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Celebrating 50 Years of Bangladesh

# Trends and Inequality of Childhood Undernutrition in Bangladesh: A Household Level Analysis (2004-2018)


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# Introduction

- Childhood undernutrition is an emerging public health concern globally
- Undernutrition (e.g., ***wasting***, ***stunting***, and ***underweight***) is a form of malnutrition, which is responsible for approximately **45%** of all global childhood deaths, which mostly occurs in LMI countries (WHO, 2018)
- Globally, **52 million** under-five children are **wasted**, and **155 million** are **stunted**, while approximately **15%** of under-five children are underweight (Acomby, 2017; WHO , 2018)
- Childhood undernutrition is a **prevalent public health concern** in Bangladesh.

# Objectives of the study

The overall objective of this study was to observe the **trends** and **patterns** of childhood undernutrition, **inequality**, and sort out **the factors** that are potentially contributing to such inequalities in Bangladesh

# Methodology

- Data were extracted from Bangladesh Demographic and Health Survey (BDHS) which is a nationally representative cross-sectional survey.
- We have utilized the latest five (5) rounds of the BDHS data (2004, 2007, 2011, 2014 and 2017-18)
- Childhood undernutrition was assessed by anthropometric measurements developed by the World Health Organization, namely, height-for-age *z*-score (HAZ), weight-for-age z-score (WAZ), and weight-for-height *z*-score (WHZ).
- *Z*-scores (HAZ, WAZ, and WHZ) were calculated following the WHO child growth standard guideline (WHO, 2006)
- A child was defined as stunted if HAZ was below minus two (−2) standard deviation (SD) from the mean of the reference population. Similarly, WAZ of below −2 SD and WHZs of below −2 SD were considered as underweight and wasting (WHO, 2006)

# Methodology (cont.)

- Inequality analysis of stunting, wasting, and underweight was executed at three stages: plotting the concentration curves, examining the concentration indexes (CIs), and decomposing of the CIs to explore the factors that contributed to the inequity of undernutrition
- We constructed the concentration curves, which plot the cumulative share of childhood undernutrition against the cumulative percentage of the population ranked from the poorest to the richest
- If the undernutrition is more concentrated among poor people, the concentration curve will lie above the equity line and vice-versa
- CIs are calculated to measure the gap between the concentration curves and the equity line.
- The value of the CI lies between −1 and +1 (i.e., $-1 \leq CI \leq +1$), where −1 refers the undernutrition is fully concentrated among the poorest quintile, and +1 refers fully concentrated among the richest quintile.

# Methodology (cont.)

- The **estimated CIs were decomposed** to observe the contribution of various factors in childhood undernutrition.

- The regression model for the health outcome (y) to the set of $k$ determinants ($x_k$) can be expressed

$y = \alpha + \sum_k \beta_k x_k + \varepsilon$ where, $\beta_k$ is the coefficient of $x_k$ and $\varepsilon$ is the error term.

- The concentration index of y denoted (C) can be written as C= $\sum_k (\beta_k \overline{x_k}/\mu) C_k + GC_\epsilon/\mu$ , Here, $\mu$ is the mean of health outcome variable (y); $\overline{x_k}$ is the mean of $x_k$ ($k^{\text{th}}$ determinant variable); the concentration index of $x_k$ is denoted by $C_k$ and $GC_\epsilon$ is the generalized concentration for the error term($\varepsilon$). $\frac{\beta_k \overline{x_k}}{\mu}$ denotes the elasticity of the undernutrition with respect to the explanatory variables.

- Percentage changes of prevalence of stunted, wasted, and underweight from 2004 to 2017-18 were calculated as

$$\text{Percentage change} = \frac{(\text{Prevalence at the base year} - \text{Prevalence at the current year})}{\text{Prevalence at the base year}} \times 100$$

- The annual percentage change of the prevalence of undernutrition was calculated based on the following formula:

$$\left(\left(\frac{\text{Prevalence at the current year}}{\text{Prevalence at the base year}}\right)^{\frac{1}{\text{No. of years}}} - 1\right) * 100$$


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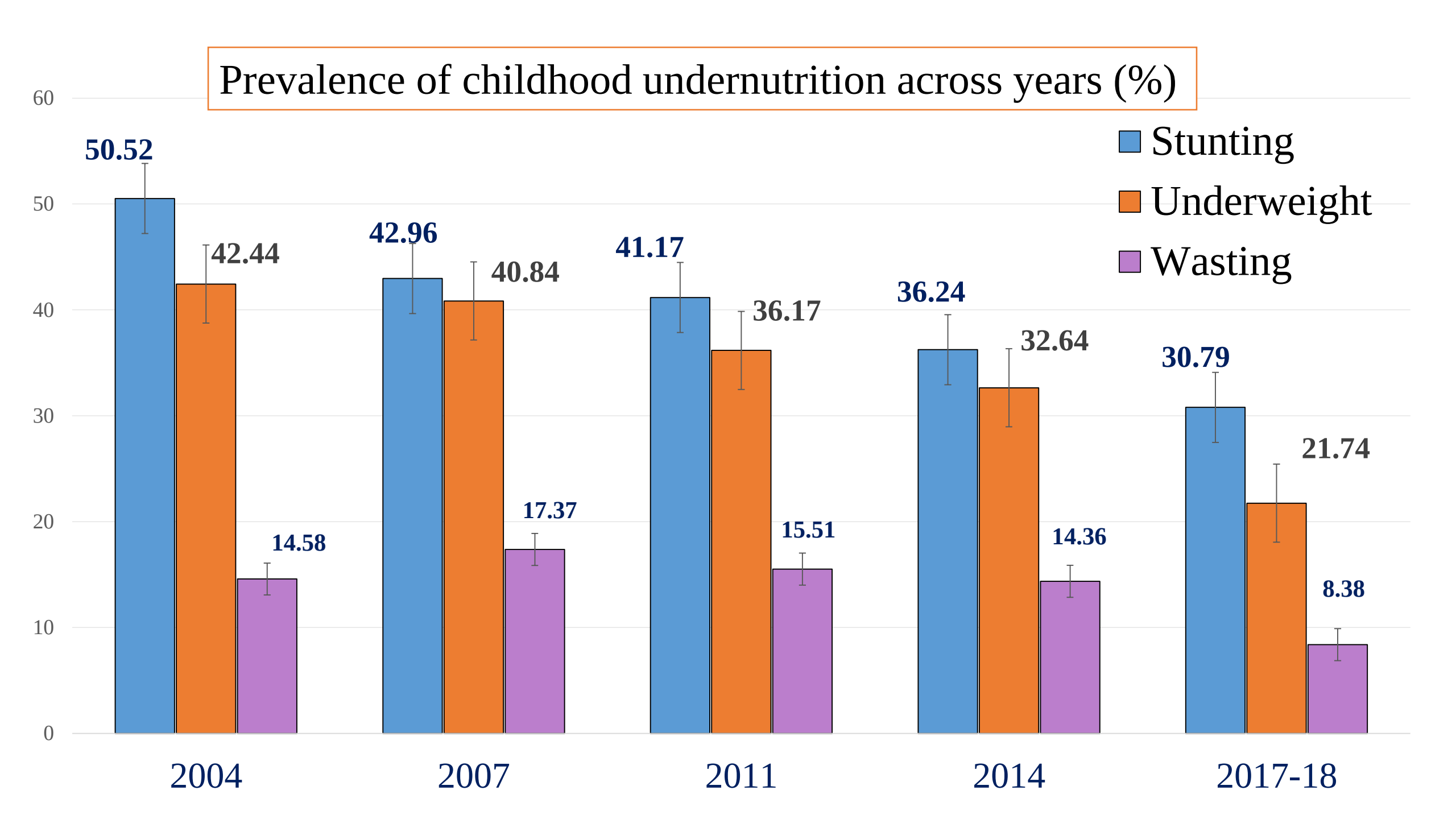
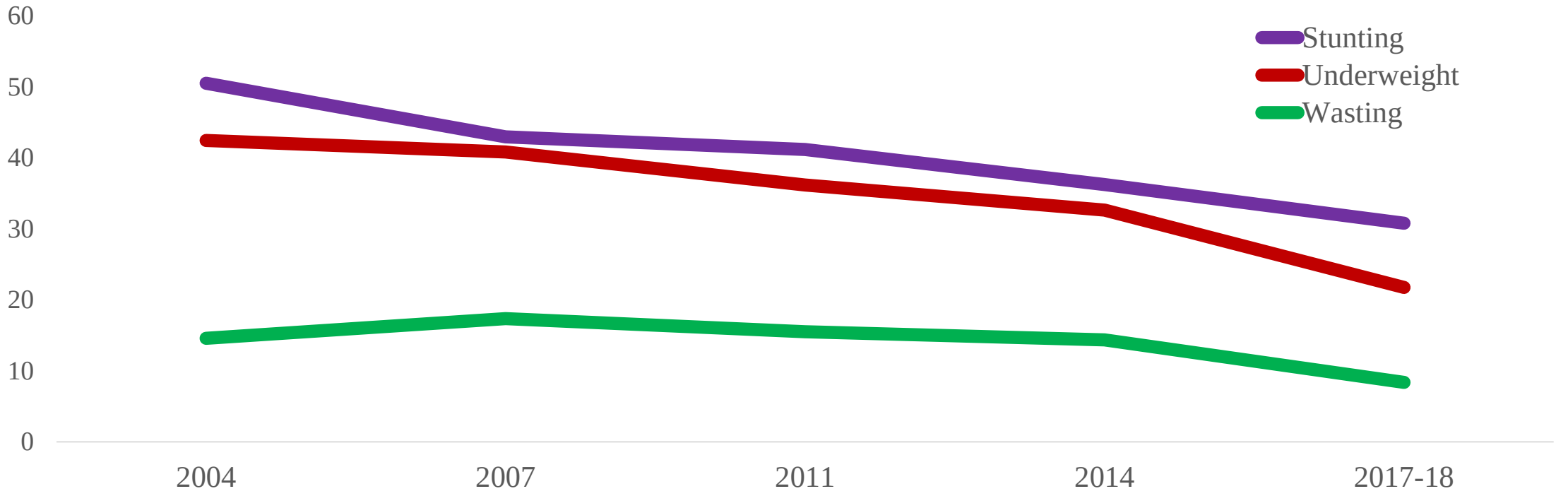
# Results

# Background Characteristics, N (%)

| Characteristics | 2004 | 2007 | 2011 | 2014 | 2017-18 |
|---|---|---|---|---|---|
| **Children's age in month** | | | | | |
| <6 months | 707 (10.22) | 495 (8.25) | 827 (9.49) | 665 (8.28) | 917 (10.63) |
| 6-12 months | 724 (10.47) | 692 (11.55) | 1033 (11.85) | 1027 (12.78) | 978 (11.32) |
| 13-23 months | 1220 (17.64) | 1123 (18.72) | 1441 (16.53) | 1522 (18.94) | 1563 (18.11) |
| 24-35 months | 1401 (20.26) | 1229 (20.48) | 1598 (18.34) | 1640 (20.41) | 1745 (20.21) |
| 36-47 months | 1459 (21.1) | 1218 (20.32) | 1958 (22.46) | 1600 (19.91) | 1704 (19.73) |
| 48-59 months | 1403 (20.29) | 1241 (20.68) | 1859 (21.33) | 1582 (19.68) | **1727 (20)** |
| **Sex of Child** | | | | | |
| Male | 3507 (50.74) | 2982 (49.73) | 4448 (51.03) | 4185 (52.1) | 4511 (52.25) |
| Female | 3405 (49.26) | 3015 (50.27) | 4268 (48.97) | 3849 (47.9) | 4123 (47.75) |
| **Place of residence** | | | | | |
| Urban | 1373 (19.86) | 1236 (20.61) | 1938 (22.23) | 2039 (25.37) | 2361 (27.34) |
| Rural | 5540 (80.14) | 4761 (79.39) | 6778 (77.77) | 5996 (74.63) | 6273 (72.66) |
| **Division** | | | | | |
| Dhaka | 2144 (31.02) | 1888 (31.48) | 2699 (30.97) | 2814 (35.03) | 2230 (25.83) |
| Chattogram | 1519 (21.97) | 1318 (21.97) | 2011 (23.07) | 1735 (21.6) | 1797 (20.81) |
| Rajshahi | 1531 (22.15) | 1295 (21.59) | 1142 (13.1) | 824 (10.26) | 718 (8.31) |
| Rangpur | - | - | 674 (7.74) | 808 (10.05) | 905 (10.48) |
| Khulna | 723 (10.46) | 574 (9.57) | 785 (9) | 605 (7.53) | 791 (9.16) |
| Mymensingh | - | - | - | - | 709 (8.21) |
| Sylhet | 589 (8.52) | 544 (9.07) | 923 (10.59) | 794 (9.88) | 1004 (11.63) |
| Barisal | 407 (5.88) | 379 (6.32) | 482 (5.53) | 455 (5.66) | 481 (5.57) |
| **Total** | **6,912** | **5,997** | **8,716** | **8,034** | **8,634** |


Prevalence of childhood undernutrition across years (%)
Stunting
Underweight
Wasting
60
50
40
30
20
10
0
50.52
42.44
14.58
42.96
40.84
17.37
41.17
36.17
15.51
36.24
32.64
14.36
30.79
21.74
8.38
2004
2007
2011
2014
2017-18

# Percentage changes of childhood undernutrition (2004 to 2017-18)




| Type of undernutrition | Percentage change | Annual Percentage Change | P-value (Base year vs. Current year) |
|---|---|---|---|
| Stunting | 39.05 | -3.26 | 0.00 |
| Underweight | 48.77 | -4.38 | 0.00 |
| Wasting | 42.52 | -3.64 | 0.00 |

# Annual percentage (%) changes of Stunting from 2004 to 2018

| Characteristics | 2004 | 2007 | 2011 | 2014 | 2017-18 | Percentage change | Annual % Change |
|---|---|---|---|---|---|---|---|
| **Children's age in month** | | | | | | | |
| <6 months | 22.57 | 18.44 | 17.69 | 14.14 | 20.06 | 11.12 | -0.79 |
| 6-12 months | 31.47 | 24.13 | 25.78 | 20.34 | 19.78 | 37.15 | -3.06 |
| 13-23 months | 55.3 | 41.61 | 49.96 | 39.8 | 34.94 | 36.82 | -3.03 |
| 24-35 months | 59.53 | 53.3 | 47.42 | 41.31 | 38.77 | 34.87 | -2.83 |
| 36-47 months | 58.61 | 54.16 | 47.14 | 45.28 | 33.5 | 42.84 | -3.68 |
| 48-59 months | 53.6 | 45.27 | 41.42 | 38.73 | 28.74 | 46.38 | -4.09 |
| Sex of Child | | | | | | | |
| Male | 51.37 | 43.59 | 40.41 | 36.88 | 30.8 | 40.04 | -3.37 |
| Female | 49.65 | 42.35 | 41.97 | 35.55 | 30.77 | 38.03 | -3.15 |
| Household size | | | | | | | |
| Small (<4 members) | 45.24 | 43.67 | 42.68 | 34.47 | 29.59 | 34.59 | -2.8 |
| Medium (4-6 members) | 51.38 | 44.19 | 41.26 | 36.57 | 31.45 | 38.79 | -3.24 |
| Large (>6 members) | 50.64 | 40.9 | 40.58 | 36.27 | 30.06 | 40.64 | -3.43 |

# Annual percentage (%) changes of Stunting from 2004 to 2018

| Characteristics | 2004 | 2007 | 2011 | 2014 | 2017-18 | Percentage change | Annual % Change |
|---|---|---|---|---|---|---|---|
| **Place of residence** | | | | | | | |
| Urban | 44.5 | 36.35 | 36.38 | 30.78 | 25.42 | 42.88 | **-3.68** |
| Rural | 51.99 | 44.73 | 42.54 | 38.08 | 32.72 | 37.06 | -3.05 |
| **Division** | | | | | | | |
| Dhaka | 52.57 | 43.77 | 43.38 | 34.14 | 25.57 | 51.36 | **-4.71** |
| Sylhet | 53.46 | 43.89 | 42.65 | 36.55 | 31.04 | 41.94 | -3.58 |
| Barisal | 55.78 | 47.27 | 44.38 | 40 | 32.85 | 41.11 | -3.49 |
| Rangpur | | | 49.76 | 49.85 | 30.25 | 39.21 | -3.28 |
| Chattogram | 52.81 | 45.16 | 41.06 | 37.96 | 32.63 | 38.21 | -3.17 |
| Rajshahi | 47.92 | 41.54 | 33.69 | 30.86 | 35.15 | 26.65 | -2.05 |
| Khulna | 40.34 | 34.87 | 33.57 | 27.89 | 25.67 | 36.37 | -2.98 |
| **Wealth index** | | | | | | | |
| Poorest | 62.06 | 53.76 | 53.51 | 49.42 | 40.32 | 35.03 | -2.85 |
| Poorer | 55.24 | 50.29 | 45.93 | 42.31 | 37.37 | 32.35 | -2.58 |
| Middle | 50.12 | 41.88 | 40.15 | 36.22 | 30.25 | 39.64 | -3.33 |
| Richer | 47.86 | 38.57 | 36.08 | 31.27 | 26.77 | 44.07 | **-3.82** |
| Richest | 30.45 | 26.36 | 25.7 | 19.48 | 17.2 | 43.51 | **-3.75** |

# Annual percentage (%) changes of Wasting from 2004 to 2018

| Characteristics | 2004 | 2007 | 2011 | 2014 | 2017-18 | Percentage change | Annual % Change |
|---|---|---|---|---|---|---|---|
| **Children's age in month** | | | | | | | |
| <6 months | 15.1 | 17.52 | 15.54 | 19.94 | 9.18 | 39.21 | -3.28 |
| 6-12 months | 17.84 | 18.34 | 14.59 | 19.47 | 7.21 | 59.59 | **-5.89** |
| 13-23 months | 19.26 | 22.87 | 15.77 | 13.81 | 8.47 | 56.02 | **-5.36** |
| 24-35 months | 13.7 | 16.21 | 14.28 | 12.79 | 7.89 | 42.41 | -3.63 |
| 36-47 months | 11.22 | 14.55 | 15.91 | 11.62 | 8.81 | 21.48 | -1.61 |
| 48-59 months | 12.66 | 15.28 | 16.47 | 13.38 | 8.66 | 31.6 | -2.51 |
| **Sex of Child** | | | | | | | |
| Male | 15.71 | 18.15 | 15.89 | 15.08 | 9.19 | 41.5 | -3.53 |
| Female | 13.42 | 16.61 | 15.11 | 13.58 | 7.51 | 44.04 | **-3.81** |
| **Household size** | | | | | | | |
| Small (<4 members) | 14.04 | 16.56 | 16.22 | 12.71 | 9.81 | 30.13 | -2.37 |
| Medium (4-6 members) | 15.72 | 18.06 | 15.8 | 14.84 | 8.21 | 47.77 | **-4.26** |
| Large (>6 members) | 13.19 | 16.53 | 14.8 | 14.08 | 8.14 | 38.29 | -3.18 |

# Annual percentage (%) changes of Wasting from 2004 to 2018 (cont.)

| Characteristics | 2004 | 2007 | 2011 | 2014 | 2017-18 | Percentage change | Annual % Change |
|---|---|---|---|---|---|---|---|
| **Place of residence** | | | | | | | |
| Urban | 13.59 | 14.36 | 13.82 | 12.21 | 8.92 | 34.36 | -2.78 |
| Rural | 14.82 | 18.17 | 15.98 | 15.08 | 8.19 | 44.74 | **-3.9** |
| **Division** | | | | | | | |
| Dhaka | 12.85 | 15.39 | 15.49 | 12.01 | 8.9 | 30.74 | -2.43 |
| Chattogram | 15.74 | 17.57 | 15.74 | 15.58 | 8 | 49.17 | -4.43 |
| Rajshahi | 16.24 | 18.91 | 16.36 | 17.55 | 8.84 | 45.57 | -3.99 |
| Rangpur | | | 18.43 | 11.93 | 7.11 | 61.42 | **-6.18** |
| Khulna | 16.25 | 18.82 | 14.71 | 13.64 | 7.7 | 52.62 | **-4.88** |
| Sylhet | 15.11 | 18.14 | 13.09 | 17.61 | 7.61 | 49.64 | -4.49 |
| Barisal | 9.27 | 18.07 | 14.74 | 17.74 | 8.92 | 3.78 | -0.26 |
| **Wealth index** | | | | | | | |
| Poorest | 17.77 | 20.56 | 17.84 | 17.11 | 9.91 | 44.23 | -3.84 |
| Poorer | 15.22 | 17.83 | 15.74 | 16.65 | 8 | 47.44 | **-4.22** |
| Middle | 15.41 | 17.05 | 17.57 | 12.63 | 7.63 | 50.49 | **-4.6** |
| Richer | 11.74 | 17.55 | 13.39 | 13.22 | 8.8 | 25.04 | -1.91 |
| Richest | 11.05 | 12.98 | 12.11 | 11.78 | 7.34 | 33.57 | -2.7 |

# Annual percentage (%) changes of Underweight from 2004 to 2018

| Characteristics | 2004 | 2007 | 2011 | 2014 | 2017-18 | Percentage change | Annual % Change |
|---|---|---|---|---|---|---|---|
| **Children's age in month** | | | | | | | |
| <6 months | 27.4 | 28.5 | 15.92 | 19.14 | 15.51 | 43.39 | **-3.74** |
| 6-12 months | 33.27 | 28.28 | 25.65 | 22.05 | 14.07 | 57.71 | **-5.6** |
| 13-23 months | 45.85 | 39.32 | 35.77 | 32.03 | 18.82 | 58.95 | **-5.79** |
| 24-35 months | 45.84 | 44.47 | 39.43 | 36.63 | 24.24 | 47.12 | -4.18 |
| 36-47 months | 44.7 | 46.82 | 42.94 | 37.12 | 26.09 | 41.63 | -3.54 |
| 48-59 months | 46.33 | 46.01 | 41.31 | 37.68 | 25.85 | 44.2 | -3.83 |
| **Sex of Child** | | | | | | | |
| Male | 42.55 | 39.59 | 34.17 | 32.14 | 21.65 | 49.12 | **-4.43** |
| Female | 42.33 | 42.08 | 38.25 | 33.18 | 21.83 | 48.43 | -4.34 |
| **Household size** | | | | | | | |
| Small (<4 members) | 34.97 | 40.64 | 37.53 | 29.62 | 22.26 | 36.35 | -2.98 |
| Medium (4-6 members) | 44.46 | 41.6 | 37.32 | 33.24 | 22.18 | 50.11 | **-4.55** |
| Large (>6 members) | 41.52 | 39.74 | 33.89 | 32.64 | 20.73 | 50.07 | **-4.55** |

# Annual percentage (%) changes of Underweight from 2004 to 2018 (cont.)

| Characteristics | 2004 | 2007 | 2011 | 2014 | 2017-18 | Percentage change | Annual % Change |
|---|---|---|---|---|---|---|---|
| **Place of residence** | | | | | | | |
| Urban | 37.32 | 33.32 | 27.84 | 26.25 | 19.03 | 49.01 | -4.41 |
| Rural | 43.69 | 42.85 | 38.54 | 34.79 | **22.71** | 48.02 | -4.29 |
| **Division** | | | | | | | |
| Dhaka | 41.98 | 39.82 | 36.3 | 28.42 | 18.43 | 56.1 | -5.37 |
| Chattogram | 45.44 | 41.25 | 37.24 | 35.79 | 21.04 | 53.7 | -5.03 |
| Rajshahi | 42.7 | 43.1 | 34.11 | 32.28 | **25.64** | 39.95 | **-3.36** |
| Rangpur | | | 45.25 | 39.99 | 20.08 | 55.62 | -5.3 |
| Khulna | 35.02 | 34.27 | 28.79 | 25.56 | 18.95 | 45.89 | -4.03 |
| Sylhet | 46.65 | 41.59 | 34.4 | 37.13 | 22.98 | 50.74 | -4.63 |
| Barisal | 40.49 | 45.67 | 39.28 | 36.51 | 22.45 | 44.55 | -3.87 |
| **Wealth index** | | | | | | | |
| Poorest | 55.66 | 50.31 | 50.3 | 45.45 | **28.76** | 48.33 | -4.33 |
| Poorer | 46.82 | 45.85 | 41.77 | 38.64 | **25.56** | 45.41 | **-3.97** |
| Middle | 38.46 | 41.19 | 35.45 | 31.97 | 19.99 | 48.02 | -4.29 |
| Richer | 38.62 | 37.73 | 27.75 | 27.34 | 20.64 | 46.56 | -4.11 |
| Richest | 25.74 | 25.8 | 20.61 | 17.44 | 12.44 | 51.67 | -4.75 |

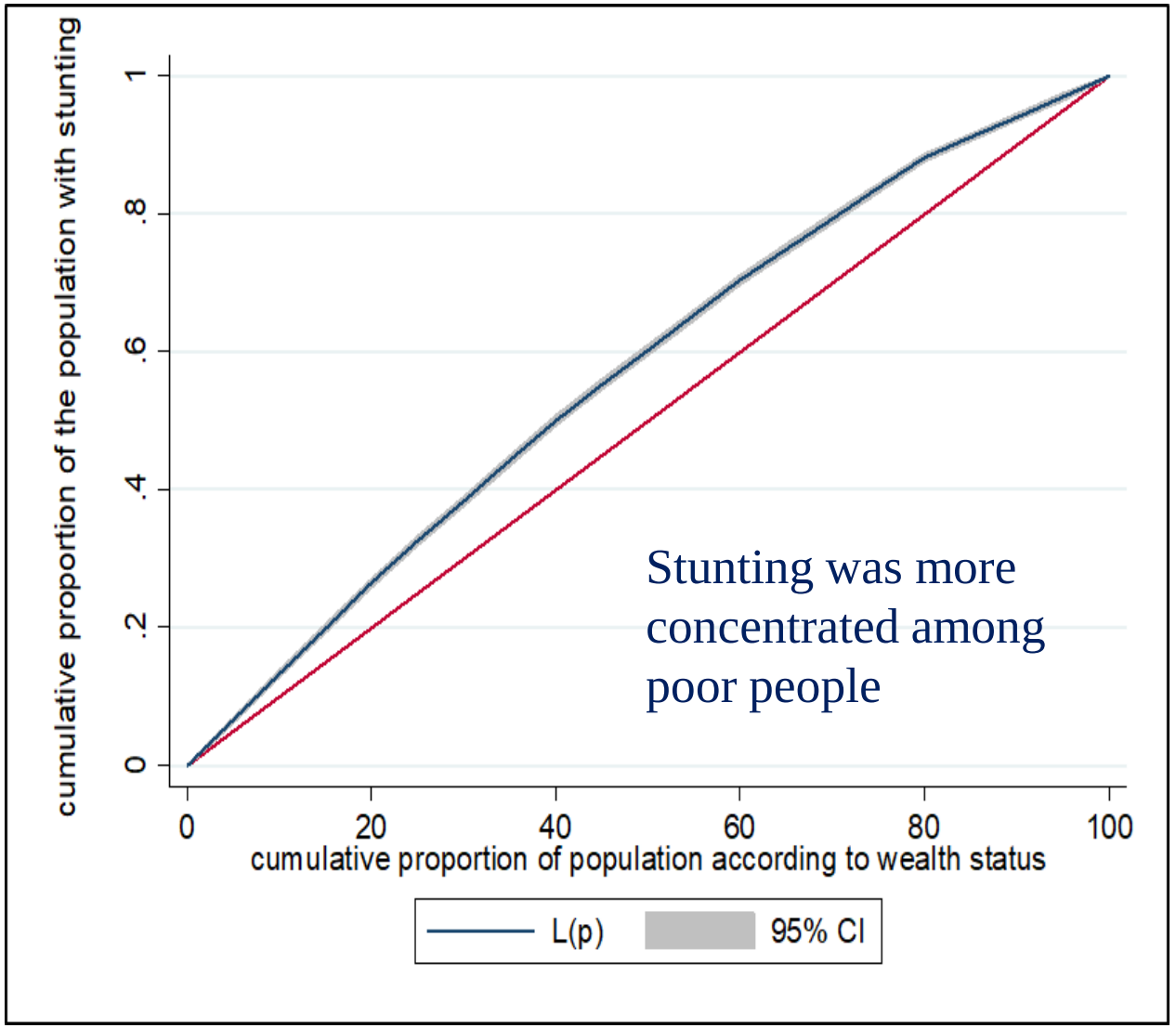
## Changing trends of concentration index (CI) of childhood undernutrition from 2004 to 2018

| Types of undernutrition | **2004** | 2007 | 2011 | 2014 | **2017-18** |
|---|---|---|---|---|---|
| Stunting | **-0.219** | -0.213 | -0.216 | -0.247 | **-0.211** |
| Wasting | -0.109 | -0.085 | -0.083 | -0.092 | -0.046 |
| Underweight | **-0.224** | -0.185 | -0.256 | -0.247 | **-0.176** |

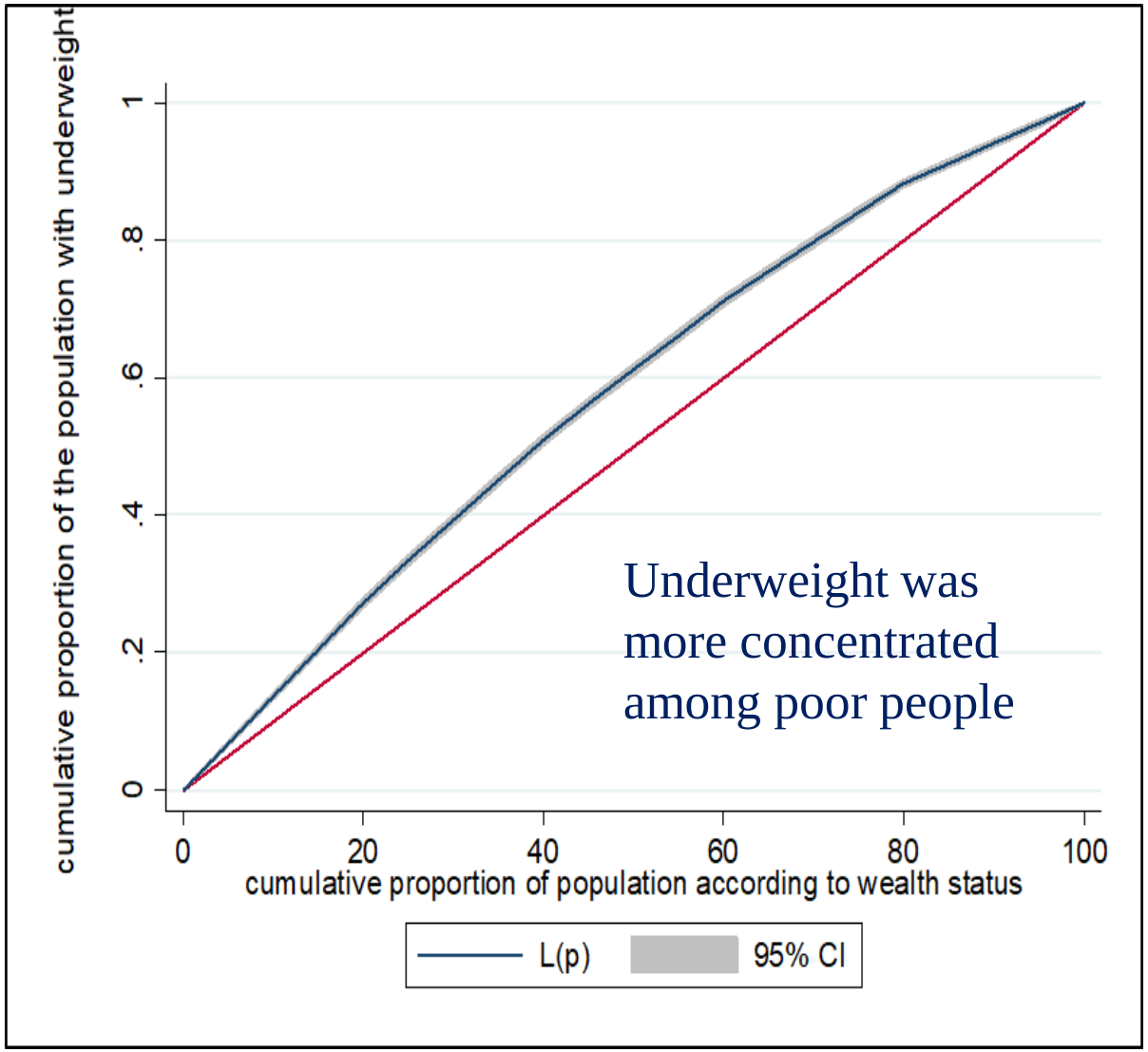
*The value of the CI lies between −1 and +1 (ie, −1 ≤ CI ≤ + 1), where −1 refers the undernutrition is fully concentrated among the poorest quintile, and +1 refers fully concentrated among the richest quintile*

# Concentration curves showing inequities for childhood

# (A) Stunting and (B) Underweight, BDHS 2017-18




(A) Stunting




(B) Underweight

# Decomposition analysis of sociodemographic characteristics for stunting

- The tables represent the results of elasticity analysis, the concentration index of the regressors (CI), absolute, and the percentage contribution of regressors to the inequality of childhood wasting.
- We observed that maternal education, mothers BMI, household size, mass-media exposure, and wealth status of households were important contributors of the total inequality of wasting in 2017-18
- Among the variables, the greatest contributions towards inequality in wasting were **wealth status of households (49%)**, **maternal education (20%)**, **exposure of mass media (8%)** and **BMI status of mothers (7%)**

| Characteristics | Elasticity | Concentration Index (CI) | Absolute contribution | Percentage contribution |
|---|---|---|---|---|
| Children's age in month | | | | |
| <6 months (ref.) | | | | |
| 6-12 months | 0.000 | -0.006 | 0.000 | 0.003 |
| 13-23 months | 0.029 | 0.007 | 0.001 | -0.455 |
| 24-35 months | 0.038 | 0.004 | 0.001 | -0.333 |
| 36-47 months | 0.029 | 0.002 | 0.000 | -0.128 |
| 48-59 months | 0.018 | -0.005 | 0.000 | 0.169 |
| Total | | | 0.002 | -0.744 |
| Sex of Child | | | | |
| Male | 0.001 | -0.004 | 0.000 | 0.013 |
| Female (ref.) | | | | |
| Birth order | | | | |
| First (ref.) | | | | |
| Second | -0.002 | 0.046 | 0.000 | 0.232 |
| Third | 0.000 | -0.045 | 0.000 | 0.026 |
| Fourth or more | 0.005 | -0.121 | -0.002 | 1.298 |
| Total | | | -0.002 | 1.556 |
| Childhood illness | | | | |
| Yes (ref.) | | | | |
| No | 0.000 | 0.037 | 0.000 | -0.021 |
| Mothers' educational status | | | | |
| No education | 0.012 | -0.102 | -0.005 | 2.617 |
| Primary education | 0.040 | -0.303 | -0.049 | 25.755 |
| Secondary education | 0.042 | 0.092 | 0.016 | -8.310 |
| Higher education (ref.) | | | - | - |
| Total | | | -0.038 | 20.062 |
| Mothers age at first birth | | | | |
| Less than 18 years | -0.004 | -0.246 | 0.004 | -2.070 |
| 18-24 years (ref.) | | | | |
| 25 years or above | -0.002 | 0.089 | -0.001 | 0.342 |
| Total | | | 0.003 | -1.728 |
| Mothers working status | | | | |
| Yes | 0.005 | -0.260 | -0.006 | 2.988 |
| No (ref.) | | | | |
| Mothers BMI (Body Mass Index) | | | | |
| Underweight | 0.009 | -0.146 | -0.005 | 2.666 |
| Normal Weight (ref.) | | | | |
| Overweight | -0.008 | 0.200 | -0.007 | 3.493 |
| Obese | -0.003 | 0.110 | -0.002 | 0.807 |
| Total | | | -0.014 | 6.966 |
| Household size | | | | |
| Small (<4 members) (ref.) | | | | |
| Medium (4-6 members) | 0.018 | -0.086 | -0.006 | 3.259 |
| Large (>6 members) | 0.011 | 0.076 | 0.003 | -1.721 |
| Total | | | -0.003 | 1.538 |
| Source of drinking water | | | | |
| Improved water sources (ref.) | | | | |
| Non-improved water sources | 0.001 | -0.023 | 0.000 | 0.054 |
| Toilet facility | | | | |
| Hygienic toilet facility (ref.) | | | | |
| Unhygienic toilet facility | 0.001 | -0.510 | -0.001 | 0.555 |
| Place of residence | | | | |
| Urban (ref.) | | | | |
| Rural | -0.006 | -0.458 | 0.012 | -6.144 |
| Division | | | | |
| Dhaka (ref.) | | | | |
| Chattogram | 0.008 | 0.066 | 0.002 | -1.092 |
| Rajshahi | 0.005 | -0.088 | -0.002 | 0.864 |
| Rangpur | -0.001 | -0.095 | 0.000 | -0.210 |
| Khulna | -0.002 | 0.037 | 0.000 | 0.138 |
| Mymensingh | 0.013 | -0.014 | -0.001 | 0.400 |
| Sylhet | 0.001 | -0.014 | 0.000 | 0.020 |
| Barisal | 0.002 | -0.075 | -0.001 | 0.326 |
| Total | | | -0.002 | 0.446 |
| Mass media exposure | | | | |
| Yes | -0.006 | 0.635 | -0.015 | 7.690 |
| No (ref.) | | | | |
| Wealth index | | | | |
| Poorest | 0.028 | -0.694 | -0.077 | 40.526 |
| Poorer | 0.027 | -0.297 | -0.032 | 16.725 |
| Middle | 0.015 | 0.016 | 0.001 | -0.485 |
| Richer | 0.012 | 0.323 | 0.015 | -8.145 |
| Richest (ref.) | | | - | - |
| Total | | | -0.093 | 48.621 |

# Decomposition analysis of sociodemographic characteristics for underweight

- We observed birth order of the child, childhood illness, maternal education, mothers' BMI, toilet facilities, and wealth status were major contributor of the inequality of childhood underweight in 2017-18 in Bangladesh.
- Household economic status as measured by **wealth index** was responsible for **46%** of the inequality in 2017-18
- Maternal **education** made a significant contribution to underweight inequality explaining **21%** of the total inequality in 2017-18
- Mothers' **BMI** was responsible **12%** of the total inequality of childhood underweight

| Characteristics | Elasticity | Concentration Index (CI) | Absolute contribution | % of contribution |
|---|---|---|---|---|
| Children's age in month | | | | |
| <6 months (ref.) | | | | |
| 6-12 months | -0.003 | -0.006 | 0.000 | -0.059 |
| 13-23 months | 0.003 | 0.004 | 0.000 | -0.034 |
| 24-35 months | 0.016 | 0.002 | 0.000 | -0.085 |
| 36-47 months | 0.018 | 0.004 | 0.000 | -0.203 |
| 48-59 months | 0.019 | 0.000 | 0.000 | 0.001 |
| Total | | | 0.000 | -0.380 |
| Birth order | | | | |
| First (ref.) | | | | |
| Second | 0.001 | 0.051 | 0.000 | -0.223 |
| Third | 0.001 | -0.043 | 0.000 | 0.131 |
| Fourth or more | 0.006 | -0.121 | -0.003 | 2.266 |
| Total | | | -0.003 | 2.174 |
| Childhood illness | | | | |
| Yes (ref.) | | | | |
| No | -0.029 | 0.040 | -0.005 | 3.692 |
| Mothers' educational status | | | | |
| No education | 0.011 | -0.099 | -0.004 | 3.473 |
| Primary education | 0.027 | -0.299 | -0.032 | 24.783 |
| Secondary education | 0.028 | 0.082 | 0.009 | -7.225 |
| Higher education (ref.) | | | - | - |
| Total | | | -0.027 | 21.031 |
| Mothers age at first birth | | | | |
| Less than 18 years | 0.000 | -0.245 | 0.000 | -0.121 |
| 18-24 years (ref.) | | | | |
| 25 years or above | 0.001 | 0.089 | 0.000 | -0.242 |
| Total | | | 0.000 | -0.363 |
| Mothers working status | | | | |
| Yes | -0.001 | -0.256 | 0.001 | -0.798 |
| No (ref.) | | | | |
| Mothers BMI (Body Mass Index) | | | | |
| Underweight | 0.012 | -0.146 | -0.007 | 5.639 |
| Normal Weight (ref.) | | | | |
| Overweight | -0.008 | 0.198 | -0.006 | 4.948 |
| Obese | -0.004 | 0.110 | -0.002 | 1.375 |
| Total | | | -0.015 | 11.962 |
| Toilet facility | | | | |
| Hygienic toilet facility (ref.) | | | | |
| Unhygienic toilet facility | 0.006 | -0.516 | -0.013 | 9.759 |
| Place of residence | | | | |
| Urban (ref.) | | | | |
| Rural | -0.005 | -0.457 | 0.008 | -6.616 |
| Division | | | | |
| Dhaka (ref.) | | | | |
| Chattogram | 0.004 | 0.070 | 0.001 | -0.797 |
| Rajshahi | 0.004 | -0.086 | -0.001 | 1.008 |
| Rangpur | -0.002 | -0.092 | 0.001 | -0.459 |
| Khulna | -0.001 | 0.039 | 0.000 | 0.101 |
| Mymensingh | 0.011 | -0.016 | -0.001 | 0.548 |
| Sylhet | 0.002 | -0.019 | 0.000 | 0.106 |
| Barisal | 0.002 | -0.078 | 0.000 | 0.365 |
| Total | | | 0.000 | 0.872 |
| Mass media exposure | | | | |
| Yes | 0.007 | 0.637 | 0.018 | -14.092 |
| No (ref.) | | | | |
| Wealth index | | | | |
| Poorest | 0.019 | -0.695 | -0.053 | 41.094 |
| Poorer | 0.017 | -0.296 | -0.020 | 15.861 |
| Middle | 0.009 | 0.015 | 0.001 | -0.412 |
| Richer | 0.010 | 0.325 | 0.013 | -10.284 |
| Richest (ref.) | | | - | - |
| Total | | | -0.059 | 46.259 |

# Summary and Conclusion

- Our study observed that from 2004 to 2017-18, the prevalence of childhood **stunting, wasting**, and **underweight** has declined by **39%, 43%,** and **49%,** respectively
- The overall change in stunting over the decade was highest among the richest, urban residents, among male children, children from larger households and educated mothers and those living in Dhaka division
- The overall change in wasting was highest among female, children from uneducated mother, rural resident, children who belonged to the medium households (4-6 member), belonged to Rangpur and Khulna division, among the poor and middle quintiles households
- The overall change in childhood underweight was highest among male, children fro educated mothers, from larger households, urban residents, who belonged to the Dhaka and Sylhet division and among richest households.
- We have shown the reduction of undernutrition in terms of **stunting** and **underweight** was **not guaranteed** to improve **equity** in Bangladesh.
- Wealth status was accounted for almost **half of the total inequality** in both stunting and underweight prevalence of children, whereas **maternal education** was ranked as the **second contributor**.

# Summary and Conclusion (cont.)

- The main conclusion could be summarized by observing that, while the overall **childhood undernutrition** situation is **improving**, **inequalities** in terms of socioeconomic aspects has appeared to have **widened over time**
- Improving **economic activity** and **maternal education** will improve the nutritional status of children and as a consequence reduce inequality.
- Nutrition-specific interventions, such as micronutrient supplementation and improved food and nutrient intake during pregnancy for low-income households might also be prioritized.
- The latest **Bangladesh National Nutrition Policy** emphasizes improving health equity for the poor and geographically marginalized populations **through identifying its various underlying causes.** Thus, this study can contribute to identifying the actions should be taken to prevent inequalities in childhood undernutrition.

# Thank You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