Socioeconomic inequalities of child stunting in Sri Lanka –A decomposition study

Extend Abstract

Background and Objectives

Stunting defined by low height for age is a growth retardation of children that reflects chronic malnutrition, remains a global health challenge to the survival of children. Stunted children are at higher risk of developing permanent deficiencies towards adulthood (Derso *et al*., 2017). These include both short term and long-term consequences. Short-term consequences are poor physical and cognitive development and decreased immunity. Long term consequences are cognitive disability as adults, reduced school performance, and lower work capacity that hinders future economic productivity (Bhutta, 2017; Martins *et al*., 2011; McGovern *et al*., 2017; UNICEF *et al*., 2017; Woldehanna *et al*., 2017). Thus, the prevention of stunting has been acknowledged as one of the six main global nutrition targets for the period until 2025.

Several studies in low and middle-income countries have shown the evidence that socioeconomic inequality is linked to stunting; such that population sub groups with high socioeconomic inequality bear a disproportionately high burden of stunting. Thus, many development strategies prioritize in understanding the drivers of socioeconomic inequality in health and nutritional outcomes.

Despite improvements in child and maternal health and life expectancy indicators, Sri Lanka has not made progress in reducing child undernutrition as might have been expected. For an example, a recent Demographic and Health Survey in 2016 reported the percentages of children stunted as 17%, which has stagnated since 2006 (Department of Census & Statistics, 2017). Apart for having stagnated stunting rates, there are socioeconomic inequalities in stunting rates among different population sub groups.

However, these socioeconomic inequalities of stunting and the contributing factors of such inequalities are not properly addressed in Sri Lanka. Thus, this study aimed to determine the extent of socioeconomic inequality in stunting among under-5 children and to decompose the inequality into its social determinant factors. We used a nationally representative sample from the Sri Lanka demographic survey, conducted in 2016 (EDHS 2016), which is the first DHS covered whole island after the civil war ended in 2001.

Methodology

This study obtained the data from the 2016-2017 DHS in Sri Lanka, which collected information from a nationally representative probability sample of 27210 household units. From the households, 18302 ever-married women, aged 15-49 were selected for the interviews. The total number of children included in the current analysis was 7,961 children. Stunting is defined according the WHO definition. For example, if a child's height for age z-score was more than two standard deviations above the mean of the WHO standard, he or she was categorised as 'stunted' and given the code 1 for the binary variable denoting stunting.

The association between the determinant variables and stunting was determined by doing bivariate analyses, using the Chi square test of association. Socioeconomic inequality in the child stunting was measured using concentration curve or concentration index. Concentration index (CI), values range from -1 to +1, with a value of -1 indicating that the variable is concentrated in the poorest household, a value of zero shows no inequality (represented by the line of equality), and +1 when it is concentrated in the richest household. Concentration indices ware later disaggregated by different ethnic groups and residential groups. Thereafter, socioeconomic inequalities in stunting was decomposed into its contributing social determinants, following the Blinder–Oaxaca decomposition approach.

Results

Among the total of 8855 (9588 weighted) under-5 children with complete data on the variables of interest were found in the dataset and included in this analysis.

The age of the children ranged from 0 to 59 months, with mean (SD) of 32.9 (15.4) months. Overall, 17% of children are reported as stunted. Children factors such as child's age, child's birth interval, birth weight and sex are highly associated with both stunting. 33 percent of children who had low birth weight are reported as stunted and boys were slightly stunted than girls (18.7% vs 17.5%). Maternal factors such as BMI and maternal height, maternal education and ethnicity are associated with the stunting and underweight status. Among the household and residential factors, wealth, source of drinking water, residence as measured by residential sectors and provinces is significantly associated with stunting. . The findings revealed that more than one fourth of children (25.9%) in the lowest wealth quintile had the highest stunted rates, also ethnic minorities such as Indian Tamils children stunting rates were more than doubled compared to Sinhala major ethnic group in Sri Lanka (39.6% vs 16.2%).

Results of concentration index and curves

Concentration indices were derived by ranking the people at each corresponding group according to the total income groups. This considered a within inequality which captures the variability of total income within each socioeconomic groups.

The results show a clear gradient in stunting, the concentration index value was -0.157 which suggests stunting is more concentrated among the poorest households. We further analysed socioeconomic inequalities by different ethnic groups and districts. It was found that there are significant socioeconomic inequalities in stunting by different districts. For example, inequalities were more concentrated on poor people belong to the minor ethnic groups such as Indian Tamils (Concentration index value -0.585, CI:-0.651,-0.486) and people who reside in the Estate sector (Concentration index value -0.645, CI:-0.722,-0.379). Further, Northern Province, which was severely affected by war, socioeconomic inequalities were more visible among people with low income than those with higher income.(Appendix 2,3 & 4).

This study also conducted a decomposition analysis to understand the contributing factors of inequality. From the decomposition, the analysis revealed that birth weight, age of child, maternal BMI status; belong to the minor ethnic groups in the estate sector and being in a conflict-affected province significantly contributed to the socioeconomic inequality. As shown in the Appendix 5.

Maternal factors including BMI, low birth weight and child age were responsible for nearly 37% of the total inequality. The unexplained inequality was 30.5 %(residual term) could be claimed due to the effect of wealth and other factor did not included in the decomposition.

Conclusion

Our findings indicate that the poverty level still exist in the country and poor in more disadvantaged groups such as belong to the ethnic minority, conflict-affected areas and people live in Estate sectors is yet to reap the benefit of the economic progress of the country.

Policy Relevance

The findings of the study are significant as this was the first study examined the child stunting inequalities in the context of whole island coverage at the post-war Sri Lanka. Children from the poorest households who belong to the ethnic minorities, reside in the conflict-affected province, or reside in Estate sectors endured the burden of child undernutrition compared to children from the wealthiest households, belong to major ethnic

groups, reside in non-conflict affected areas or reside in other sectors. Even though the government has taken several strategies for the reduction of child stunting, these strategies still not at the satisfactory level causing a constant rates even for a decade.

Development can be achieved from the equity perspective. Therefore reducing health inequalities can be achieved through implementing a diverse range of nutrition interventions specifically targeting poor households. The findings of this study imply the importance of mapping and targeting the socioeconomic groups vulnerable to stunting, hence it is essential to decentralize health services with the coordination of collective actions at the individual household and community levels.

Appendix

Appendix 1

Background Characteristics	**Stunted**		
	%	**n**	**P value**
	18.2	**1266**	
Age in months			
6-11	16.8	121	0.000
12-23	20.5	301	
24-47	19.8	632	
48-59	13.3	212	
Sex			
Male	18.7	673	0.184
Female	17.5	593	
Birth Interval in months			
First Birth	15.8	430	0.000
<24	21.2	76	
24-47	20.7	297	
48+	18.9	463	
Birth order			
1	15.8	430	0
2 to 3	19.2	737	
4 to 5	24.5	92	
6+	21.2	7	
Birth weight		n=1225	

Normal weight	14.9	838	0
LB weight	33.6	387	
Child morbidity status	n=1265		
Not had diarrhea/cough/fever	18.9	983	0.024
Had diarrhea/cough/fever	16	273	
Had all	20.9	9	
Maternal Age at birth			
<20	19.2	52	0.647
20-29	18.4	639	
30-34	17.3	355	
35+	18.8	220	
Maternal Height	**n=1255**		
Short <=145 cm	39.7	193	0
Average 145.1-155 cm	21.6	831	
Tall 155.1 & over	8.9	231	
Maternal Body Mass Index	**n=1253**		
<18.5	23.6	190	0
18.5-24.9	19.2	649	
>=25-30	15.7	311	
>=30	13.6	103	
Mother's education			
Grade 5 passed	30.8	109	0
O/L passed	19.8	922	
A/L passed	12.2	193	
Degree and above	10.6	42	
Household factors			
Wealth quintile			
Lowest	25.9	458	0.000
Second	19.8	285	
Middle	16.5	213	
Fourth	13.3	180	
Highest	11.6	130	
Household Size			
<=4	17.1	472	0.174

5-7 members	18.7	691	
8 and more	19.6	103	
Ethnicity			
Sinhala	16.2	730	0.000
Sri Lanka Tamil	20.8	303	
Indian Tamil	39.7	87	
Sri Lanka Moor/Musl ims	18.6	146	
Source of drinking water			
Improved	16.9	1077	0.000
Not improved	31.1	189	
Access to media			
Low	22	32	0.032
Medium	19.2	590	
High	17	629	
Toilet facility			
Improved	18	1227	0.045
Not improved	24.2	39	
Residence			
Urban	14	156	0.000
Rural	17.6	956	
Estate	35	154	
Provinces			
Western	14.3	188	0
Central	27.9	244	
Southern	14.1	111	
Northern	17.6	152	
Eastern	18.8	149	
North- Western	15.8	121	
North- Central	16.1	77	
Uva	20	98	
Sabaragam uwa	20.5	126	

Appendix 2: Concentration index of stunting

Index:	No. of obs.	Index value	Std. error	p-value
CI	7961	-.1579629	.0150056	0.0000

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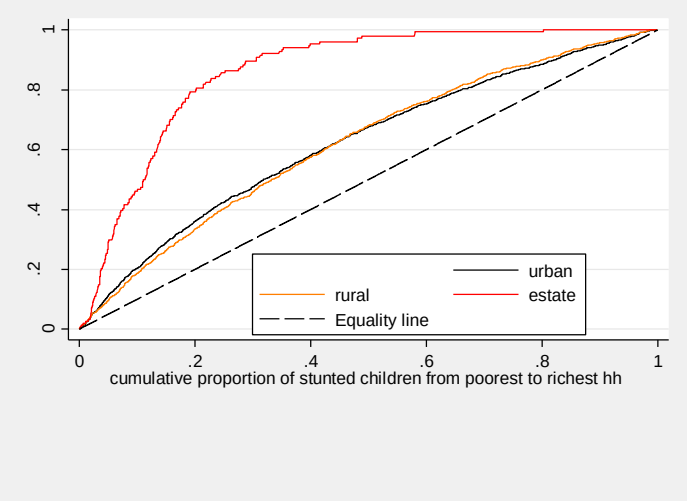
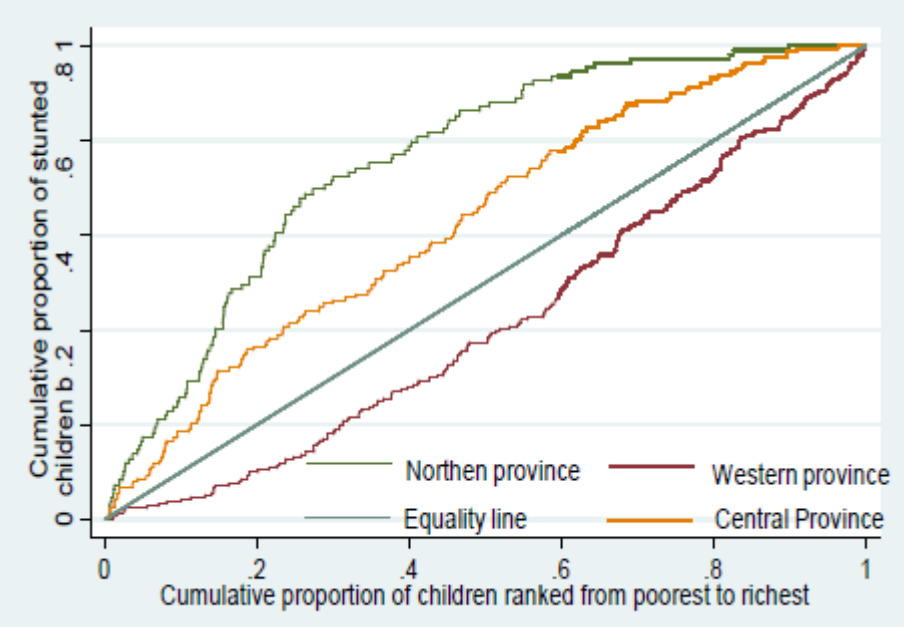


Appendix 3: Concentration curves by residential sector for child stunting



Appendix 4: Concentration curves by districts for child stunting

Appendix 5: Decomposition table of stunning

Covariates	Elasticity	Concentration Index	Absolute Contribution	Percentage Contribution	
				Individual (%)	Group

Maternal Body Mass Index	0.129813	0.02195624	0.002850199	23.854929	23.85493
Child birth weight (continuous)	0.540958	0.00284634	0.001539749	12.887034	12.88703
Child morbidity	0.013423	-0.01846246	-0.000247828	-2.074212	-2.07421
Child age (continuous)	0.17945	0.00103312	0.000185393	1.5516599	1.55166
Birth order and preceding birth interval (ref. first birth)					
Preceding birth interval < 24 months	0.001166	-0.00411976	-4.80436E-06	-0.04021	
Preceding birth interval 24-47 months	0.008484	-0.0071414	-6.05876E-05	-0.507092	
Preceding birth interval 48-59 months	0.003344	-0.03366627	-0.000112575	-0.942201	-3.5791
Preceding birth interval 60+ months	0.004978	-0.05015555	-0.000249667	-2.0896	
Child is male (ref:female)	0.010189	0.00483292	4.9243E-05	0.4121428	0.412143
Maternal Education (Ref:Degree & above)					