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Understanding Child Malnutrition Reduction in Indonesia Children Aged 0–19 Years: A Linear Decomposition Approach

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ABSTRACT

This study examines child malnutrition reduction in Indonesia and whether it was due to improved nutrition in younger cohorts or reversal of malnutrition in older cohorts. Data were from five Indonesian Family Life Survey (IFLS) waves 1993–2015, comprising 59,973 observations from 29,073 children aged 0–19 years. This study used logit models to perform linear decomposition. The results show cohort replacement (AOR=0.992, p<0.01) and intracohort change (AOR=0.979, p<0.01) reduce stunting. However, these effects do not protect younger cohorts from being overweight (AOR=1.073, p<0.01) or prevent older cohorts from thinness (AOR=1.009, p< 0.01). In conclusion, there are cohort effects on child malnutrition reduction in Indonesia.

Keywords: cohort, IFLS, Indonesia, linear decomposition, malnutrition

INTRODUCTION

Although malnutrition remains evident, Indonesia witnessed an incremental improvement in children's nutritional status recently (MoH RI 2019). Despite an increasing trend in overweight, the number of stunting in under-five children decreased from 37.2% in 2013 to 30.8% in 2018. Furthermore, the number of children suffering from thinness decreased from 10.2% in 2018 to 3.3% in 2013. These improvements, however, are rarely followed by further inquiries, for example, the role of cohort effects in trends of child nutritional status statistics. This study linearly decomposes cohort effects to understand how malnutrition in Indonesia is reduced. The objective is to offer an insight on whether the better child nutrition statistics came from enhancing nutritional status of the younger cohort (cohort replacement) or from reversing early years malnutrition the older cohort once suffered from (intracohort change) (Firebaugh 1997).

METHODS

Data were pooled from five waves of the Indonesian Family Life Survey (IFLS) from 1993–2015. The data comprised 59,973 observations from 29,073 children. The IFLS collected a wealth of information on health indicators and socioeconomic conditions. Further details, including approval of the survey procedures, can be found in Strauss *et al.* (2016). The outcome variables Y_{it} are for child *i* measured in year *t*. *Yit* is a binary, logging whether the child exhibited stunting (height-for-age≤-2SD), thinness (BMI-for-age≤-2SD), and/or overweight (BMI-for-age≥1SD). The independent variables are intracohort change $Year_{it,}$ the year when the child's anthropometry was measured, and cohort replacement $Cohort_{it}$, the birth year of the child. X_{it} is a vector of control variables and e_{it} is random errors. The logit regression models used robust standard errors to reduce biases. The model is as follows.

$$logit\,(Y_{it}) = b_0 + b_1 \times Year_{it} + b_2 \times Cohort_{it} + b_3 \times X_{it} + e_{it}$$

RESULTS AND DISCUSSION

Table 1 summarizes the characteristics of the research subjects. The table shows a constant decline in stunting prevalence from 44.7% in IFLS–1 (1993/1994) to 26.6% in IFLS–5 (2014/2015). There is progress in reducing thinness by 1.1% from 1993 to 2015. Unfortunately, being overweight is on an upward trend. From slightly under 7% in IFLS-1 (1993/1994), the number of children suffering from overweight has risen to nearly 15% in IFLS–5 (2014/2015). Table 1 also depicts other characteristics that become control variables for the logit models.

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Table 1. Subjects' characteristics

	IFLS-1 (1993/1994)	IFLS 2 (1997/1998)	IFLS 3 (2000)	IFLS-4 (2007/2008)	IFLS-5 (2014/2015)
Nutritional status					
Stunting	44.7%	41.0%	38.1%	33.3%	26.6%
Thinness	10.1%	10.1%	10.4%	10.2%	9.0%
Overweight	6.9%	7.5%	8.1%	12.6%	14.7%
Control variables					
Male	51.0%	50.5%	51.1%	51.6%	51.4%
High SES[a]	49.1%	45.9%	42.8%	44.6%	68.2%
Living in urban areas	46.2%	45.6%	45.7%	51.2%	59.1%
Born in urban areas	46.3%	45.5%	45.3%	48.7%	55.7%
Other characteristic(s)					
Age[b]	7.67	9.71	9.36	9.16	9.26
N	7,972	10,672	12,739	13,630	14,961

Total N=59,973 observations from 29,073 children measured in multiple IFLS waves

IFLS: Indonesian Family Life Survey

[a]High Social Economy Status (SES) assigned when children lived in a household with above median per capita expenditure

[b]Average age of the observed children in years not included in models in Table 2

The results of the linear decomposition are in Table 2. The table presents the Adjusted Odds Ratio (AOR) for intracohort change and cohort replacement. In general, cohort effects affect child nutritional status in Indonesia, as shown by all coefficients for intracohort change. Cohort replacement has a $p<0.01$. The younger cohort has a 0.8% lower chance of being stunted than those born in the previous year (AOR=0.992, $p<0.01$). As children aged, their stunting prevalence is lower by 2.1% (AOR=0.979, $p<0.01$). This evidence supports The Young Lives Study in Peru and India, proving that stunting might be reversible at a later age (Georgiadis 2014). Unlike the encouraging results from the logit model for stunting, linear decomposition for thinness and overweight has revealed some challenges. The younger cohort has a higher chance (7.3%) of being overweight than those who were born a year before (AOR=1.073, $p<0.01$). Meanwhile, the older cohort is at risk of becoming thin at a minor 0.9% rate each year (AOR=1.009, $p<0.01$). Such a body mass contradiction during childhood and adolescence (age 0–19 years) calls for future studies that identify the underlying risk factors (e.g., spatial location, maternal education, and dietary habits) and validate model specifications. This is because the contradiction may pose threats to skeletal and muscle development among children during their formative years (Dimitri 2019).

Table 2. Logit models for linear decomposition

	Stunting AOR	Thinness AOR	Overweight AOR
Decomposition (cohort effects)			
Intracohort change ($Year_{it}$)	0.979** (0.002)	1.009** (0.003)	0.969** (0.003)
Cohort replacement ($Cohort_{it}$)	0.922** (0.002)	0.986** (0.003)	1.073** (0.003)
Control variables included?	Yes	Yes	Yes
Pseudo-likelihood	-37,260	-19,237	-19,242

*p<0.05; ** p<0.01; SE: Standard Error in parentheses

AOR:Adjusted Odds Ratio

CONCLUSION

The smaller number of stunted children in recent statistics is due to the success in enhancing the nutrition of the younger cohort and the recovery of the older ones from stunting. Unfortunately, these cohort effects inadequately protect the younger cohort against overweight and prevent them from becoming thinner later.

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DECLARATION OF CONFLICT OF INTERESTS

The author has no conflict of interest.

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