

Factors Affecting Stunting Growth of Children in Pakistan: Evidence from Pakistan Demographic Health Survey 2017-18

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ABSTRACT

Pakistan is one of the pioneer countries, who agreed-upon Sustainable Development Goals (SDGs)'s global agenda in 2016. UNO set the country-based targets to eliminate stunting by 40% by 2025 (Branca et al., 2015a). As a developing country, Pakistan faces an untoward situation and strives to achieve the commitments and targets. Stunting growth is a multi-layered problem. Stunting, along with severe physical effects of stunting, casts lifelong shortcomings among children and militate their natural potential and mental growth. Furthermore, stunting can cause up to a 3% loss in GDP. The situation and stakes attached with the issue make it conspicuous enough to be addressed. This paper's core objective is to explore the effects of socio-economic factors on stunting growth in Pakistan. Secondary data analysis was conducted on nationally representative cross-sectional survey data from the Pakistan Demographic and Health Survey (PDHS), 2017-2018. The given analysis was limited to children stunting growth with sample (N=5360). Notably, data were analysed through descriptive and inferential statistics. The study found that children's stunting growth was associated with mother education obtaining, locality (less developed area), children's incomplete immunization status, father's education level, mother earnings types, food diversity, drinking water source, and language-based ethnicity. The study concluded that stunting growth halted the government of Pakistan's efforts to achieve sustainable development goals regarding health and well-being. The problem is multi-dimensional; thus, a collaborative strategy is required to intervene at various levels (individual, family, organizational, and community). It has also been recommended that the parents be aware of their role in the mother's timely child immunization and diet in the pre and postnatal period. Community sensitization through local influencers' engagement would catalyse behaviour change toward child immunization programs. The government and social sector provide complete immunization, food provision, health facilities in less developed areas, and education for the parents.

Keywords: Stunting Growth; Child Immunization Status; Food Diversity; Mother Education Level.

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Introduction

Stunting is considered a health complication under the broader issue of malnutrition in a child, especially those under five years. It is one of the major causes of more than 5 million annual deaths in developing countries (Grantham-McGregor *et al.*, 2007). Stunting is estimated to affect more than 162 million children under the age of 5 years worldwide (Branca *et al.*, 2015a; WHO, 2014). UNICEF (2006) defines *stunting* as 'short height for age' and 'wasting' as 'short height for weight.' Stunting is associated with various causes, including, but not limited to, inadequate nutritional intake, acute shortage of food, and other social and health-related factors regarding children and mothers (Renggli *et al.*, 2021; Sekartaji *et al.*, 2021; Tariq *et al.*, 2018). Stunting not only casts short-term health complications but has a lifelong effect on educational performance and social productivity. Furthermore, Stunted children have poor cognitive skills in later life, resulting in lower adult wages, and are more prone to nutrition-related diseases (Varela-Silva *et al.*, 2018; Victora *et al.*, 2008). Sensing the delicacy of the matter, the World Health Assembly (WHA), the prestigious forum of the World Health Organization (WHO), vide resolution 65.6, has incorporated stunting in the 2025 Sustainable Development Goal (SDG) Agenda among top priorities. WHO decided that prevalent stunting in children under five years would be reduced by 40% by 2025; and eliminate malnutrition by 2030 (Branca *et al.*, 2015a).

Stunting is when a child fails to attain his potential height concerning age (Golden, 2009). As defined by WHO and UNICEF, which is academically recognized too, a child is considered to be a moderately stunted child if he falls lower than minus two standard deviations and considered as a severely stunted child if lowers than minus three from the median height-for-age in a given population reference (UNICEF, 2019; WHO, 2006). The repercussions caused by stunting and wasting last for a few years of a child's growth and have shattering effects for the whole life. Batool *et al.* (2019) hold that stunting has a more devastating effect on children under nutrition and other wasting and underweight. This situation warrants that children must be cared for and fed correctly for adequate nourishment and potential growth (Kim *et al.*, 2019). The peer, parents, and caregiver must adhere to certain practices regarding the health apprehensions towards young ones, nutrition, and a balanced diet (Casey *et al.*, 2001).

Literature Review

Various reasons and factors are attributed to stunting. Still, the most chronic is intrauterine growth retardation, insufficient intake of required nutrients in children in their early life, leading to frequent infections due to weak immune system, which results in more stunting (Branca *et al.*, 2015a; WHO, 2014). Moreover, various community factors and mother health issues also affect children's linear growth, especially until they are two years old. The plight worsens after two years, though; children stunted in their first two years are more likely to experience abrupt weight gain later. This weight gain leads to acute vulnerability to stroke, heart disease, and type 2 diabetes (Branca *et al.*, 2015a; WHO, 2014).

Little attention has been paid to the birth spacing between two consecutive births and the undernutrition of children. However, it has been evident that if the space between consecutive births is too close, it would not only cause to result in less time for child nourishment and proper care but also affect the instant pregnancy and have a severe effect on the mother and unborn child (Avelin *et al.*, 2013; Cacciatore *et al.*, 2009; Gutiérrez-Jiménez *et al.*, 2019). Short birth interval has been a critical factor in stunting among children in developing counties (Gutiérrez-Jiménez *et al.*, 2019; Sommerfelt & Stewart, 1994; Song *et al.*, 2019). Low birth interval, along with affecting the potential growth of youngsters, also drastically affects mothers' health recovery after delivery (Akbulut-Yuksel *et al.*, 2020).

Conversely, higher birth intervals and more spacing allow the mother to recover and provide appropriate time and nutrition to her child (Gutiérrez-Jiménez *et al.*, 2019; Sommerfelt & Stewart, 1994; Song *et al.*, 2019). Therefore, it has been recommended by the World Health Organization (WHO) that mothers should wait for 24 months to conceive after the previous birth (WHO, 2005). The birth spacing shorter than 18 months and more than 59 months considerably affect the mother's health and causes stunting of

children (Giuliani *et al.*, 2016). The most perilous is the low birth interval, as it is more likelihood of fetal death and infant mortality (Barclay & Kolk, 2018; Van Dijk, 2019). Some studies have also suggested that along with birth interval, birth order also has a significant effect on stunting since parents pay less attention and cannot give due care to older children due to the birth of the new one (Van Dijk, 2019). It is hypothesized that less interval among siblings leads to more divided care and attention, resulting in child malnutrition (Musa *et al.*, 2017).

The mother's food and nutritional level are closely linked to the children's prenatal and postnatal health status. Pre- and post-birth health status of mothers, childbirth weight, and early nutrition of children affect children's future growth, and the unsatisfactory status of the former has drastic effects on the latter (Akbulut-Yuksel *et al.*, 2020). This association between mothers and children does not limit here; it yields to another generation of children, and mothers' malnutrition turns into future malnutrition; hence, stunting becomes a saga of future generations. Various scholars have established and reinforced this correlation (Woday *et al.*, 2018; Wolde & Belachew, 2019). Undernutrition may start after a child's birth, preferably at the early stages of pregnancy, and it continues to affect adulthood. So, the solution to the issue entails long-term and short-term targets, starting from addressing pregnancy and mother nutrition to child care and nutrition (De Onis & Branca, 2016). There are other more complex but equally important factors to eliminate both mother and child's risks regarding health in the context of stunting growth. It was suggested that health services' requirements for both mother and child should provide a clean and balanced diet and evolve a comprehensive mechanism to fetch out the marginalized and the unprivileged from poverty (Compaoré *et al.*, 2020; Organization, 2020). Solutions to the problem must improve food security too, which is short-term and the most logical, easily achievable goal (Vaivada *et al.*, 2020).

Many studies have found that less birth weight and size strongly correlate with children's stunting (Martorell & Zongrone, 2012); thus, stunting starts in utero (Dewey & Huffman, 2009). Likewise, De Onis *et al.* (2013) have found that stunting starts from and even before a child's conception (Woday *et al.*, 2018). So, providing appropriate nutrition before conception would reduce the chances of stunting (Ceesay *et al.*, 1997). Ergo, prenatal and postnatal nutrition is equally imperative to redress the enigma of stunting (Christian *et al.*, 2016). Since this is a problem that requires multi-sectoral and collective response (Stewart *et al.*, 2013), therefore, the response at individual and collaborative levels by the relevant departments and social sectors may ensure the provision of food, nutrition, health, water, sanitation, and essential status of women (Stewart *et al.*, 2009).

Although WHO has adopted a resolution to reduce stunting by 40% by the end of 2025, current statistics and progress project that 127 million more stunted children will be added by 2025, which makes only a 26% reduction rather than a 40% (WHO, 2018). While nutrition is a significant reason for stunting. Nutrition alone is insufficient to address the problem, especially after localizing world targets into regional country-based targets. Notwithstanding that Asia has considerable improvement in decreasing the percentage of stunting in children under five from 48% to 27 %, Pakistan has a long way to go yet since Pakistan's country-wise progress is to decrease to 41.7 % from the baseline, measured in 2008, which was 32.3% against the total number of children in 2008 under five years age brackets (Onyango *et al.*, 2014).

It has been statistically evidenced by Banerjee *et al.* (2018) that stunting has enormous and manifold effects on a country's economy by reducing individual productivity. Such as, Milman *et al.* (2005) established that many economists are working on stunting growth, which can slash a country's GDP by up to 3%. Since Pakistan has a considerable number of cases related to child stunting, being a developing country, this study addresses the issue of stunting growth which has a relationship with a health challenge and maintained SDGs Goal 3 meticulously. As Pakistan prioritizes making many efforts to map the SDGs, this paper will help policymakers take future guidelines for stopping stunting growth. Considering SDGs Goal 3 (Good health and well-being), stunting growth is a crucial problematic issue to achieving this goal. Though, the paper's commitment is to research bluntly on the subject and pledge to take emergency measures to address the stunting growth among children affected by socio-economic

demographic (SED) factors. Despite the organizational commitment, efforts without evidence would be futile, and PDHS is the primary source of data collection for the government about health in Pakistan. Using this survey for systematic analysis to provide evidence-based policy recommendations and design programs is the policy gap that was filled through this study. This study analyzes the SED factors causing stunting in children under the age of five. Having included various aspects and variables found in PDHS and data, it was held that the health system's functionality and food department could take the brief recommendation to control stunting growth among children. For instance, Zaidi et al. (2013) claimed that UNO recommended that the local government control stunting growth with the help of good health policies and SED factors. Furthermore, the study had provided guidelines for the survey administrator to revise the tool for the next PDHS.

Conceptual Framework

Stunting growth is not just a health issue but has social implications. Living in a less developed area, low educational attainment and parents' education are some of the SED factors that adversely affect the children's stunting growth. This study conceptualized that SED factors are related to stunting growth, which was not researched previously in the Pakistani context. Finally, the study proposes a conceptual framework and evidence-based community interventions for reducing stunting growth based on indigenous resource mobilization that could better contribute to achieving the SDGs agenda by 2025 in Pakistan. The study developed a conceptual framework for the socio-economic demographic factors and explained the relationship with child stunting growth (see Figure. 1).

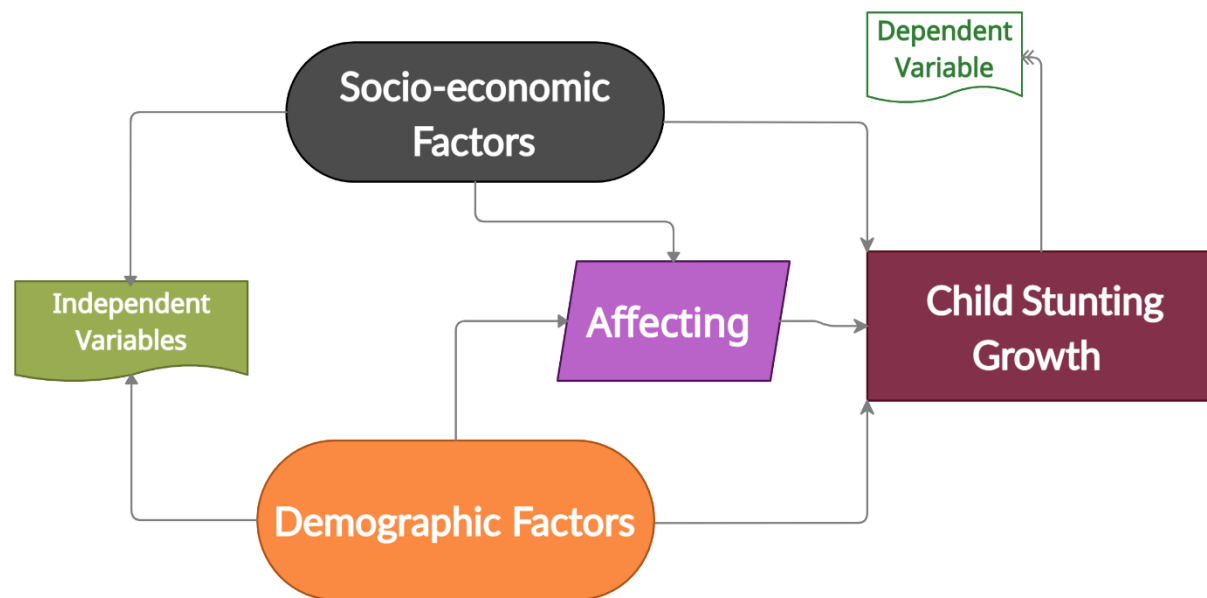


Figure. 1: Conceptual Framework

Study Objectives

- ❖ To determine the association between socio-economic factors and their association with children stunting growth at the national data of PDHS 2017-18.
- ❖ To measure statistically community-based demographic factors' relationship with stunting growth among children under five years of age.
- ❖ To put forward policy recommendations to the federal and national government, health departments, social welfare departments, and civil society organizations.

Study Hypotheses

- ❖ There is likely to be an association between socio-economic factors and children's stunting growth.
- ❖ Likely community-based demographic factors; have a relationship with children stunting growth under five years of age.

Methodology

PDHS and Sampling

This study was conducted using secondary data of (PDHS) 2017-2018, which is part of a world-based survey program, and the fourth national household survey in Pakistan. Demographic Health Survey (DHS) plays a vital role in assessing and finding solutions to the social health-related problems, particularly women and children (Corsi et al., 2012). Prime focus of DHS are family planning, maternal and child health care, and fertility (PDHS, 2017-2018). The DHS data is collected with the close collaboration of DHS, NIPS, (Pakistan Bureau of Statistics) UNICEF, and the funds provided by the US Agency for International Development (USAID), under the supervision of the Ministry of National Health Service (PDHS, 2017-2018).

Data in PDHS is collected from ever-married women and some ever-married men, of whole Pakistan excluding Azad Jammu & Kashmir. All provinces' 498 areas were selected to collect data, wherein urban areas were divided into enumeration blocks based on 200 to 250 households, mutually exclusive they are: whereas rural data was collected based on villages/Mouzas (PDHS, 2017-2018). The study's sample size is (n=5360), taken from PDHS by using 'select cases' in SPSS, and only those respondents are considered who have at least one child during the last five years.

Survey Management and Variables Description

Dependent Variable: Coding and Definition

Stunting in children under five years was a qualitative dependent variable. Data of PDHS was recoded into binary categories of "stunting" as a variable of interest and "not stunting." The cutoff points of standard deviation from means are taken as defined by WHO. Therefore, the children whose Z-score falls below -2 standard deviations from the WHO reference population's median are termed as 'stunted,' and those who have less than -3 are called 'severely stunted.' However, the variable for age for height was recorded; all those who fell below -2 were listed as 'Stunting', and all others were taken as 'Not Stunted.'

Socio-economic and demographic variables of children and coding in Pakistan

Demographic Health Survey

Various SED aspects of children under study were considered over. Therefore, living area, age brackets, immunization status, and birth size were included, which were further statistically tested with stunting status using SPSS.

Parental Variables

Since it has been, undoubtedly, established by numerous studies, and has been accepted by UNO that stunting does not start after birth but with time the mother conceives a child; therefore, certain significant factors related to mother, like health, food, educational status, employment status, type of earning, access to information and decision-making power were enlisted by recoding certain original variables. While where it was needed during recoding, internally and academically accepted definitions and references were used. On the same pattern, a father is an important figure while adhering to rearing and feeding practices at home, not only for children but also for mothers, especially prenatal and postnatal care. A few of the essential variables from PDHS were taken into account to check their correlation with stunting in

children. For that, educational level (no education, primary, secondary, higher), status (educated and uneducated), and household head were used.

Community, Environmental Household Variables and Coding

Among other, community-related variables from PDHS were also considered and statistically calculated whether they are correlated with the stunting of children. Similarly, since the PDHS has data from the whole of Pakistan, a provinces-based variable was also taken. Moreover, the sample was also divided into urban and rural defect residence type. They spoke based on language; the data were categorized into six categories: Urdu speaking, Punjabi, Sindhi, Balochi, Pashtu, and ‘another minorities’ language. These different original variables were recoded into new variables.

Statistical Tests Applied

At first, the data were weighted; and then SPSS version 21 was used to analyze the secondary data obtained from the PDHS to determine the stunting growth in children. The weighted analysis was used to account for the multipart sampling drawing and permit us to generalize the conducted finding on all children having stunting in Pakistan. Having done with that, descriptive statistics were used for all the groups of demographic variables and accounted for frequency distributions percentage. The current study measured for all variables with weighted percentages of the national population from the genuine sample of PDHS. This study also evaluated the association between stunting and other factors and measured totally unadjusted odd ratios (OR) as well as adjusted odds ratios (AOR) with 95 % confidence intervals (CI). The simple binary logistic regression analysis has been calculated to assess the association between stunting growth and independent factor.

Similarly, multivariate logistic regression analysis was also used using SPSS. The inclusion criteria of all the independent variables were based on a significance level of $p < 0.05$. Also, the value of AOR was found out, and all the independent variables were entered simultaneously. The bivariate analysis has been calculated, and the cutoff point of the value was less than 0.05. Those variables that were significant at the bivariate analysis level were included in the study, and others were excluded.

Ethical Considerations

Since the secondary data of PDHS was used to conduct the study, ethical approval was not sought from the department. Formal permission to use PDHS data was secured from measure DHS before the study.

Results and Findings

Socio-demographic Features of Stunting Growth in Children

The children found to have stunting growth under the age of five years ($n=5360$) were 11.8%. In terms of the immunization status of children, 8.6% have incomplete immunization. 36.1% were living in rural areas, and 28.2% of fathers were uneducated. Similarly, half of the mothers were uneducated, 47.9%. Furthermore, 51.5% were passing their lives in the Punjab province (Table 1). As far as the types of earning of mothers were counted, 11.9% were not paid. In terms of the decision taken by mothers in medical treatment were 13.5%. So far, so the source of respondents' drinking water was concerned, it was found that 26.9% of respondents were used piped water. Simultaneously, more than half of the children were involved in food diversity, 59.2%. Further, 36.2% of native respondents were Punjabi speakers.

Table 1: *Descriptive statistics of Demographic Characteristics of Stunting and not Stunting growth of Children under age five years (N=5360)*

Variables	Number of Respondents	Weighted Percentage
Stunting and not Stunting Growth in Children		
Stunting	792	30.6
Not Stunting	1794	69.4

Immunization Status of Children		
Incomplete Immunization	415	8.6
Complete Immunization	4394	91.4
Region		
Punjab	3453	51.5
Sindh	1571	23.4
KPK	1101	16.4
Baluchistan	377	5.6
ICT	54	.8
FATA	156	2.3
Urban and Rural Area		
Urban	1948	63.9
Rural	1101	36.1
Father's Education		
Uneducated	1889	28.2
Education	4693	69.9
Mother's Education Level		
No Education	3212	47.9
Primary Education	1097	16.3
Secondary Education	1492	22.2
Higher Education	911	13.6
Type of earnings of mothers		
Not paid	141	11.9
Cash only	965	81.6
Cash and in-kind	38	3.2
In-kind only	39	3.3
Decision taken by Mother or Others		
Decision taken by Mother	754	13.5
Decision taken by Others	4835	86.5
Employment Status of Mothers		
Unemployed	5528	82.4
Employed	1183	17.6
Father's Educational Level		
No Education	1889	28.2
Primary Education	1085	16.2
Secondary Education	2316	34.5
Higher Education	1293	19.3
Source of Drinking Water		
Drinking Piped Water	1808	26.9
Drinking Natural Water	4307	64.2
Drinking Mineral Water	363	5.4
Food Diversity in Children		
Children with no Food Diversity	1496	40.2
Children with Diversity	2226	59.2
Native Languages		
Urdu	583	8.7
Sindhi	786	11.7
Punjabi	2432	36.2
Sariaki	954	14.2
Baluchi	192	2.9

Pushto	1238	18.5
Other	520	7.7

Source: Pakistan Demographic Health Survey (2017-2018)

Determinants of Stunting Growth in Children under Age of Five Simple Binary Logistic Regression

The data processing results in SPSS for simple binary logistic regression revealed that incomplete immunization among children (OR = 1.416; 95% CI: .999-2.008) had a higher chance of stunting growth among children. The result also showed that region was also an important social factor causing stunting; the chances of stunting growth in children were more in Sindh province (OR = 1.670; 95% CI: .548-.818). On the same pattern, on the classification on the basis of rural and urban, it was found that higher stunting growth in rural areas (OR = 1.573; 95% CI: .439-.748). While accessing the role of parent education, both mother and father were considered, and the results showed that an uneducated father had higher stunting growth in his children (OR = 7.807; 95% CI: .671-.970) in comparison with educated ones. Similar results were found regarding mothers' education that the children of uneducated mothers (OR = 1.115; 95% CI: .872-1.426) were more prone to stunting growth than educated ones. Mothers' employment status and mode of their payments were also studied, and decision-making power at home and outside the home. It was found that the mother who had not been paid, their children were likely to fall in the category of stunting growth (OR = 1.080; 95% CI: .593-1.968). Looking at the women's autonomy in decision-making power at home, the showed that children of such households where mothers cannot have decision power had higher stunting growth (OR = 1.306; 95% CI: .984-1.734). Additionally, children of unemployed mothers were found more in stunting than children of employed mothers (OR = 5.728; 95% CI: 1.587-1.904). Results showed that children of such households who were using drinking water from the pipe have greater chances of stunting growth in their children (OR = 4.781; 95% CI: 2.642-2.950) than such who are using safe water from filtration plant or companies' water. Since many national and transnational studies have already held it, the same was the instant study outcome that children who have no food diversity had higher stunting growth (OR = 1.748; 95% CI: 1.595-1.939). Moreover, the children's Sindhi speakers (OR = 3.617; 95% CI: 2.428-2.891) established a high probability of child stunting (Table 2).

Table 2: Simple binary logistic regression for the predictors associated with stunting growth in children under age five years (N=5360)

Socio-demographic characteristics	Stunting Growth in children under age five years (Weighted Percentage)		OR	95%CI	P-value
	Yes	No			
Immunization Status of Children					
Complete Immunization	37.4	62.6	1		
Incomplete Immunization	29.7	70.3	1.416	.999-2.008	.050
Region					
Punjab	29.7	70.3	1		
Sindh	38.6	61.4	1.670	.548- .818	<0.001
KPK	24.8	75.2	1.271	.988-1.635	.062
Baluchistan	28.3	75.2	1.063	.728-1.554	.751
ICT	21.1	78.9	1.651	.525-5.192	.391
FATA	17.9	82.1	1.884	.950-	.070

				3.733	
Urban and Rural Area					
Urban	36.7	60.7	1		
Rural	24.8	75.2	1.573	.439-.748	<0.001
Father' Education Level					
Uneducated	33.9	66.1	1		
Education	29.3	70.7	7.807	.671-.970	.002
Mother's Education Level					
No Education	33.3	66.7	1		
Primary Education	31.1	68.9	1.115	.872-1.426	.007
Secondary Education	28.6	71.4	1.246	1.004-1.546	.046
Higher Education	24.6	75.4	1.537	1.186-1.991	<0.001
Type of Earnings of Mothers					
Not paid	35.2	64.8	1		
Cash only	34.0	64.0	1.080	.593-1.968	.004
Cash and in-kind	80.0	20.0	1.805	.038-.563	.005
In-kind only	57.1	42.9	.404	.118-1.378	.038
Decision taken by Mother or Others					
Decision taken by Mother	25.7	74.3	1		
Decision taken by Others	31.1	68.9	1.306	.984-1.734	.065
Employment Status of Mothers					
Unemployed	29.5	70.5	1		
Employed	36.6	63.4	5.728	1.587-1.904	.004
Father's Educational Level					
No Education	33.9	66.1	1		
Primary Education	32.3	67.7	1.077	.836-1.387	.012
Secondary Education	26.5	73.5	1.422	1.145-1.767	<0.001
Higher Education	31.2	68.8	1.133	.893-1.438	.305
Source of Drinking Water					
Drinking mineral Water	27.0	73.0	1		
Drinking Natural Water	32.2	67.8	4.781	2.642-2.950	.038
Drinking piped Water	28.2	71.8	.943	.631-1.411	.013
Food Diversity in Children					
Children with no Food Diversity	33.8	66.2	1.748	1.595-1.939	.003
Children with Diversity	27.2	72.3			
Native Languages					
Sindhi	27.5	72.5	1		

Urdu	37.9	62.1	3.617	2.428-2.891	<0.001
Punjabi	28.9	71.1	.923	.673-1.265	.618
Sariaki	35.6	64.4	.679	.478-.965	.031
Baluchi	47.3	52.7	.424	.248-.724	.002
Pushto	21.1	78.9	1.400	.978-2.004	.066
Other	38.6	61.4	.598	.400-.893	.012

Abbreviations: 1 reference category, OR odds ratio, CI confidence interval by using χ^2 test.

Multivariable Logistic Regression

Multivariable logistic regression analysis was applied to the data. Children who were found to be with the factor of incomplete immunization (AOR = 1.550; 95% CI: 1.071-2.244) had higher chances of stunting than children with complete immunization. As far as the place of residence is concerned, children who belonged to rural areas (AOR = 1.746; 95% CI: 1.337-2.280) were found to have a significant association with stunting compared to urban areas. Additionally, the odds ratio of children who belonged to Sindh (AOR = 2.616; 95% CI: 1.472-1.804) having Sindhi as a native language (AOR = 1.545; 95% CI: 1.332-1.893) was higher as compared to other regions hence, showing a greater probability of stunting. Education of mother and father was also an important factor which influenced stunting among children less than five years of age. Children of those mothers who received secondary education (AOR: 1.080; CI: 1.426-1.968) were at a greater risk of stunting. Similarly, children with uneducated fathers were found to be strongly correlated with stunting among children and held that the higher level of education a father had less are the chances that his children would have stunted growth. Employment status of mothers was found to have no association with stunting among children under five years of age (AOR: 3.229; CI: 1.049-1.064); however, children from mothers who had no source of earning and no decision-making power (AOR: 6.627; CI: 4.453-2.280) were more likely to show symptoms of stunting. Moreover, it is evident from the results that children who preferred natural water (AOR: 1.729; CI: .588-.903) or mineral water (AOR: 1.089; CI: 1.020-1.734) over piped water drinking and consumed diverse types of food had lower chances of being stunted (Table 3).

Table 3: *Adjusted odd ratios multivariable logistic regression of factors independently associated with stunting growth in children under age five years (N=5360)*

Variables	AOR	95CI%	P-value
Immunization Status of Children			
Incomplete Immunization	1		
Complete Immunization	1.550	1.071-2.244	.020
Region			
Punjab	1		
Sindh	2.616	1.472-1.804	<0.001
KPK	1.171	.829-1.654	.370
Baluchistan	.829	.492-1.397	.482
ICT	.888	.229-3.452	.864
FATA	1.286	1.021-1.620	.033
Urban and Rural area			
Urban	1		
Rural	1.746	1.337-2.280	<0.001
Father Education			
Educated	1		

Uneducated	1.635	1.246-.2.145	<0.001
Mother's Education Level			
No Education	1		
Primary Education	1.080	1.426-1.968	.080
Secondary Education	.147	.038-.563	.005
Higher Education	.404	.118-1.378	.148
Type of Earning of Mother			
Not paid	1		
Cash only	1.736	1.030-1.503	.005
Cash and in-kind	.147	.038-.563	.014
In-kind only	.290	.118-1.2.102	.008
Decision taken by Mother or Others			
Decision taken by mother	1		
Decision taken by others	6.627	4.453-2.280	.005
Employment Status of Mothers			
Employed	1		
Unemployed	3.229	1.049-1.064	.060
Father's Educational Level			
No Education	1		
Primary Education	1.265	.681-2.351	.019
Secondary Education	.222	.056-.887	.033
Higher Education	1.133	.481-1.190	.074
Source of Drinking Water			
Drinking mineral Water	1		
Drinking Natural Water	1.729	.588-.903	.004
Drinking piped Water	1.089	1.020-1.734	.006
Food Diversity in Children			
Children with Food diversity	1		
Children with no Food diversity	1.497	.265-.933	.029
Native Languages			
Urdu	1		
Sindhi	1.545	1.332-1.893	.016
Punjabi	.911	.587-1.413	.677
Sariaki	.658	.408-1.061	.086
Baluchi	.401	.196-.820	.012
Pushto	1.366	.829-2.250	.222
Other	.505	.290-.879	.016

Abbreviations: 1 reference category, AOR adjusted odds ratio, CI confidence interval by using χ^2 test. Note: Multivariate logistic regression analysis was carried out to attain AOR after entertaining all the independent variables simultaneously that were significant at level 0.05 in binary logistic.

Discussion

Child stunting is one of the burning issues in Pakistan, affecting physical growth of the children, hence, leading to the feeble future of generation. For instance, Sagar *et al.* (2016) found that linear stunting growth is also harming mental growth and problem-solving capacity of the children (Sagar *et al.*, 2016). The current study revealed that sociocultural and economic factors associate with child stunting growth and it is also disturbing children well-being. Various studies found similar results; such as, states of Uttar Pradesh and Bihar in India's country had 47.3, 49.4%, and 50.6% stunting growth of the child. Such social strata did not have conducive social status, and the children of the low and middle working classes in Sierra Leone in West Africa also had a 45% child stunting rate (Dasgupta *et al.*, 2016; Organization,

2020). It was also deduced that mother's decision-making choice was responsible for low birth weight and stunting, which was accounted for 20% of child stunting (Sagar *et al.*, 2016; Vaivada *et al.*, 2020).

Since it is a well-established fact that stunting is a health complication (Akombi *et al.*, 2017; Branca *et al.*, 2015b), immunization status among children was one of the prime factors to be studied. The results of these studies showed that lack of proper immunization was strongly correlated with the stunting (Akseer *et al.*, 2020). Children who were adequately immunized were found less prone to be stunted than those who did have immunizations (Batoool *et al.*, 2019). Furthermore, the current study results were in linked with the above studies, such as children in rural areas were more stunted than in urban areas. Yaya *et al.* (2020) results were inconsonant with our findings. Therefore, the current study found that rural area does not have as many good social facilities as urban rural area children have more stunting growth.

Additionally, the present study also assessed stunting growth with various ethnicities, (classified on the basis of their native tongue, and currently, they are also living in the ethnic culture). Having the reference category as Punjabi, the data showed that the Sindhi speakers were more strongly associated with stunting ratio among children. Women are being treated on their social conditions in which they are raised, and it is the depiction of an individual mindset. The studies of Bala *et al.* (2020) and Ali *et al.* (2020) measured the Sindhi social culture and especially the Sindhi living in rural areas do not provide much social autonomy and importance to their women which cause stunting growth among children. Women are generally in miserable conditions, which directly results in more stunting among their children. In a similar context, various studies found that parent education is directly associated with many social and health aspects of children stunting, and especially under five age (Bearss *et al.*, 2015; Garg *et al.*, 2015; Perry *et al.*, 1988). The results of the current study found that uneducated parent's children are at greater risk of stunting. Then a comparative analysis of their level of education was also carried out, and the result showed that parent's higher level of education has less chances for their children stunting growth. The same results has been established by Vollmer *et al.* (2016) and Ahirwar *et al.* (2020) that education level has association with child nutrition status and its effect on stunting growth.

The strengths of this study include having data from an authentic source and analyzed with logistic regression to know the relationship of mother employment status with stunting, but conversely, results were statistically measured with multivariate logistic regression to know the adjusted odd ratio of the data for better understanding of stunting growth. Further, women's status in employment was not significantly associated with stunting among children. While conducting a comparative analysis, such mothers who had no source of income and those who had found differences and the mother's no source of income were significantly associated with stunting compared with those who had some source of income.

The current study measures the factor of drinking water, and it was further classified into piped water, natural water, clean drinking water and filtration plant water. The multivariate in adjusted odd ratio results showed that children using piped and naturally preserved water for drinking purposes were more acutely vulnerable to stunting than children using water from a filtration plant. The study's finding is similar to the results of (Rah *et al.*, 2015; Rah *et al.*, 2020; Torlesse *et al.*, 2016), where the drinking water source affects the child's health and causes more symptoms of stunting growth. Similar results have been reported by serval studies that children with food diversity are less found to be in the status miserable condition of stunting rather than those who do not have food diversity (M'Kaibi *et al.*, 2017; Motbainor *et al.*, 2015; Trisasmitta *et al.*, 2020). The results found in this current study showed that children with no food diversity were more stunted than children with proper dietary diversity.

Conclusion

It is concluded that stunting growth is a significant challenge to ensuring a progressive healthy generation, especially the mother as a source of the children's healthy birth for future offspring. Controlling stunting growth can demand solemn efforts to address the issue and to devise a comprehensive mechanism to take some practical and vital steps to have a mentally and physically vibrant nation. The current study has concluded that factors, i.e., low birth weight, 'mothers' and fathers' level of education, mother's earning

types, household wealth index, and ethnic and regional stratification, are significantly associated with child stunting growth under the age of five years. These factors make the nation and the future of children in many ways. Consequently, such counterproductive social aspects must be dealt with severely to pause the prevailing worst situation of child stunting in Pakistan. The current study deduced from the statistical findings that Baluchistan and Sindh have relatively more children with stunting growth than the other areas of Pakistan. More importantly, rural areas are encountering the immense and severe threat of children stunting growth. It warrants the future of children, and it needs a practical, short- and long-term multidisciplinary approach to overcome children stunting by the government, private and public sectors, as well as social institutions.

Recommendations

- It is pertinent to mention that vibrant and aware civil society organizations are consistently more result-oriented and have a far-reaching effect on sustainable amelioration in the status quo to control children stunting growth.
- It is recommended that more caution should be given to the public sectors related to parents' education, health, food and good municipalities for less chances of stunting in children.
- Parents, teachers and peers can play a pivotal role in bringing a paradigm shift in prevailing circumstances and assisting the Pakistani government in achieving its SDGs targets by 2025.
- Socio-economic and cultural factors are responsible for children stunting growth, especially public and private sectors should focus on education, health, food, and municipalities. All these factors need to understand for predictability to overcome the seemingly herculean task of stunting growth among children, which is an accomplished reality.
- The policymakers should give special attention to the marginalized segments of society and also neglected areas of the country.
- It is also recommended that policymakers should be aware of society's mob regarding initial children's growth.

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Conflict of Interest


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