



Decomposing the gap in child malnutrition between poor and non-poor in Sierra Leone

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Abstract

Aim The main aims of the study were to quantify the contribution of factors that explain the poor/non-poor gap in underweight and stunting among children aged less than 5 years in Sierra Leone.

Subject and methods We used cross-sectional data from the Sierra Leone DHS conducted during 2013. Descriptive statistics, logistic regression, and nonlinear (fairlie) decomposition technique were used to explain the contribution to the average gap in malnutrition between poor and non-poor children in Sierra Leone.

Results Considerable proportions of children were found to be underweight (16.8%) and stunted (38%) in Sierra Leone in 2013. The malnutrition gap between the poor and non-poor was stark in Sierra Leone. For these two indicators, the main contributing factors were place of residence, mother's education, media exposure, and institutional delivery.

Conclusion Based on the findings, the study suggests that improving public services such as basic health care and the education level of the mothers among the poor can ameliorate the negative impact of poverty on childhood malnutrition.

Keywords Malnutrition · Underweight · Stunting · Decomposition

Introduction

Malnutrition and poor health of children are one of the most significant threats to public health in developing countries (Chen et al. 2014). Adequate and proper nutrition is critical to child development. The period from birth to age 2 is imperative for ideal development, wellbeing, and advancement, yet it is frequently negatively affected by development vacillating, micronutrient deficiencies, and common childhood illnesses, for example diarrhea and acute respiratory infections. Proof of the short- and long-term consequences of childhood malnutrition is well established (Onis et al. 2000; Wagstaff and Watanabe 2000). Under-nutrition is complex, with numerous

causes. Individuals can become undernourished either because they do not get enough of the correct nourishment to eat, or because they are debilitated. Beyond this, the principal factors that poor households do not have access to water and sanitation or access to basic health services, and that there are insufficient behavioral change interventions targeting women of reproductive age, all play a part (MDG 2011; Sierra Leone Food and Nutrition Security and Implementation Plan 2012-2016).

Sierra Leone has both one of the highest malnutrition rates and child mortality rates in the world. More than one-third of children are chronically malnourished; in 2010, 22% were underweight, and 44% were stunted (SUN Movement Sierra Leone Report 2014) On account of the conflict in Sierra Leone's recent past, malnutrition had recently come into focus as a concern. Children and women make up the larger proportion of the uprooted population, and they typically suffer the most in such circumstances. Alternate impacts of conflict on public health wellbeing are affected by a more extensive complex of circumstances (Loretto 1997). These internally uprooted individuals are often trapped within battle zones and have difficulty in reaching universal help (Spiegel et al. 2004). The public health impact of these conflicts includes increased prevalence of acute and

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chronic malnutrition, high mortality rates, high rates of diarrheal diseases, etc. (Dillingham and Guerrant 2004; Terry et al. 2001; Toole 1995).

Sierra Leone was ranked among the five countries with the highest global hunger index scores in the year 2009 (ACDIVOCA 2011). According to MICS (2010), It has been estimated that there were over 1 million of children under 5 years old, of whom 44% were stunted, 22% were underweight, and only 8% were wasted (MICS 2010). Since 2010, a significant gain in nutrition has been observed in Sierra Leone. The prevalence of underweight was 12.9% among children from 6 months to 5 years old, while the prevalence of stunting has been gradually reduced from 34.1% to 28.8% during the period 2010–2014. Despite this progress, micronutrient deficiencies are still prevalent in Sierra Leone among both women and children (SMART 2010; SMART 2014).

In 2013, Sierra Leone joined the Scaling Up Nutrition (SUN) Movement, in an effort to diminish malnutrition through strengthening multi-sectoral collaboration and coordination. This prompted the 2013–2017 Multisectoral National Nutrition and Food Security Policy and Implementation Plan, with policies and techniques to support evidence-based high-impact nutrition interventions and a joint effort with relevant sectors. In association with the Government of Sierra Leone, the World Food Programme is supporting malnourished children from the poorest family units through a supplementary feeding programme, achieving 49,740 children across the country. Gaps in child malnutrition between rich and poor countries are wide and growing, and there is evidence of growing inequity within countries (Bredenkamp et al. 2014). The trends in malnutrition prevalence by different surveys FAO (2008), SMART (2010), and SLDHS (2014) are shown in Fig. 1.

The current study aims to explain the factors contributing to the poor/non-poor gap in child malnutrition in Sierra Leone, using cross-sectional data from the Demographic Health Survey conducted during 2013. For the purpose, we used the extension of Blinder–Oaxaca decomposition analysis known as the non-linear decomposition (Fairlie) technique. This technique is useful in explaining the gap in outcome between the two population groups (Blinder 1973; Oaxaca 1973). This gap

is most glaring in comparative and nationally representative studies of child malnutrition. Without standard measures of the SES of families and groups, researchers have normally utilized their own indicators using cross-sectional study. The evidence of the relative contribution of indicators that clarify the gap in childhood malnutrition between the poor and non-poor may support policymakers in their endeavors to diminish poor people/non-poor gap. Few studies have highlighted the mounting poor/non-poor gap in the utilization of childhood undernutrition, maternal healthcare services and child health, postnatal care, infant mortality, and child mortality (Kumar and Mohanty 2011b, a). These areas have been growing asymmetrically. To our knowledge, there exists no published literature explaining the poor/non-poor gap in child malnutrition by using this type of decomposition technique.

Data and methods

Data

This study used data from Sierra Leone from the Demographic and Health Survey (DHS) conducted during 2013 which was carried out in collaboration with the Ministry of Health and Sanitation of Sierra Leone. The survey provides reliable estimates of fertility, infant and childhood mortality, family planning, utilization of maternal and child health care services, etc., at the country as well as regional and district level. A total of 13,006 households were targeted, involving 16,658 female and 7262 male respondents. The target groups in the survey were women of age 15–49 and men of age 15–59 from randomly selected households. Information of children under 5 years of age, including their weight and height, were also collected from the eligible women. The survey adopted multistage sampling design — a two-stage sampling design in rural areas and three-stage in sample design urban areas. SLDHS sample for the year 2013 was a stratified sample selected in two stages from the 2004 census frame. Stratification was achieved by separating each district into urban and rural areas. SLDHS collected data using different interview schedules — household schedule, women/ individual schedule, and men's schedule — from the sampled

Fig. 1 Prevalence of malnutrition in Sierra Leone, 2008–2014

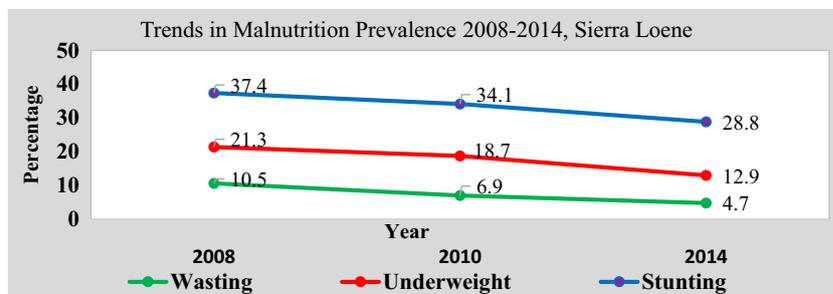
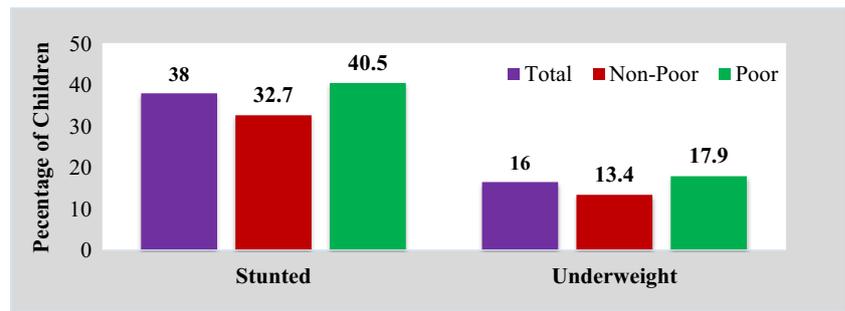


Fig. 2 Percentage of undernourished children across the poor and non-poor in Sierra Leone, 2013



households. The household response rate was 99%; the response rate for men was 96%, and the individual response rate was 97%.

Methods

Using second rounds of SLDHS data, we carried out a binary logistic regression analysis to estimate the level and patterns, and socio-economic, demographic differentials in child nutritional status in Sierra Leone. Multicollinearity for all the exposure variables was tested before putting them into the logistic regression model. Over the past few decades, the common approach to identifying the gap between poor and non-poor is the Blinder–Oaxaca decomposition (Blinder 1973; Oaxaca 1973). In our study, the Blinder–Oaxaca decomposition technique aims to explain the gap in malnutrition between poor and non-poor. Suppose we have a variable, *y*, which is our outcome variable of interest. We have two groups, which we shall call the poor and the non-poor. We assume *y* is explained by a vector of determinants, *x*, according to a regression model:

$$y_i = \begin{cases} \beta^{poor} \chi_i + \varepsilon_i^{poor} & \text{if } poor \\ \beta^{nonpoor} \chi_i + \varepsilon_i^{nonpoor} & \text{if } nonpoor \end{cases}$$

where the vectors of β parameters include intercepts. In the case of a single regressor, the non-poor are assumed to have a more advantageous regression line than the poor. At each value of *x*, the outcome, *y*, is better. Also, the non-poor are assumed to have a higher mean of *x*. The

result is that the poor have a lower mean value of *y* than do the non-poor. However, this technique is not appropriate for binary models to decompose the poor and non-poor gap in malnutrition that can be attributed to different factors. Hence, an extension to Blinder–Oaxaca decomposition is the non-linear decomposition (Fairlie) technique (Fairlie 2005). This method allowed us to quantify the contribution of factors explaining the poor and the non-poor gap in underweight and stunting in Sierra Leone. The detailed explanation of the decomposition method proposed by Fairlie has been described elsewhere (Fairlie 2005).

Results

Figure 2 shows differences in the prevalence (%) of underweight and stunting among poor and non-poor children in Sierra Leone. The overall prevalence of underweight children in Sierra Leone was 16% in 2013. The corresponding prevalence of stunting was 38%. The prevalence of underweight and stunting varied starkly between the urban poor and non-poor. Around 18% of poor children were underweight compared to only 13.4% among non-poor children. Similarly, about 40.5% of poor children were stunted compared to 32.7% among non-poor children.

We also examined trends in economic inequalities in the underweight and stunting of the children measured by concentration indices (CI) and concentration curves (Fig. 3). Figure 3 shows the Lorentz curve of stunting and underweight

Fig. 3 Concentration curve showing the economic inequality in underweight and stunting among children in Sierra Leone

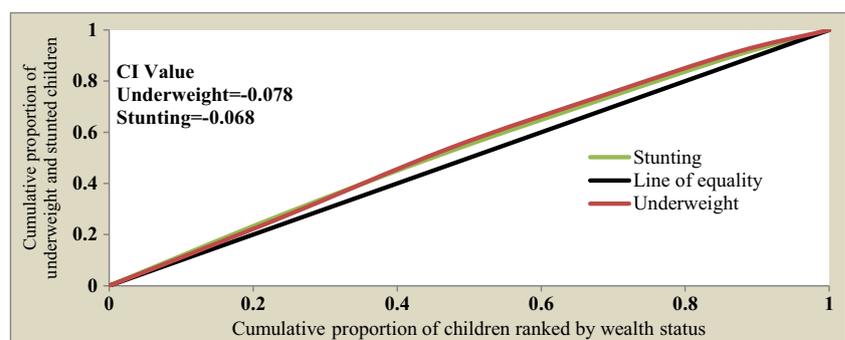
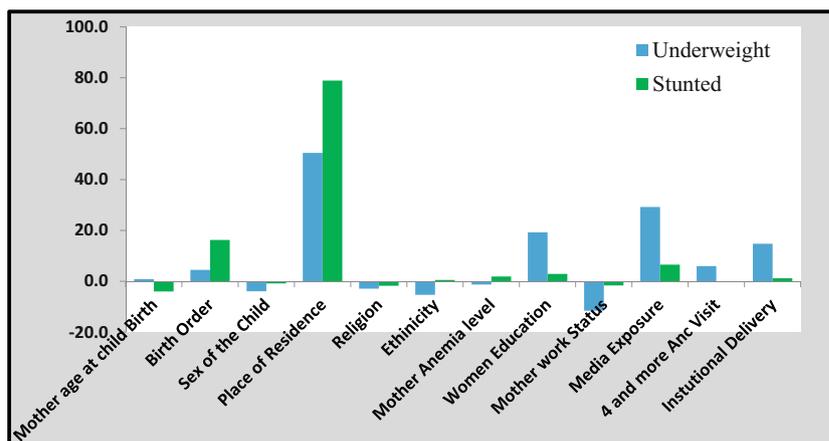


Fig. 4 Percentage contribution of different factors in child malnutrition to the total gap between poor and non-poor in Sierra Leone



by wealth quintile. We used Fairlie decomposition analysis to quantify the contribution of different socioeconomic and demographic predictors explaining the gap in the underweight and stunting of the children between poor and non-poor population. The figure indicates that stunting and underweight are concentrated among the poor. There is not much inequality observed for the two indicators (-0.078 and -0.068 for underweight and stunting respectively). However, the inequality is higher in underweight than in stunting (Figs. 3 and 4).

Table 1 shows the distribution of poor and non-poor children across various demographic and socio-economic characteristics in Sierra Leone. Overall, three-quarters of the children were living in rural Sierra Leone, and 95% of them are poor. Around 82% of the children belong to the Muslim community; among them, 84% were poor. The Mende and Temne ethnic groups constitute more than 70% of the total population. The level of education is very poor in Sierra Leone, i.e., two out of three persons are illiterate, and among them 77% are poor. Just under 50% of women were anaemic during the survey, and around 70% of poor parents do not have any media exposure.

Table 2 shows the differences in stunted and underweight among the children (0–59 months) between poor and non-poor across the selected background characteristics in Sierra Leone, 2013. Non-poor mothers who have given birth below 20 years of age, their 18% children were underweight, and the corresponding figure for stunted was 33%. Whereas, underweight and stunting children were higher among those poor mothers who gave birth after 20 years of age (Table 2).

The cases of stunting and underweight were higher among poor children whose birth order is higher (fourth and above) than in lower birth order children. Around 42% of poor children of high birth order (fourth and above) were stunted, and the corresponding figure for underweight was 18.4%. Underweight and stunting were higher among male children than female children in both poor and non-poor. The cases of underweight and stunting were much higher in rural poor (18% and 41% respectively) than in urban poor children (13.7% and 33% respectively). Poor children belonging to the Christian

community reported much higher cases of underweight (19.5%) and stunting (43.5%) than other religious communities.

As far as ethnicity is concerned, poor Mende children have reported much higher cases of underweight (18.6%) and stunting (44.7%) than other ethnic groups of Sierra Leone. Poor children belong to illiterate mothers have a higher risk of underweight (18.5%) and stunting (40.7%) than those poor children belonging to secondary- and above-educated mothers. Poor children whose mothers were not working and did not have any media exposure had more risk of being underweight and stunted. In mothers who had less than four ANC visits, cases of underweight and stunting among their children were much higher; among poor, 23% of the children were underweight, compared to 17.3% of children whose mothers who had four and above ANC visits. In the same way, mothers having institutional delivery had a lower risk of having underweight children.

Table 3 shows that among non-poor children, the role of mother's age at childbirth, place of residence, and mother's ANC visit have a significant association with risk of underweight. The children of mothers who have given birth at an age between 20 and 34 have a lower risk of underweight (OR = 0.612; 95% CI, 0.354–1.055) than children of those mothers giving birth below 20 years of age. The risk of underweight was significantly higher among rural non-poor children (OR = 1.468; 95% CI, 0.979–2.201) than do urban non-poor children. As expected, mothers who had four or more ANC visits during the 1st trimester of pregnancy had lowered the risk of underweight among their children (OR = 0.673; 95% CI, 0.432–1.046).

As far as poor children of Sierra-Leone are concerned, the role of mother's age at childbirth, sex of the child, media exposure, and institutional delivery of mothers have a significant effect on risk of underweight among their children. Unexpectedly, children of mothers who have given birth at an age between 20 and 34 have a higher risk of underweight (OR = 1.568; 95% CI, 0.983–2.504) than mothers below 20 years of age. Female, poor children were less likely to suffer underweight than poor male children (OR = 0.775;

Table 1 Distribution of poor and non-poor children across selected demographic and socio-economic characteristics in Sierra Leone, 2013

Background characteristics	Poor	Non-Poor	Total
Mother's age at child birth			
< 20 years	17.9	20.6	18.8
20–34 years	65.6	67.4	66.2
35–49 years	16.6	12.0	15.0
Birth order			
First	18.0	27.3	21.1
Second/third	32.8	37.3	34.3
Fourth and above	49.3	35.5	44.6
Sex of the child			
Male	50.0	49.9	50.0
Female	50.0	50.1	50.0
Place of residence			
Urban	5.1	65.0	25.5
Rural	94.9	35.0	74.5
Religion			
Christian	15.8	21.7	17.8
Islam	83.8	78.0	81.9
Others	.3	.2	.3
Ethnicity			
Mende	40.7	29.7	37.0
Temne	32.4	38.7	34.5
Others	26.9	31.6	28.5
Anaemia level of mother			
Anaemic	49.3	43.4	47.4
Not anaemic	50.7	56.6	52.6
Level of education			
No education	77.4	52.2	68.8
Primary	13.4	15.5	14.1
Secondary and above	9.2	32.3	17.0
Work status			
Not working	19.3	32.4	23.7
Working	80.7	67.6	76.3
Media exposure			
No exposure	69.5	49.0	62.5
Media exposure	30.5	51.0	37.5
Four and more ANC visits			
No	25.5	20.7	23.8
Yes	74.5	79.3	76.2
Institutional delivery			
No	51.0	37.1	46.4
Yes	49.0	62.9	53.6

95% CI, 0.609–0.985). Media exposure has a significant effect on underweight among poor children. Children of mothers who had any media exposure were less likely to suffer underweight (OR = 0.732; 95% CI, 0.556–0.967) than those of mothers without any media exposure. As expected,

Table 2 Differences in stunted and underweight among the children (0–59 months) between poor and non-poor across the selected background characteristics in Sierra Leone, 2013

Background characteristics	Underweight		Stunted	
	Non-poor	Poor	Non-poor	Poor
Mother's age at child birth				
< 20 years	17.8	14.4	33.1	37.3
20–34 years	12.5	18.4	32.3	40.6
35–49 years	11.7	18.7	34.0	42.1
Birth order				
First	14.7	16.8	32.3	34.7
Second/third	13.1	17.6	30.0	40.8
Fourth and above	12.8	18.4	35.6	41.9
Sex of the child				
Male	15.0	18.6	34.0	41.1
Female	12.0	17.2	31.5	39.7
Place of residence				
Urban	12.6	13.7	30.3	33.1
Rural	14.8	18.1	36.7	40.7
Religion				
Christian	13.2	19.5	38.0	43.5
Islam	13.5	17.7	31.2	40.0
Others	NA	NA	NA	12.9
Ethnicity				
Mende	13.0	18.6	37.8	44.7
Temne	14.7	15.3	31.0	35.2
Others	12.2	20.5	30.0	41.1
Anaemia level of mother				
Anaemic	13.3	17.2	31.7	40.7
Not anaemic	12.9	18.2	33.0	39.7
Mother's education				
No education	12.8	18.5	34.3	40.7
Primary	15.8	16.3	35.5	40.3
Secondary and above	13.4	14.9	28.6	38.1
Work status				
Not working	14.2	20.4	32.3	40.2
Working	13.1	17.3	33.0	40.4
Media exposure				
No exposure	13.6	19.1	31.3	40.6
Media exposure	13.2	15.4	34.0	39.9
Four and more ANC visits				
No	19.4	22.9	42.4	39.1
Yes	12.6	17.3	29.8	39.0
Institutional delivery				
No	14.0	19.2	30.4	40.2
Yes	13.1	16.7	34.0	40.7
Total	13.4	17.9	32.7	40.5

children who received institutional delivery had a lowered risk of underweight (OR = 0.764; 95% CI, 0.593–0.982).

Table 3 Results from the logistic regression (odds ratio at 95% confidence interval) showing the determinants of underweight and stunting among poor & non-poor

Covariates	Underweight		Stunting	
	Non-poor	Poor	Non-poor	Poor
Mother's age at child's birth				
< 20 ®				
20–34	0.612 (0.354–1.055)**	1.568 (0.983–2.504)**	0.707 (0.462–1.081)	1.023 (0.714–1.466)
35–49	0.582 (0.267–1.265)	1.362 (0.769–2.414)	0.667 (0.373–1.194)	0.871 (0.557–1.362)
Birth order				
First ®				
Second/third	0.93 (0.528–1.637)	0.776 (0.498–1.209)	0.823 (0.537–1.26)	1.087 (0.764–1.547)
Fourth and above	1.094 (0.570–2.100)	0.892 (0.563–1.414)	1.114 (0.69–1.798)	1.416 (0.974–2.059)**
Sex of the child				
Male				
Female	0.921 (0.636–1.335)	0.775 (0.609–0.985)**	0.777 (0.59–1.021)**	0.815 (0.672–0.989)**
Place of residence				
Urban ®				
Rural	1.468 (0.979–2.201)*	1.214 (0.740–1.995)	1.524 (1.125–2.064)***	1.587 (1.07–2.354)***
Religion				
Christian®				
Islam	1.289 (0.786–2.114)	0.944 (0.680–1.311)	0.955 (0.674–1.354)	1.014 (0.772–1.332)
Others	NA	NA	NA	1.526 (0.244–9.528)
Ethnicity				
Mende ®				
Temne	0.873 (0.542–1.407)	0.787 (0.572–1.081)	0.756 (0.532–1.075)	0.634 (0.494–0.814)***
Others	0.86 (0.525–1.407)	1.205 (0.894–1.626)	0.727 (0.508–1.039)**	0.975 (0.761–1.25)
Mother having anaemia				
Anaemic ®				
Not anaemic	0.998 (0.686–1.450)	1.098 (0.862–1.396)	1.055 (0.8–1.392)	0.939 (0.774–1.14)
Education level				
No education ®				
Primary	0.72 (0.392–1.325)	0.978 (0.675–1.414)	1.022 (0.682–1.53)	1.033 (0.772–1.383)
Secondary and above	0.97 (0.595–1.582)	0.811 (0.499–1.319)	0.675 (0.466–0.976)**	0.943 (0.654–1.351)
Women working status				
Not working ®				
Working	0.76 (0.506–1.141)	0.849 (0.632–1.143)	0.864 (0.635–1.164)	1.005 (0.787–1.284)
Media exposure				
No exposure ®				
Exposure	1.33 (0.900–1.965)	0.732 (0.556–0.967)***	1.407 (1.055–1.878)**	0.987 (0.797–1.223)
Four and more ANC visits				
No ®				
Yes	0.673 (0.432–1.046)*	0.849 (0.641–1.122)	0.733 (0.518–1.038)**	1.046 (0.827–1.322)
Institutional delivery				
No ®				
Yes	0.931 (0.617–1.405)	0.764 (0.593–0.982)**	1.305 (0.954–1.785)*	0.914 (0.743–1.114)

®: Reference category, * $p = 0.10$; ** $p = 0.05$; *** $p = 0.01$, NA: not applicable

As far as stunting among non-poor children of Sierra Leone are concerned, sex of the child, place of residence,

ethnicity, education level and media exposure of mother, ANC visits, and institutional delivery of mothers have a

Table 4 Summary result of nonlinear decomposition analysis showing the differences in underweight and stunted among poor and non-poor children in Sierra Leone

	Underweight	Stunted
Number of observation	2845	2854
No of observation in poor	1835	1841
No of observation in non-poor	1010	1013
Proportion of underweight in poor	0.191	0.394
Proportion of underweight in non-poor	0.135	0.322
Difference between poor and nonpoor	0.057	0.072
Total explained gap	0.034	0.068

statistically significant association with the risk of stunting. Female non-poor children were less likely to suffer stunting than do their counterparts (OR = 1.524; 95% CI, 1.125–2.064). Rural non-poor children had a significantly higher risk of stunting (OR = 1.524; 95% CI, 1.125–2.064) than urban non-poor children. As expected, non-poor children of educated mothers (secondary and above) had lowered risk of stunting (OR = 0.675; 95% CI, 0.466–0.976) than non-poor children of illiterate mothers. Mothers who had for or more ANC visits during the 1st trimester of pregnancy had a lowered risk of stunting (OR = 0.733; 95% CI, 0.518–1.038) among their children. Unexpectedly, non-poor children of mothers who had any type of media exposure and received institutional delivery had significantly higher risk of stunting than did those children whose mothers had no media exposure and did not receive institutional delivery.

The result of odds ratio on stunting among poor children of Sierra Leone shows a statistically significant association with birth order and sex of the child, place of residence and ethnicity. Poor children of fourth and higher birth order had a higher

risk of stunting (OR = 1.416; 95% CI, 0.974–2.059) than children of the first order. The poor female child was less likely to suffer stunting than do a male child. As expected, poor rural children had a significantly higher risk of stunting (OR = 1.587; 95% CI, 1.07–2.354) than do urban children. As for ethnic group, poor children of the Temne community had a lowered risk of stunting (OR = 0.634; 95% CI, 0.494–0.814) compared to those of the Mende community.

Result of the decomposition analysis

Summary results of the decomposition analysis are presented in Table 4. Results indicate that after controlling other factors, the prevalence of underweight and stunting among children is lower among non-poor than among the poor population. For instance, the probability of underweight is 0.191 among the poor compared with 0.135 among the non-poor population. Similarly, the probability of stunting is 0.394 among the poor compared with 0.322 among the non-poor population. Results further indicate that 62.5% and about 95% of such differences are explained by the factors included in the analysis for underweight and stunting respectively. The unexplained gap (05–37%) might be associated with other structural factors that are not covered by the data set.

Table 5 shows how differences in the distribution of each determinant contributed separately to the first part of the gap (endowment effect). In particular, place of residence, media exposure, the use of maternal health care services such as institutional delivery and four ANC visits, and mother’s education level were the most important contributors explaining the gap in average coefficients of underweight among children between the poor and non-poor. Place of residence contributed the highest, at 52%, of the gap for underweight, followed by

Table 5 Contribution of each factor in poor & non-poor differentials in underweight and stunted children in Sierra Leone

Covariates	Underweight		Stunted	
	Coefficients	% Contribution	Coefficients	% Contribution
Mother’s age at child’s birth	0.000	0.81	−0.003	−3.97
Birth order	0.002***	04.48	0.011***	16.27
Sex of the child	−0.001*	−03.90	−0.001	−0.84
Place of residence	0.017***	50.49	0.054**	78.99
Religion	−0.001	−02.90	−0.001*	−1.76
Ethnicity	−0.002	−05.30	0.000	0.52
Mother’s anaemia level	0.000	−01.28	0.001**	1.87
Women’s education	0.007*	19.27	0.002	2.90
Mother’s work status	−0.004***	−11.58	−0.001	−1.67
Media exposure	0.010***	29.21	0.004**	6.56
Four and more ANC visits	0.002**	05.98	0.000***	−0.03
Institutional delivery	0.005***	14.77	0.001**	1.18

Level of significant: *p, 0.10; **p, 0.05; ***p, 0.01

media exposure (29%), mother's education level (19%), institutional delivery (15%), four or more ANC visits (6%), and birth order of the child (4.5%). In explaining the gap in average coefficients of stunting between poor and non-poor children, place of residence in a similar way contributed the highest, at 79% of the gap, followed by birth order of the child (16%) and media exposure (6.5%). Overall, place of residence in Sierra Leone was the most determinant contributory factor explaining the gap between poor and non-poor for both underweight and stunting among children less than 5 years of age.

Discussion and conclusion

From the findings, it is evident that the rich–poor gap in childhood malnutrition has remained large. On comparing the rich–poor gap, the gap is higher in the stunted children than in underweight. However, our finding suggests that the overall percentage of underweight and stunting has declined, and the same has been reported in one of the studies (Caulfield et al. 2006). The main findings from this analysis build a strong case for multipronged policies specifically targeted to improve the health of children by reducing the gap between poor and non-poor. Decomposition analysis findings shows that the children belonging to poor households are undernourished not only because of poverty but also due to limited use of maternal health care services and poor care resulting from the lower educational status of parents and poor health of mothers. If policymakers want to reduce the gap in childhood undernutrition between the poor and the non-poor, the problem of the low use of public services such as antenatal check-ups, institutional delivery, and mother's education should be addressed among the poor. This may improve the nutritional status of poor children by ameliorating the negative impacts of poverty, and could reduce the gap in childhood malnutrition between poor and non-poor in the country. Special protection is needed to improve service coverage to poor mothers and their children irrespective of ethnicity, creed, and religion. These findings are not only applicable to reducing the poor/non-poor gap in childhood undernutrition but also contribute to reducing the overall burden of childhood undernutrition (particularly of underweight and stunting) in Sierra Leone. In addition to targeting the poor, there is a need for a comprehensive nutritional strategy to reduce the burden of childhood undernutrition in Sierra Leone. Regardless of these difficulties, Sierra Leone is endeavoring to increase the health of its population. The country is making progress, yet there is still work to be done to diminish malnutrition in the country. The government needs to conduct studies related to inequalities in malnutrition, as some areas in the north and east may be more vulnerable than other districts. It is said that malnutrition in Sierra Leone is everyone's

business. Thus, everybody has a part to play to end hunger and malnutrition. By working in association with government, implementing partners, community-based organizations such as, for example, the Sierra Leone Market Women's Association, can influence policy change and mobilize communities for social change, to guarantee that together we can accomplish our objective to end hunger and enhance the nutrition status of all Sierra Leoneans (especially our women and children).

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Conflict of interest The authors declare no conflict of interest.

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Informed consent The study used the data set that is available online in the public domain; hence, there was no need to seek ethical consent to publish this study.

Data sharing statement The authors confirm that all data underlying the findings are fully available without restriction. Data are publicly available from the Demographic and Health Survey website: <https://dhsprogram.com/data/available-datasets.cfm>.

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