International Journal of Community Medicine and Public Health
Oo MZ et al. Int J Community Med Public Health. 2023 Mar;10(3):981-986
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20230610

Original Research Article

Risk factors for stunting of under-five children in Myanmar

Moe Zaw Oo[1]*, Pa Pa Soe[2]

[1]Faculty of Health and Social Sciences, University of Bedfordshire, Luton, United Kingdom
[2]Department of Preventive and Social Medicine, University of Medicine 2, Yangon, Myanmar

Received: 12 December 2022
Revised: 19 January 2023
Accepted: 21 January 2023

***Correspondence:**
Dr. Moe Zaw Oo,
E-mail: drmoezawoo@gmail.com

ABSTRACT

Background: This study aimed to identify risk factors and assess their significance concerning childhood stunting in Myanmar.
Methods: This study was conducted through the analysis of a secondary dataset based on the 2015-2016 Myanmar Demographic and Health Survey (MDHS 2015-2016), a program funded by the United States Agency for International Development (USAID). Among the 5239 under-five children who participated in the Myanmar DHS 2015-2016 survey, 4172 children with complete anthropometric measurements were included in this study. This was a cross-sectional study, and Chi-squared analysis was applied to determine the association of each risk factor with stunting. In addition, logistic regression was used for multivariate analysis of all risk factors combined.
Results: Out of 4172 children who participated in the study, 1146 (27.5%) were stunted. Type of place of residence, household wealth index, and maternal education level have a significant effect on stunting of under-five children with (χ^2=52.79, df=1, p=0.000), (χ^2=82.03, df=2, p=0.000) and (χ^2=72.31, df=3, p=0.000) respectively. When applied to multivariate logistic regression analysis, all three factors remained significant predictors of stunting in under-five children.
Conclusions: Individual- and community-level factors determining the stunting of under-five children in Myanmar were explored. Government support programs for the occupation and income of the household heads and household members, as well as education programs targeting women in both the short term and long term, may help improve the condition.

Keywords: Malnutrition, Myanmar DHS, Stunting, Under-five children, Under-nutrition

INTRODUCTION

Stunting is defined as the height-for-age of a child more than two standard deviations below the WHO child growth standards median. Stunting (too short for age) is a form of malnutrition. It is due to the impaired growth and development of the child resulting from poor nutrition, repeated infection, and inadequate psychosocial stimulation.[1]

According to 2020 data, 149 million children under five years of age around the world were supposed to be stunted, accounting for 22% of children worldwide.[2] Though the global stunting rate has declined steadily from 33% since 2000, faster progress is needed to reach the 2030 target. Among stunted under-five children, more than half are from Asia, and two-fifths are from Africa.[3]

Chronic or recurrent undernutrition during intrauterine life and early childhood results in stunting. Children who are suffering from stunting may not attain their full possible height and their full cognitive potential. Childhood stunting is highly related to consequences of short- and long-term health and economic outcomes, including increased risks of childhood infections, developmental problems resulting in poorer school

performance and lower productivity and earnings in adulthood, and also at increased risk of obesity-related adult non-communicable diseases and mortality.[4,5]

Myanmar is one of the 46 least-developed countries in the world, with a land area of 653080 km² and a population of 54.410 million. GDP per capita was 1212 US$ in 2015, and 1693 US$ in 2020.[6] According to MDHS 2015-2016, 29% of under-five children are found to be stunted (short for their age), 7% are wasted (thin for their height), 19% are underweight (thin for their age), and 1% are overweight (heavy for their height) along with under-5 mortality rate of 50 deaths per 1,000 live births.[7] Risk factors for child stunting in Myanmar include child age, child sex, perceived child size at birth, maternal stature, maternal occupation, institutional delivery, mother's occupation as a farm laborer or working in an office or shop, institutional delivery, household wealth index, household drinking water, and area of residence.[8] 5.54% of households in Myanmar are encountering the problem of double burden of malnutrition at the household level (DBMHL), i.e., the coexistence of overweight mothers and stunted children in the same household and the significant risk factors are accountable for occurring DBMHL, especially the socioeconomic inequality.[9]

This study aimed to identify determining factors for the stunting of under-five children in Myanmar and evaluate their importance concerning the under-five children in Myanmar using an analysis of a suitable secondary dataset.

Not so many studies exist about risk factors for the stunting of under-five children in Myanmar. The malnutrition framework of UNICEF described the risk factors as household (residence and wealth quintiles), maternal, and child characteristics.[10] In a secondary analytical survey using Ethiopian DHS data, rural children were 29% more likely stunted than their counterparts.[11] An analytical study performed using the data from 50 DHS of 14 low- and middle-income countries showed that a 10% increase in the percentage of the urban population was associated with a 0.67 pp (p=0.013) decreased probability of stunting.[4]

Several of the studies reported that poverty affected the malnutrition of under-five children. A study in Bangladesh also showed a strong linkage between child malnutrition and poverty, with children from wealthy families having a lower likelihood of being stunted and underweight.[12] In another study, it was found that children born in families of poor and middle socioeconomic positions were found to have more likelihood of undernutrition than their counterparts.[13] A case-control study conducted on children aged 6 to 59.9 months in 2014–2015 found that children from the poorest households were more likely to be stunted than those from the wealthiest families.[14]

There is proven evidence from several studies about low maternal education as the risk factor for under-five malnutrition. In a study in urban slum settings of Nairobi, maternal education is found to be a strong predictor of childhood stunting, with 43% of children born from mothers with a primary level of education being stunted compared to 37% for children of mothers with at least secondary level of education.[15] Result of a study using data collected from 590,570 families in Indonesia and 395,122 families in Bangladesh as part of major nutritional surveillance programs is a good evidence of better maternal formal education leading to a decrease of between 4.4% and 5% in the odds of childhood stunting (odds ratio per year 0.950, 95% CI 0.946-0.954 in rural settings; 0.956, 0.950-0.961 in urban environments) in Indonesia and better maternal formal education leading to a 4.6% decrease in the odds of child stunting (0.954, 0.951-0.957) in Bangladesh.[16]

METHODS

Secondary dataset

The secondary dataset from the demographic and health surveys (DHS), a program funded by the U.S. Agency for International Development (USAID) to learn more about global health in developing countries, was used to write this paper.

The Myanmar dataset for the 2015-2016 DHS was used for this study. The sampling method employed by the MDHS was stratified two-stage sampling with 15 urban and 15 rural areas spread over 15 regions. The first step was to independently select 442 clusters (123 urban and 319 rural) using an equal-probability sampling process. In the second step, 30 households from each selected cluster were sampled using equal-probability systematic sampling. A total of 13,260 households were included in this study.[7]

Ethical approval for the MDHS was obtained from the Ethic Review Committee of the department of medical research. This approval was extended to include a secondary analysis of the data approved by the DHS. The Myanmar DHS 2015-2016 was a nationally representative sample comprising participants randomly chosen from all regions across Myanmar from December 7, 2015, to July 7, 2016. Permission to use the Myanmar DHS dataset for this report was requested from the DHS program (authorization: 159017), and the dataset was downloaded from the website https://dhsprogram.com/data.

Study design

This study was a cross-sectional study, and the Chi-squared test was applied to determine the association of each risk factor with stunting. In addition, logistic regression was used for multivariate analysis of all risk factors combined.

The selection criteria for the study participants were all under-five children from all the households included in the Myanmar DHS 2015-2016 Survey. 1067 out of the 5239 children under the age of five from the households that took part in the Myanmar DHS 2015-2016 survey were left out of this study because their anthropometric measurements were not complete.

Statistical analysis

SPSS statistics (v25, IBM Corporation, Armonk, New York, USA) was applied for performing all statistical analyses. Each of the three risk factors identified in the literature review was transformed into a categorical variable. Classifications for the type of residence used the DHS categories of urban and rural, and maternal education classifications also used the DHS categories of no education, primary, secondary, and higher education. Wealth indexes for urban/rural were reclassified into three groups the poor, middle, and rich though the DHS categories were classified into five groups. The ages of the children were also recoded into five age groups by determining the cut-offs to create five groups with as close to equal numbers as possible, which were 0-11 months, 12-23 months, 24-35 months, 36-47 months and 48-59 months.

Chi-squared analysis was used to determine the association of each risk factor with stunting, while logistic regression was used for multivariate analysis of all risk factors combined. Confidence intervals of the odds ratios obtained from chi-squared and logistic regression analysis were used to determine significant differences between groups, with 95% confidence levels used.[17]

RESULTS

Participants

Though the Myanmar DHS 2015-2016 survey included 5239 under-five children aged 0-59 months, only 4172 under-five children with complete anthropometric measurements were included for analysis. The demographic characteristics of the study participants are shown in Table 1.

Of the 4172 children selected for this study, 1146 (27.5%) were stunted. Table 2 shows the prevalence of stunting among children under five according to the type of place of residence, the wealth index for urban and rural areas, and the maternal education level.

Risk factors for stunting of under-five children

Type of place of residence

The type of place of residence was seen to have a significant effect on the stunting of under-five children (χ^2=52.79, df=1, p=0.000). Furthermore, by comparing children in the urban area, which was taken as the reference group, there was an increased risk of stunting in children living in rural regions (Table 3).

Table 1: Demographic characteristics of the study participants.

Characteristic	Frequency	Percentage (%)
Child's age (months)		
0-11	819	19.6
12-23	837	20.1
24-35	822	19.7
36-47	889	21.3
48-59	805	19.3
Child's gender		
Male	2152	51.6
Female	2020	48.4
Type of place of residence		
Urban	859	20.6
Rural	3313	79.4
Wealth index		
Poor	2141	51.3
Middle	832	19.9
Rich	1199	28.8
Maternal education level		
No education	703	16.9
Primary	1882	45.0
Secondary	1297	31.1
Higher	290	7.0

Table 2: Prevalence of stunting among under-five children.

Variables	Frequency	Percent prevalence within group
Type of place of residence		
Urban	162	18.8
Rural	984	29.7
Wealth index		
Poor	690	32.3
Middle	223	27
Rich	233	19.5
Maternal education level		
No education	236	33.6
Primary	570	30.3
Secondary	296	22.8
Higher	44	15.3

Table 3: Effect of place of residence on stunting of children.

Place of residence	Childhood stunting	Chi-square test	UOR (95%CI)
Urban	18.80%	Reference group	
Rural	29.70%	χ^2=51.74**	1.83 (1.55-2.15)

*p<0.05, **p<0.01, UOR-Unadjusted Odds Ratio.

Wealth index for urban/rural

The household wealth index significantly affected childhood stunting (χ^2=82.03, df=2, p=0.000). By comparing children in poor families, which was taken as the reference group, there was a decreased risk of stunting for middle and rich families (Table 4).

Maternal education level

Concerning maternal education level, there was a significant effect on stunting in under-five children (χ^2=72.31, df=3, p=0.000). When compared to those with no education, which was taken as the reference group, there was a significantly decreased risk of stunting in children in mothers who had no education, primary education, and secondary education, with each increase in education level corresponding to lower risk (Table 5).

Table 4: Effect of wealth index on stunting of children.

Wealth index	Childhood stunting	Chi-square test	UOR (95%CI)
Poor	32.30%	Reference	
Middle	27.00%	χ^2=9.83**	0.78 (0.66-0.91)
Rich	19.50%	χ^2=80.28**	0.51 (0.44-0.59)

*p<0.05, **p<0.01, UOR-unadjusted odds ratio

Table 5: Effect of maternal education level on stunting of children.

Maternal education level	Childhood stunting	Chi-square test	UOR (95%CI)
No education	33.60%	Reference	
Primary	30.30%	χ^2=6.26*	0.81 (0.68-0.95)
Secondary	22.80%	χ^2=39.96**	0.55 (0.46-0.66)
Higher	15.30%	χ^2=41.43**	0.34 (0.24-0.47)

*p<0.05, **p<0.01, UOR-unadjusted odds ratio

Table 6: Logistic regression analysis of the place of residence, wealth index for urban/rural, and maternal education level for stunting in children.

Risk factor	Group	Chi-square test	AOR (95%CI)
Place of residence	Urban	Reference	
	Rural	χ^2=28.99*	1 .66 (1.38-2.00)
Wealth index	Poor	Reference	
	Middle	χ^2=6.13*	0.81 (0.68-0.96)
	Rich	χ^2=47.54**	0.55 (0.46-0.65)
Maternal education level	No education	Reference	
	Primary	χ^2=2.23	0.88 (0.74-1.04)
	Secondary	χ^2=9.22**	0.73 (0.60-0.90)
	Higher	χ^2=6.01*	0.63 (0.44-0.91)

*p<0.05, **p<0.01, AOR-adjusted odds ratio.

Multivariate analysis

By entering all risk factors into a multivariate logistic regression analysis to adjust for covariates, all three factors, including the type of place of residence, wealth index for urban/rural, and maternal education level, remained significant predictors of stunting in under-five children (Table 6).

DISCUSSION

Risk factors for stunting in under-five children

The type of place of residence was a significant factor in the stunting of under-five children in Myanmar, with an increased risk of stunting in rural children. Similar results have been reported in other studies. Multivariable analysis of cross-sectional data from the Myanmar Demographic Health Survey 2015-2016 showed that living in the north-east states, the west-south region, and the west states is associated with 59%, 58%, and 43% higher odds of child stunting (OR=1.59, 95%CI [1.17-2.17]; OR=1.58, 95%CI [1.08-2.31]; and OR=1.43, 95%CI [1.02-1.20] respectively) compared with living in central regions.[18]

The combined household wealth index for urban/rural is a significant risk factor for the stunting of under-five children in Myanmar. The analytical study using data from the Myanmar Demographic Health Survey 2015-2016 also showed the OR for stunting is significantly increased with lower wealth quintiles (OR=1.75-1.99), compared with the highest quintile.[18] A study of child stunting in rural areas of Moramanga and Morondava, Madagascar, showed that compared with the 4th quartile, household wealth index within the 1st, 2nd, and 3rd quartile was associated with 2.3 (95%CI: 1.6-3.4), 2.3 (95%CI:

1.5-3.4) and 1.2 (95%CI: 0.8-1.7) odds of stunting, respectively.[14]

The education level of mothers was a significant risk factor for the stunting of under-five children in Myanmar. A study using data from demographic and health surveys (2007-2018) from 35 LMICs also showed that lack of maternal education (OR=3.5; 95% CI 3.3-3.7; p<0.001) and poorest household wealth (OR=3.4; 95% CI 3.2-3.5; p<0.001) conditional on all other factors.[19] A study conducted in Indonesia also showed that child stunting is associated with low maternal education, low household socioeconomic status, and living in rural areas.[20]

Strengths and limitations

The strength of this study is the use of a DHS dataset providing a nationally representative sample of children in Myanmar, and the DHS program is internationally recognized to be of high quality. Furthermore, the dataset used was the most recent dataset available, with data collection occurring in 2016. The dataset was large and collected by a highly-skilled research team and representative of Myanmar children, and the results can be considered generalizable. The possibility of recall bias is minimal as anthropometric measurement was done at the time of the study, and the information collected was of clear evidence.

Despite these strengths, there were some limitations to this study, however. There are relatively few references regarding the stunting of under-five children in Myanmar. The analysis was also limited to three risk factors, with other potential risk factors, such as age and sex of children, birth order, household size, and the number of under-five children in the household, etc., not included in the analysis.

CONCLUSION

This study showed individual- and community-level factors determined childhood stunting in Myanmar children. The risk factors for stunting of under-five children in Myanmar identified in this study include the type of place of residence, wealth index, and maternal education level. Of these factors, wealth index and maternal education level are adjustable, and the promotion of girl education, improving the economic status of households, and narrowing of rural-urban disparities are recommended.

Government support programs for the occupation and income of household heads and members may improve the wealth index to some extent in rural and urban areas. In addition, education programs directed at women in the short term and long term may uplift the education levels of women. Special nutrition programs targeting rural communities are vital to reducing the prevalence of under-five children's stunting. It may be done through various nutrition campaigns, including health education and awareness-raising sessions for childhood stunting, cooking demonstration sessions in rural areas, and nutrition support activities such as support of food and money.

ACKNOWLEDGEMENTS

This study was conducted using the secondary data set from the 2015-2016 Myanmar DHS survey and fully obliged with the publication guidelines for publication submission of the DHS Program. In addition, the authors would like to thank the University of Bedfordshire and lecturers from STI Myanmar University for mentoring and contributing to this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Oo MZ, Soe PP. Risk factors for stunting of under-five children in Myanmar. Int J Community Med Public Health 2023;10:981-6.