the knowledge of TB is used to present health knowledge of mothers [12]

Health Care Amenities

Mothers with education are more likely to accept latest medicine, to use protective health services and to visit a medical center [17]. It was declared nutrition maintaining attitude as a connection between mother schooling and infant health outcomes [32]. It was concluded that enterprising and hopeful mothers were successful to maintain optimal nutritional level for their children regardless of poor surroundings [33]. On the other hand, mothers with fatalistic point of views were suffering from malnutrition. Thus, past studies referred to a change in mother behavior as a linkage through which maternal formal schooling affects child health. In our study, prenatal care is used as proxy for health seeking attitude.

Empowerment

Education also improves decision-making power of mothers in the family. Educated mothers are personally more responsible for their infants and are depicting more attention to the illness, require quick action to be taken, and move to the health care center, rather than postponing decisions to conventional authority structures [14]. Mother autonomy pathway relating maternal education to child survival is also favored by few empirical studies. A study also linked maternal education with her decision-making power and increased child health [34]. In this research, mother decisions to purchase cost oriented products is presenting female autonomy.

Reproductive Behavior

Reproductive behavior is another linkage between maternal education and infant health. Past studies have

also connected maternal formal education and reproductive mind-set to infant health [24]. Decisions regarding birth spacing are so conscious and well educated mothers keep reproduction decision in their own control. [35] did not observe a consistent relationship between chronic malnutrition and mother age. However, a study on Bolivian population found an inverse outcome between maternal age and stunting [15]. Our study takes mother age at first birth as reproductive variable. Based on the models of [24], important pathways between maternal schooling and child health are proposed in our study.

The aim of our study is a) to examine the effect of maternal formal education and her education oriented linkages on rural-urban child malnutrition in Pakistan.

Following the previous literature, this research will reveal the significance of the earlier pathways which associate mother education to child survival in short and long run, using Pakistan Demographic and Health Survey, 2012-13 (PDHS) data. Where our research findings will recommend evidence-based strategies for promoting nutritional rank of infants, they will also guide a household to change its traditional health care behavior by accepting latest medical services.

METHODS

Data and Study population

The data source for all dependent and independent variables is PDHS 2012-13 (Pakistan Demographic and Health Survey). The data on all children under age five whose stature and weight are computed at the time of survey are filtered for our empirical study.

Outcome Measure

Two anthropometric indices i.e. underweight (low weight for age) and stunting (low height for age) as dependent variables reveal short and long term infant health indicators respectively. They are defined in term of number of standard deviation (SD) units i.e. (Z-score) from the reference group's median for which Child Growth Standards are calculated by WHO (World Health Organization) (Organization 2006). While underweight is a symbol of acute malnutrition, stunting shows infant's chronic malnutrition. An infant with Z-score of weight for age / height-for-age less than -2 standard deviations (SD) from the median of WHO reference class is underweighted or stunted. In short, the dependent variables is categorized as weighted/stunted infants=1, otherwise=0 [37].

$$Z - Score = \frac{Measured\ Value - Average\ Value\ for\ the\ Reference\ population}{Standard\ Deviation\ of\ the\ Reference\ population}$$

WHO Anthro software is employed for z-scores calculation (36).

Independent Variables

Mother Formal Education and its Linkages

In our study, mother schooling is categorized with no schooling=0, primary =1, secondary/higher =2. Her socioeconomic position is presented by wealth index of household. It is calculated with the help of PCA (principle component analysis) by DHS (Demographic and Health Survey). Wealth index ranks her socioeconomic position as poor=0 and rich=1. HH environment condition is identified by protected water that is classified as protected water=0 and not protected water=1. Mother decision to buy cost oriented products is an appropriate measure for her empowerment (only mother decides to buy large household commodities=0, and otherwise=1). Visiting to a medical surgeon for the purpose of prenatal care is a proxy of her health seeking activities. Knowledge of tuberculosis disease (if she has heard about it=0 and otherwise=1) indicates her health knowledge. Mother BMI (continuous) is a comprehensive proxy for her nutrition status. Mother age at the occasion of first birth (continuous variable) represents reproductive behavior of mother. All preceding explanatory variables are important pathways between maternal formal schooling and infant health status. Mostly, if direct measures are not available in the database, their proxy is taken for empirical analysis.

STATISTICAL ANALYSES

Binary Logistic Regression Model

The standard econometric model for this research work is as follow:

Child Health = f (mother schooling, empowerment, health knowledge, environmental condition, age at first birth, mother BMI, wealth status, health seeking activities) where child health is presented by stunting and underweight.

As response variable is binary, it is difficult to estimate the coefficients of regressors by ordinary least square method. Therefore, there is a need to explain the basic idea of logit model to estimate the prior model having binary response variable. Thus, the linear probability model showing binary regressand is as follow:

$P_i = E(Y=1 \mid X_i) = \beta_1 + \beta_2 X_i \ldots \ldots (1)$

Y=1 means if a kid is facing malnutrition problem, otherwise Y=0. X_i is a group of regressors. Now consider the above equation in the following representation.

$$Pi = E(Y = 1 \mid X_i) = \frac{1}{1 + e^{-(\beta_1 + \beta_2 Xi)}} \ldots . (2)$$

For ease of description, we write the equation (2) as

$$Pi = \frac{1}{1 + e^{-2}} = \frac{e^z}{1 + e^z} \ldots \ldots \ldots . (3)$$

Where $z_i = \beta_1 + \beta_2 X_i \ldots \ldots$ (38)

Equation (3) represents logistic distribution function. It confirms that as Z_i ranges from $-\infty$ to $+\infty$, Pi series are between 0 and 1 and that as P_i is nonlinearly related to Z_i (i.e. X_i), it satisfies the two conditions discussed earlier (As $Zi \to +\infty$, e−Zi tends to zero and as $Zi \to -\infty$, e−Zi increases indefinitely). While satisfying these conditions, we produce an estimation problem because Pi is nonlinear not only in Xi but also in the β's as apparent from equation (2). As a result, a regular OLS procedure for parameters estimation cannot be utilized. This problem can be resolved by making equation (2) linearized as follows:

If P_i the possibility of being stunted is given by equation (3) then (1- P_i), the chance of being not stunted is:

$$1 - P_i = \frac{1}{1 + e^{zi}} \quad \ldots \ldots .. \ (4)$$

Consequently we can show odd ratio by rewriting as

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{zi}}{1 + e^{-zi}} = e^{zi} \quad \ldots \ldots \ldots \ (5)$$

Where, $P_i / (1-P_i)$ are understood as odds ratios of child stunting i.e. the ratio of the likelihood of being a child as stunted to the likelihood of being not stunted. Natural log of equation (5) gives an accurate interesting solution, namely:-

$$L_i = \ln\left(\frac{P_i}{1 - P_i}\right) = z_i = \beta_1 + \beta_2 X_i \quad (6)$$

In equation (6), L_i as a log of the odds ratio is not only linear in X_i, but also linear in parameters. Li is termed as the Logit, and hence it is called as Logit model. Bivariate relationship between mother education and the prior factors are conducted by chi-square statistics. A minimum P <0.1 probability value is used to highlight statistically significance level of predictors. All analyses are performed on SPSS 21. The last category of explanatory variables is taken as a reference category. The odds ratio of this category is 1.00.

RESULTS

The descriptive and empirical outcomes are given and discussed as below:

Table.1 depicts the descriptive statistics of stunted and underweighted infants, mother formal schooling and the prior pathways. Stunting and underweight figures in urban (rural) regions with 49.7 % (43.5 %) and 35.6% (25.9%) respectively are revealing shocking situation. In urban (rural) areas 51.8 % (32.4%) mothers are without formal schooling. 35 % (30%) and 13% (38%)

mothers have passed primary and secondary/higher level education in urban (rural) settings respectively. The filtered data set shows better picture of mother schooling in rural

TABLE 1. Descriptive Analysis

Variables	Rural Infants (Percent)	Urban Infants (Percent)
Stunted	579 (43.5%)	921 (49.7%)
Not stunted	753 (56.5 %)	931(50.3%)
Underweighted	345 (25.9%)	659 (35.6%)
Not Underweighted	987 (74.1%)	1193 (64.4%)
Mother Schooling		
No Schooling	432 (32.4%)	960 (51.8 %)
Primary Schooling	396 (29.7 %)	655 (35.4 %)
Secondary/ Higher Schooling	504 (37.8 %)	237 (12.8%)
Wealth Status		
Poor Class	79 (5.9 %)	614 (33.2%)
Middle Class	357 (26.8%)	878 (47.4%)
Rich Class	896 (67.3%)	360 (19.4%)
Health Knowledge		
Heard about TB disease	1259 (94.5 %)	1700 (91.8 %)
Did not heard	73 (5.5%)	152 (8.2%)
Empowerment		
Can Decide alone on big purchasing	78 (5.9%)	116 (6.3%)
Other Family members decide	1254 (94.1%)	1736 (93.7%)
Health Seeking Activities		
Did not visited a Doctor for Prenatal Care	551 (41.4%)	1206 (65.1%)
Visited a Doctor for Prenatal Care	781 (58.6%)	646 (34.9)
Environment Condition		
Have protected Water	154 (11.6%)	327 (17.7%)
Do not Have protected Water	1178 (88.4%)	1525 (82.3%)

regions. Socioeconomic status of mothers addressed by wealth index shows that 33 % (6%) mothers are poor in urban (rural) surroundings. 67% (94%) mothers are living in rich urban (rural) households. On average, 6% mothers are independent to buy large commodities in a household relative to 94% mothers having minor or no involvement to purchase such products in both regions. 92 % (94.5%) urban (rural) mothers are well aware of health information comparing with 8% (5.5%) urban (rural) mothers having no information about health. Urban (rural) mothers visiting medical center for prenatal care are 35% (58.6%) as compare to 65% (41.4%) urban (rural) mothers having prenatal care visit. The average mother age at the occasion of first birth (reproductive covariate) is 20 (21) years in urban (rural) regions. On average, urban (rural) mothers BMI is 23 (24). It presents a good picture of health status in both locations. Approximately, only 18% (12%) urban (rural) households are enjoying better piped water facility. It implies that majority of the infants are not availing this facility.

Table 2 shows the performance of models used for urban and rural malnutrition. It tells us that generally, all independent variables taken in the model contribute to cause dependent variables significantly as shown by the significant wald chi square values.

Table 3 underpins empirical comparison between urban and rural infants facing stunting trouble (long term health failure) using binary logistic regression model (BLRM). The odd ratio is computed by taking exponential of coefficient. The urban infants with the odds of 1.46 & 1.35 (OR =; 1.46 & 1.35; p<0.05 and p<0.1) are more likely to be stunted (see Table 3) than rural infants with the odds of 1.41 & 1.31 (OR =1.41 & 1.31; p<0.05) (see Table 3) as their mothers are without schooling and primary passed respectively relative to mothers having secondary/higher schooling. Rural mothers with poor socioeconomic position have 2.27 times (OR =2.27; p<0.01) more chances of stunted infants than urban mothers (OR =2.21; p<0.1) comparing with mothers having rich family status, but urban mothers belonged to middle economic class have 1.74 times (OR =1.74; p<0.01) more chances of stunted infants than rural mothers (OR =1.20; p<0.05)

TABLE 2. Models Performance for Urban and Rural Infant Malnutrition

Equation 1	Sample	Wald Chi²(10)	P
Underweight	1,332	288.5	0.00
Stunting	1,332	91.2	0.00
Equation 2	**Sample**	**Wald Chi²(10)**	**P**
Underweight	1,852	196.2	0.0
Stunting	1,852	71.6	0.00

comparing with mothers having rich family status. The rural kids are less likelihood to be stunted by 40 % (OR =0.60; p<0.1) than urban kids by 27% (OR =0.73; p<0.1) if their mothers are head of households comparing with male household head. There are 25% (OR =0.75; p<0.1) less chances of facing stunting problem as rural mothers are well aware about health outcomes relative to mothers having no health knowledge. When mother BMI rises, urban infants are less stunted by 4% (OR =0.96; p<0.01) than rural infants by 2% (OR =0.98; p<0.1). Relative to mothers having no interest in latest medical care services, rural mothers utilizing these services are 36% (OR =0.64; p<0.01) less likely to have stunted kids. Similarly, mother age at the occasion of first birth is significantly affecting long term health outcome (stunting) in urban area, but this impact is also weaker (4%).

Table 4 reports empirical comparison between urban and rural infants facing underweight problem (short term health failure) using binary logistic estimation. Among empirical outcomes, urban infants (OR =1.48; p<0.05) are observed more likely to face acute malnutrition (underweighting) than rural infants (OR =1.32; p<0.1) as their mothers are without formal schooling relative to mothers with secondary/higher schooling. Only urban mothers with formal primary schooling are more susceptible to have underweighted infants (OR =1.46; p<0.05) comparing with mothers having secondary/ higher education. However, female empowerment has not a considerable influence on rural and urban infants' acute malnutrition (underweight). Only urban infants with the odds of 2.15 (OR =2.15; p<0.01) are more underweighted as maternal socioeconomic position is poor, but surprisingly, 57% urban infants (OR =1.57; p<0.01) of middle class are more underweighted and 24% rural infants (OR =0.76; p<0.1) related to middle class are less underweighted comparing with rich class. As rural and urban mother age at the occasion of first birth increases, it causes less infants underweighted by 3% (OR =0.97; p<0.01). The environment condition has a considerable effect only on rural infant survival in short period in such a way that they are 1.67 time (OR =1.67; p<0.01) more susceptible to acute malnutrition when protected water is not available to them. An unexpected result is more chances of the prevalence of underweight by 1.33 (OR =1.33; p<0.1) times among urban infants as their mothers have enough health information. Mother BMI's association with underweight is inconsistent.

TABLE 3. Empirical Outcomes of Rural-Urban Infant Stunting

Stunting	Region	OR[3]	z	P>z	LB[2]	UB[2]
Empowerment (1)	Rural	0.60	-1.86	0.06*	0.35	1.03
	Urban	0.73	-1.88	0.06*	0.52	1.01
Health Knowledge (1)	Rural	0.75	-1.81	0.07*	0.54	1.03
	Urban	1.16	1.14	0.26	0.90	1.48
Environment Condition	Rural	1.17	0.87	0.38	0.82	1.67
	Urban	0.85	-1.32	0.19	0.66	1.08
Age at First Birth	Rural	1.01	0.68	0.50	0.99	1.03
	Urban	0.96	-3.72	0.0***	0.95	0.98
Mother BMI	Rural	0.99	-0.90	0.37	0.97	1.01
	Urban	1.00	0.09	0.92	0.98	1.02
Wealth Status (2)	Ref.					
Poor Class	Rural	2.27	2.95	0.0***	1.32	3.91
	Urban	2.21	5.19	0.0***	1.64	2.98
Middle Class	Rural	1.20	1.30	0.19	0.91	1.59
	Urban	1.74	4.03	0.0***	1.33	2.27
Health Seeking Activities(1)	Rural	0.64	-3.44	0.0***	0.50	0.83
	Urban	0.89	-1.13	0.26	0.72	1.09
Mother Schooling (Secondary/Higher)	Ref.					
No Schooling	Rural	1.41	2.28	0.02***	1.05	1.91
	Urban	1.46	2.34	0.02***	1.06	2.00
Primary Schooling	Rural	1.31	1.97	0.05**	1.00	1.72
	Urban	1.35	1.64	0.10*	0.92	1.69

TABLE 4. Determinants of Rural-Urban Underweighted Infants

Underweight	Region	OR[3]	z	P>z	LB[2]	UB[2]
Empowerment (1)	Rural	0.98	-0.06	0.95	0.56	1.72
	Urban	0.95	-0.27	0.79	0.67	1.35
Health Knowledge (1)	Rural	1.07	0.36	0.72	0.75	1.51
	Urban	1.33	1.66	0.10*	0.95	1.87
Environment Condition (1)	Rural	1.67	2.73	0.01***	1.16	2.41
	Urban	0.76	-1.03	0.14	0.59	0.99
Age at First Birth	Rural	0.97	-2.41	0.02**	0.95	0.99
	Urban	0.97	-3.12	0.0***	0.95	0.99
Mother BMI	Rural	0.98	-1.88	0.06*	0.96	1.00
	Urban	0.96	-4.19	0.0***	0.94	0.98
Wealth Status (2)	Ref.					
Poor Class	Rural	0.93	-0.27	0.79	0.53	1.61
	Urban	2.15	4.73	0.0***	1.57	2.96
Middle Class	Rural	0.76	-1.71	0.09*	0.55	1.04
	Urban	1.57	2.99	0.0***	1.17	2.11
Health Seeking Activities (1)	Rural	0.90	-0.70	0.48	0.68	1.20
	Urban	1.05	0.46	0.64	0.85	1.31
Mother Schooling (Secondary/Higher)	Ref.					
No Schooling	Rural	1.32	1.64	0.10*	0.95	1.83
	Urban	1.48	2.23	0.03**	1.05	2.10
Primary Schooling	Rural	1.11	1.7	0.105*	0.82	1.50
	Urban	1.46	2.18	0.03**	1.04	2.05

*1*** as z<0.01, ** as z<0.05 and * as z<0.10, 2 Upper bound and Lower bound at confidence interval of 95%, 3Odd Ratio*

DISCUSSION

The PDHS 2012-13, a consistent national database, is obtained for empirical analysis associated with short and long period infant health survival in Pakistan. Approximately, mother health seeking and reproductive mind-set, economic status and health knowledge are counted as important pathways between maternal schooling and short or/and long term infant health outcomes in both regions. Empirical findings significantly underline the impact of poor maternal schooling on infants' chronic and acute malnutrition relative to her secondary/higher schooling. Urban children are more stunted than rural children when their mothers are without education and with primary education relative to mothers owning secondary/higher schooling. Similarly, urban children are more susceptible to underweight than rural ones as their mothers have no education comparing with secondary/higher passed mothers and only urban kids are more under weighted as their mothers are primary passed. In spite of same poor schooling of mothers, infant stunting risk in urban surroundings is higher than in rural locations because rural mothers are less illiterate and more in secondary/higher schooling than urban ones. A justification regarding

positive association between mothers without schooling, primary schooling and their infants' health failure is that poor education scale keeps them ignorant, less empowered and less self-sufficient. Consequently, they fail to promote their infants health status in both (rural-urban) societies. It is also proved female education as a great contributor to decrease infant stunting in Brazil [39]. This result is also parallel to the findings of [40]. PDHS 2012-13 supports us by reporting that the 10 % (the lowest share) underweighted infants are born among the mothers who are well educated and 39 % (the highest share) underweighted infants are born among mothers having no education [3]. However, [41] opposes our outcome in case of maternal primary schooling by reporting less chances of underweighted infants as their mothers have primary schooling. Though, some studies state no causal connection between mother schooling and infant health [42]. Comparative to urban mothers, rural mothers related to poor economic position have more stunted infants because of owning less resources to manage their infants' nutritional rank and to save themselves from all pregnancy complications. This result is also calculated by other author [13]. However, urban kids are more stunted as their mothers are belonged to middle economic class because of having insufficient resources in

urban region for a healthy life. Only urban infants related to poor economic status are more under weighted. Rural middle class children are less underweighted, but infants of urban middle economic class are more underweighted relative to rich economic class because of higher expenditure-income gap in urban region. It is also revealed that children of food secured household are less stunted and under-weighted [43]identifying the cause is the basic step for nutritional intervention programs. METHODS School based cross-sectional survey was conducted among 450 schoolchildren aged 7-14 years, using multi-stage sampling techniques in Dale Woreda, southern Ethiopia. A structured questionnaire and 24-hour recall methods were administered to determine the sociodemographic and dietary intake of participants. Stool microscopic examination was done. Weight and height were measured using a standard calibrated scale. Odds ratio generated from logistic regression was used to determine the strength of variables association. RESULTS Older age group (10-14 vs. 7-9. According to past studies, low family income causes malnutrition [44,45]analyze and disseminate data on fertility, family planning, and maternal and child health. Additional information about the MEASURE DHS+ project can be obtained from MEASURE DHS+, ORC Macro, 11785 Beltsville Drive, Calverton, MD 20705 (telephone: 301-572-0200; fax: 301-572-0999; email: reports@macroint.com; internet: www.measuredhs.com. Rural kids are significantly estimated less stunted than urban ones as their mothers have autonomy power in a household matters (as their mothers are empowered) because of increasing mother empowerment in rural regions. The reason for this outcome is that mothers are more competent to handle all household affairs efficiently. This result is supported is by [46] who finalizes that healthy kids are born among mothers owing decision making spirit in all household matters and contradicted by [47] who report that female are incapable to deal with all family matters. Only rural kids are significantly less stunted when their mothers have necessary health knowledge because they have more opportunities to get benefits from health oriented programs launched by public government. According to [12] the risk of transmissible diseases can be minimized via health knowledge and easy approach to latest medicines. Maternal attitude toward using advanced medical amenities (identified by prenatal care visit) is appeared as a considerable linkage to reduce stunting of rural infants because of owning a strong mediating effect. Therefore, they have quick response to the advanced medication facilities. Though, her health seeking mind-set has no effect on short period infant health outcome. To support this finding, it is recorded that Indonesian mothers with the desire of taking Vitamin A in the earlier six months have healthier infants [26]. As mother age at the occasion of first birth rises, rural and urban infants are less underweighted and only urban infants are less stunted because her reproductive attitude is a mediating factor between mother schooling and child survival. Thus, educated mothers are more conscious about reproductive decisions. This effect is very little. The impact of rural-urban environment conditions

on child survival in the long term is inconsistent because the direct measure for this variable is missing in the PDHS 2012-13. Thus, better environment conditions cause less acute malnutrition among rural infants because of less possibility of diseases arising from poor environment status. [48] also favor this outcome.

CONCLUSIONS

In short, the mediating effect of mother empowerment, health seeking mind-set and economic status arising from her schooling, on rural infants' health is higher than that of urban infants. Regarding prior findings, some strategies are important aiming at increasing maternal poor schooling by increasing female enrollment in both regions. This plan will enhance mediating effect of her empowerment, reproductive, socioeconomic and behavior toward utilizing advanced medication on urban-rural infants' survival. In Pakistan settings, there are some key interventions to decrease underweight and stunting aiming at mothers without schooling by allocating a significant part of budget on female education through provincial and capital educational authorities to reach the targeted outcomes. For this purpose, UNICEF is helping the government of Pakistan to boost up infant nutrition arrangement by introducing health knowledge oriented programs.

APPENDIX 1. Abbreviations

PDHS	Pakistan Demographic and Health Survey
SES	Socioeconomic Status
BLRM	Binary Logistic Regression Model
NIP	National Institution of Population
MDGs	Millennium Development Goals
BMI	Body Mass Index
PCA	Principle Component Analysis
HH	Household head

Ethics approval and consent to participate

We do not need any ethical approval for this research because it is based on the Pakistan Demographic Health Survey 2012-13 secondary data collected by National Institute of Population Studies Islamabad, Pakistan. Therefore, it is not needed any consent from participants.

Competing interests

The authors declare that they have no conflict of interest.

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