

Stand-Alone Conditional Cash Transfer in Regards to Reducing Stunting in Indonesia: Evidence From a Randomized Controlled Trial

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Abstract

This study aims to investigate the connection between conditional cash transfers (CCTs) and stunting and identify the factors contributing to stunting among Indonesia's poor. The analysis relies on the data collected in 2007 and 2009. Infants aged 0–36 months from families receiving CCTs were compared with a control group using the randomized controlled trial (RCT) method. These infants from poor households, who were stunted, and were not exclusively breastfed, were selected randomly. The data were analyzed using logistic regression with the STATA program (v.13). The research findings show that CCTs alone can not impact the prevalence of stunting. In order to optimize the effectiveness of the CCT scheme, factors related to the mother's age at childbirth, education, employment, the sex of the household head, and the geographic condition should be taken into account. This research would reinforce the need for CCT programs linked closely in design with effective social behavior change programs. The study recommends further research examining how CCT would impact stunting among groups in low-income families.

Keywords

Conditional cash transfer; poor households; program Keluarga Harapan; randomized controlled trial; stunting

Introduction

According to Indonesia's Central Bureau Statistics, by September 2021, 26.50 million Indonesians (9.71% of the population) will live below the poverty line (Badan Pusat Statistik, 2015). In response to this realization, the Indonesian government exerted a conditional cash transfer (CCT) scheme called the Program Keluarga Harapan (PKH) or the Hopeful Family Program to eradicate poverty (National Team for the Acceleration of Poverty Reduction, 2017). The PKH program, initiated in 2007, with its first beneficiaries derived from the existing groups, is an aid for eligible families consisting of fixed and variable cash transfers. Each family receives a fixed cash transfer of IDR 200,000 (US\$12.74). However, if a woman is pregnant or nursing, her family would receive an annual variable cash transfer of IDR 600,000–2,200,000 (US\$38.22–140.13), which would be transferred quarterly by the central government. In short, the PKH program is intended to improve the welfare of impoverished households by enabling low-income families to improve the health and education of their children over time (Hadna & Kartika, 2017).

Several improvements have been reported as examples of Indonesia's PKH program's success (Alatas, 2012). The prevalence of stunting in Indonesia was reduced to 27.7% in 2019, and this figure has remained above the tolerance level of 20% set by the World Health Organization (WHO). The World Bank (2020) noted that even though Indonesia has succeeded in reducing early childhood mortality, the prevalence of stunting in Indonesia is among the highest in the world. It is noteworthy that during Indonesia's 2019 General Election, stunting was a significant issue for the presidential candidates and drew lengthy political debate. Ultimately, the elected government was required to establish a particular unit under the vice president's control to address the stunting issue.

The prevalence of stunting in Indonesia is noteworthy, especially within Indonesia's poverty eradication programs, particularly PKH, since 40% of stunted infants come from poor households in rural areas (Ministry of Health [Indonesia], 2013). Bassett (2008) explored the rationale for closely linking CCTs with nutrition: reducing poverty, generating long-term well-being through investments in child human capital, and providing natural entry points for improving nutrition. Moreover, CCTs target poor children, who are often most at risk of experiencing undernutrition (Farrington & Slater, 2006; Manley et al., 2020).

In a survey of PKH conducted six years after the program's implementation (2007–2013) in Indonesia, Cahyadi et al. (2018) observed substantial reductions in stunting among children aged 0–60 months. They reported that stunting had declined by approximately 9–11%, representing a 23–27% reduction in the probability of stunted (p values .02 and less than .01). Meanwhile, severe stunting declined by approximately 10% (p values both less than .01), representing a 56–62% reduction (Cahyadi et al., 2018). However, based on research conducted by Alatas (2012), the PKH's ability to decrease stunting prevalence is minimal (2.7%). A previous study also concluded that cash transfers have positive impacts on child nutrition but are small (Manley et al., 2022).

Cahyadi et al. (2018) also addressed the issue of the limited effect of PKH during its initial years. In an introduction section, Cahyadi et al. (2018) found no detectable stunting effects in the three-year follow-up, suggesting that cumulative health investments may be significant over several years. Furthermore, a study by Alatas (2012) analyzing the data from the follow-up survey in 2009 reported the same findings. Therefore, the conclusions of the two authors

should be further explored using the same data during the early PKH implementation in Indonesia from 2007–2009.

The absence of previous research examining the impact of CCT on stunting using a randomized controlled trial (RCT) within three years is an opportunity for new research findings. In addition, another novelty of this study is the selection of infants from poor households who were not exclusively breastfed. This study compares infants who benefited from the PKH program (treatment group) with infants who did not benefit from the program (control group) using the 2007 and 2009 data. In both the treatment and control groups, this study selected infants at least six months old in 2007 and experienced stunting, then compared the data from 2007 and 2009. Furthermore, this study filters its respondents by selecting infants from poor households, both the treatment and control groups, who were not breastfed exclusively.

These additional filters and the reduced time frame are intended to better understand the PKH program's effect on stunting. By selecting infant respondents who did not receive exclusive breastfeeding, this study wanted to prove the extent to which PKH has overcome stunting in the initial period of receiving PKH. Furthermore, as many as the stunted infants identified in 2007 were not surveyed again in 2013. In other words, valid data for this study were only available until 2009. Thus, the objectives of this study are: first, to determine how PKH implementation will help low-income families improve infants' health, as measured by their height-for-age z-scores (HAZ); second, to explore other factors that may determine the prevalence of stunting in Indonesia.

Stunting: A complexity problem

Stunting is also a child welfare and behavioral problem related to the capacity to fulfill their nutritional needs, and families and communities provide adequate nutrition (Manley et al., 2022; Manley et al., 2020). The WHO estimates that 55% of infant and toddler deaths are caused by poor nutrition (Branca & Ferrari, 2002). More than a third of children under five in Indonesia experienced chronic malnutrition in 2013 (Rokx et al., 2018). Studies found that persistent undernutrition can result in stunting, generally caused by chronic malnutrition during the first 1,000 days of life (Black et al., 2013). It is also argued that many family members will pay less attention to fulfilling the children's nutrition due to the diversity of food provided (Motbainor et al., 2015). In other words, the greater the number of family members, the less diversity of food is consumed (Geberselassie et al., 2018; Mahmudiono et al., 2017).

However, several factors must be considered when rationalizing stunting, as it is a complicated social and health problem (Manley et al., 2020; Owusu-Addo et al., 2018, 2019; Siddiqui et al., 2020). The Ministry of Health Indonesia (2013) elaborated that direct factors, i.e., consumption and health conditions, have caused 30% of stunting cases, while indirect factors have caused the remaining 70% of the cases; handling the latter is more crucial. All indirect factors include childcare and nurture, access to health facilities, food availability, and household consumption, all closely related to poverty.

A healthy environment is another critical factor in preventing stunting. For example, when exploring a case in India, Chambers & von Medeazza (2013) found that children who lived in households without sufficient toilets risked developing diarrhea (Schlaudecker et al., 2011).

This insufficient toilet triggers the child to experience health problems, which causes stunting (Spears, 2013). In addition to sanitation, access to minimum clean water is another cause of stunting (Cumming & Cairncross, 2016; Kwami et al., 2019; Mbuya & Humphrey, 2016). The authors concluded that the lack of clean water, especially drinking, can cause stunted bone growth, infections, and diarrhea.

Stunting is relevant to a child's age factor; the older the child is, the more prevalence of stunting emerges (Darteh et al., 2014; Geberselassie et al., 2018; Kismul et al., 2017). Furthermore, stunting is also related to the mother's age at birth. The ideal age for giving birth is between 21–35 years, while the non-ideal age is < 21 and > 35 years. The study by Danaei et al. (2016) in 137 developing countries found a correlation between teenage motherhood and the prevalence of stunting.

Another factor believed to influence children's health is the provision of nurture, which is related to the knowledge and awareness of the nurturer. In this case, the educational level of the nurturer is a prevalent factor affecting children's health. This nurture pattern is reflected in the arguments of Abuya et al. (2011), Glewwe (1999), Hall et al. (2018), and Semba et al. (2008), who showed that parents' education level determines the health status of their children. In addition, the United Nations Children's Fund (UNICEF) (2022) indicated that children nurtured by uneducated parents were 1.7 times more likely to experience stunting than children raised by parents with more education. In short, mothers' education is critical as in many societies—including in Indonesia—there is a tendency to make childrearing the mother's responsibility.

Regarding maternal involvement, a contradiction was found regarding working mothers. Food vulnerability in low-income families is mitigated when mothers have additional income, and working mothers significantly have influenced stunting more than those mothers who are unemployed. Handayani et al. (2017) found that 42.5% of children under five whose mothers have gainful employment were healthier than those with mothers who did not work (i.e., have no additional income). Working parents can improve family income levels, which will support the children's development by ensuring that parents can provide for their primary and secondary needs. However, mothers being involved in the workforce also have adverse effects. Evidently, working mothers tend to have less time for their children. This contradiction is particularly interesting for the current research, and as such, the role of working mothers in stunting has been an essential point of analysis.

Beal et al. (2018) suggested that community and societal factors in Indonesia should be addressed to reduce stunting. As such, stunting is also closely linked to the gap between rural and urban areas. Undernutrition and stunting are generally more prevalent in rural areas than in urban areas (Smith et al., 2005). In China, children living in urban areas are 40% less likely to suffer stunting than those living in rural regions (Liu et al., 2014). A similar condition is also found in Indonesia, whereby 40% of children in rural areas suffer stunting, while 33% of children in urban areas do not have this condition (Ministry of Health [Indonesia], 2013). In addition, there is a significant difference in the rural-urban gap related to access to facilities and infrastructure. In Indonesia, many regions are still underdeveloped. For example, the food availability in the eastern parts of Indonesia is lower than in the western areas, especially in Java. Furthermore, eastern parts of the country, such as Nusa Tenggara, Maluku, Sulawesi, and Papua, still need health services.

Despite the rapid development of health facilities in villages, including underdeveloped regions, access to health facilities still needs improvement. Data from the National Health

Survey showed that infants who did not receive anthropometric measurement services increased from 25.5% in 2007 to 34.3% in 2013 (Ministry of Health [Indonesia], 2013). More than one-third of Indonesian infants did not benefit from village-based health centers. Access to health services is not solely determined by the availability of health facilities in rural areas, especially in underdeveloped regions, but also by families' awareness and willingness to access them. Awareness and willingness are related to families' level of education, which brings us back to our explanation about families' capacity to provide necessary arrangements for their children's health.

In short, stunting is not entirely determined by poverty; it is similarly related to other factors. Thus, reducing stunting by relying exclusively on poverty alleviation through CCT will not be significant. To achieve maximal results, CCT and other programs should also seek to increase access to better health services and decrease the gap between rural/urban areas and regions. Moreover, CCT will become more effective if it can increase families' empowerment and awareness to nurture their children.

Research methods

Study design and participants

Data used in this study originated from surveys conducted by the Center for Population and Policy Studies (CPPS) UGM in 2007, 2009, and 2013. The 2007 baseline survey was used as the RCT at the district level (Alatas, 2012). Districts were selected randomly from 360 districts, distributed amongst six provinces. All selected districts met specific baselines regarding malnutrition, poverty, drop-out, and the availability of health and education facilities. Districts were chosen as samples and divided into treatment and control groups. Households that received CCTs through the PKH program in each district, treatment, and control were randomly selected. A midline evaluation conducted by Wong et al. (2012b), in which surveyed households were revisited and reinterviewed (Satriawan, 2016), was subsequently consulted.

This study composed data from 2007 (Wong et al., 2012a) and 2009 (Wong et al., 2012b) surveys, as the same infants had received anthropometric measurements. Data from the 2007 survey was used to ascertain infants' condition before the PKH program was initiated, while data from the 2009 survey was used to determine infants' condition several years after the program was implemented. Therefore, data from these two years was considered sufficient to show the CCT program's effect on stunting.

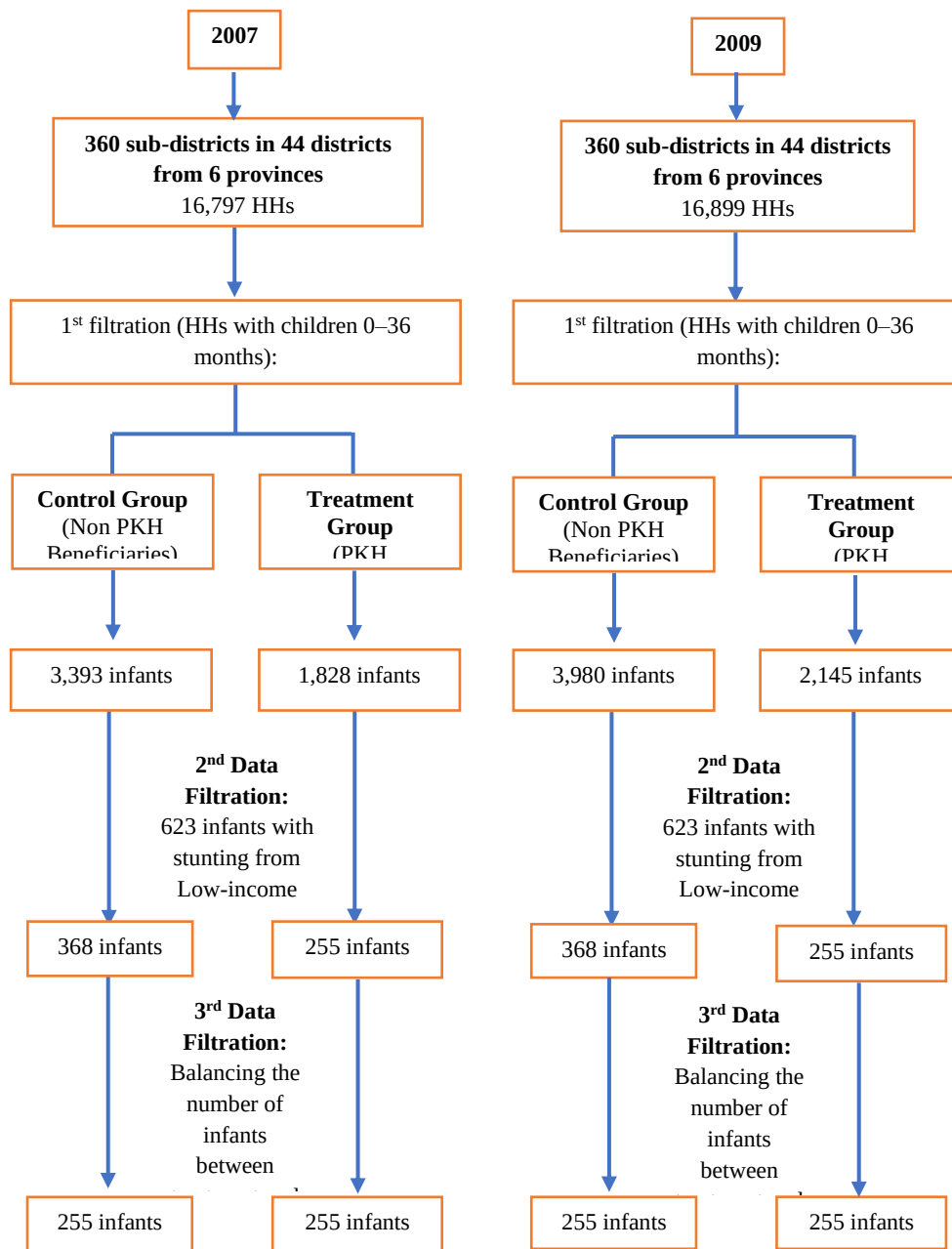
Data were collected quantitatively using two-panel surveys of the same households. Respondents were distributed amongst 360 districts in six Indonesian provinces: the Jakarta Capital District, West Java, East Java, East Nusa Tenggara, North Sulawesi, and Gorontalo. Sampling was conducted using a hierarchical approach, covering 360 districts in 44 regencies in 6 provinces. In each district, forty households were selected randomly from eight clusters, set at the village level (if there were eight or more villages in the district) or the hamlet level (fewer than eight villages in the district). In addition, the characteristics of each location (urban, rural) were also considered. Through this sampling process, 16,797 households were selected for the 2007 survey.

All selected households were subsequently tracked and contacted for the 2009 survey. Sampled households fell into two categories: (a) households with women who had been pregnant or had given birth within the past two years and (b) households with children between the ages of six and fifteen. Five households in these categories were selected randomly: two from category (a) and three from category (b).

The research focused on infants between the ages of 0–36 months. Samples were selected through a multi-stage filtration process that distinguishes this study from the previous ones. During the first filtration stage, information on children was collected from 16,797 households (in 2007) and 16,899 households (in 2009); the numbers differed because several households had fragmented between the surveys. During the second stage, households were filtered under the above-mentioned infant criteria. In the 2007 survey, 5,221 children between the ages of 0–36 months living in 4,819 households were identified; 1,828 children (35.01%) received CCTs through the PKH program, and 3,393 children (64.99%) did not. Meanwhile, in the 2009 survey, 6,125 children between the ages of 0–36 months living in 5,210 households were identified; 2,145 children (35.02%) received CCTs through the PKH program, 3,980 children (64.98%) did not.

Data were further filtered to identify infants who experienced stunting and originated from low-income families. This filtering process investigates the effects of the PKH program on stunting. Stunting was identified based on infants' height-for-age z-score, calculated using the WHO Anthro application (v3.2.2). The following specifications were used: severe stunting ($HAZ < -3 SD$) = 1, stunting ($HAZ \geq -3 SD$ dan $< -2 SD$) = 2, normal (HAZ between $-2 SD$ and $2 SD$) = 3, and height ($HAZ > 2 SD$) = 4. Infants were divided into two categories: stunted infants (i.e., coded 1 or 2) and not stunted infants (i.e., coded 3 or 4). Poverty was ascertained using definitions put forth by Statistics Indonesia in 2007 and 2009. In 2007, the poverty line was drawn at IDR 187,942 (US\$12) per month for urban areas and IDR 146,837 (US\$9.35) per month for rural areas. In 2009, the poverty line was drawn at IDR 222,123 (US\$14.15) per month and IDR 179,835 (US\$11.45) per month for urban and rural areas. Finally, the researchers selected children who had not been exclusively breastfed. Studies have concluded that not breastfeeding, and even early cessation of breastfeeding children can inhibit physical growth (Arpadi et al., 2009; Onyango et al., 1999; Stewart et al., 2013). Thus, breastfeeding dramatically affects the growth and development of children. Therefore, this variable should be excluded from the analysis to ensure the purity of the answers on how much influence CCT has on stunting.

After filtration, 623 infants were identified, with 255 from households that received CCTs through the PKH program (treatment group) and 368 from households that did not receive CCTs (control group). In addition, to ensure the balance between the treatment group and the control group, 255 infants were selected randomly from the latter. Consequently, the total population of this study was 510 infants, with 255 infants in the treatment group and 255 infants in the control group.

Figure 1: Data Selection

Note: Prepared by the authors

Definition of variables

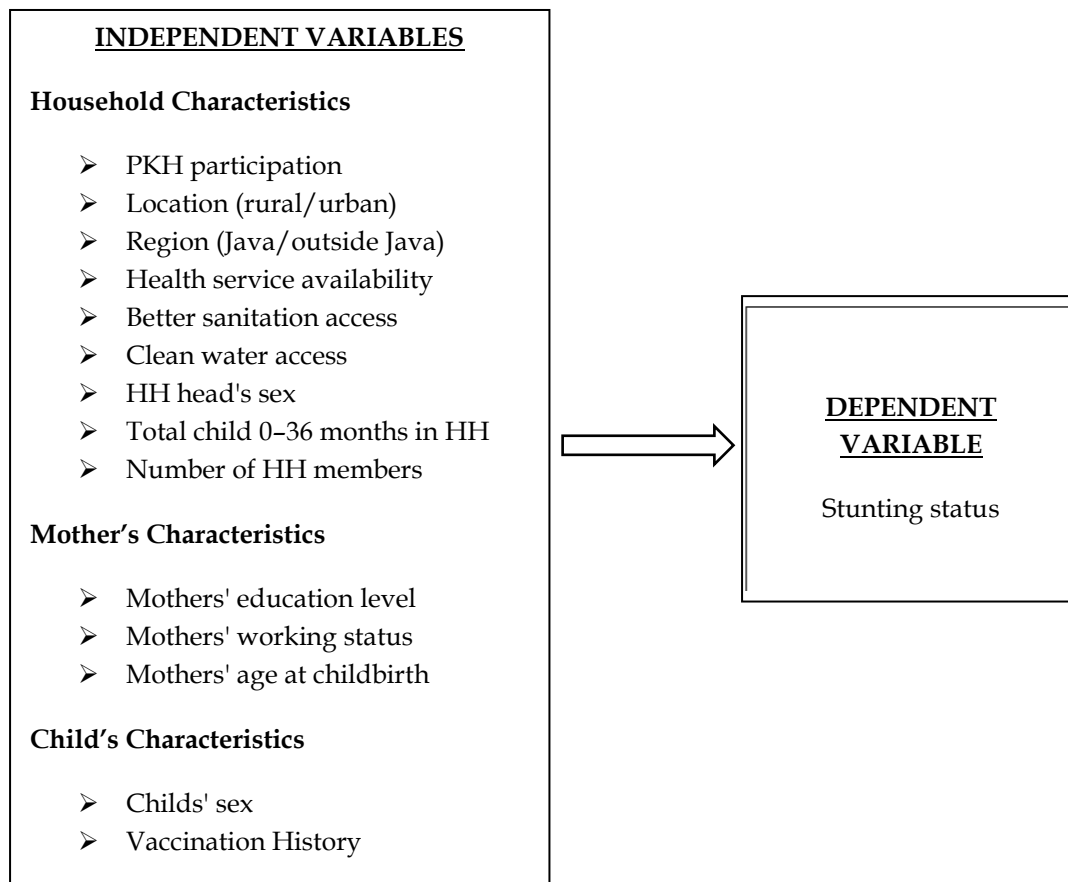
Dependent variable: Stunting status

Stunting is commonly defined as defective growth and development because of poor nutrition, repeated infections, and inadequate psychosocial stimulation experienced by children. The identification of stunting is determined by examining a child's length or height and bringing out the meaning of the measurement results by comparing them with a recognized set of standard values (de Onis & Branca, 2016). The WHO and UNICEF (2019)

published standardized anthropometric variables for measuring children's growth, including length/height-for-age (HAZ), weight-for-age (WAZ), weight-for-length, weight-for-height, and body mass index-for-age. Of these variables, HAZ is most commonly used to indicate the prevalence of stunting among children, especially in developing countries (Garoma et al., 2017; Perumal et al., 2018). They are stunted when the children's measurement (HAZ) is more than two standard deviations below the WHO Child Growth Standards median (World Health Organization, 2015). As its dependent variable, this study takes stunting among infants. Therefore, data on infants identified as stunted in the 2007 survey was subsequently consulted to ascertain whether they remained stunted in 2009.

Independent variables

For this study, stunting was understood as influenced by numerous independent variables. First were those intrinsic to infants: sex and vaccination history. Regarding sex, children were identified as male (= 1) or female (= 0). Meanwhile, children were identified as having received age-appropriate vaccines (= 1) or not (= 0) in vaccination history. Second were those variables associated with infants' mothers, including their age at childbirth, employment status, and level of education (the completion of nine years of compulsory schooling). Third were those variables associated with the households, including receipt of CCTs through the PKH program, location, and special conditions. Households were located in urban or rural areas and Java or other islands. In addition, households' proximity to healthcare facilities and professionals (clinics, hospitals, medical practitioners, and paramedic staff) and their drinking water and sanitation access were considered. Finally, special household conditions included the sex of the household head, the number of infants in the household, and the number of household members.

Figure 2: Dependent and Independent Variables

Note: Research model prepared by the authors

Statistical analysis

This article employs logistic regression analysis to ascertain the probability that an independent variable will influence the dependent variable. In addition, this analysis technique can also identify the characteristics of the groups involved (i.e., PKH beneficiaries and non-beneficiaries) and the most influential factors. The formula used for the logistic regression analysis in this study is as follows:

$$Y_{it} = a + pkh_{it} + \beta_2.child_sex + \beta_3.basic_vaccination + \beta_4.mother_age_at_labor + \beta_5.mother_education + \beta_6.mother_work + \beta_7.PKH_status + \beta_8.urban_status + \beta_9.java_area + \beta_{10}.sanitation_access + \beta_{11}.cleanwater_status + \beta_{12}.health_facilities + \beta_{13}.HHhead_sex + \beta_{14}.total_toddler + \beta_{15}.total_HHmember + \varepsilon_{it}$$

where i = individual; t = time/year; and ε = component error

Data analysis was conducted using STATA (v.13), with the level and direction of change (increase/decrease) proven using the coefficient value. In addition, logistic regression analysis was used to show the significance through the *p* value, while the odds ratio (OR) was used to show the extent and direction of change.

Results

This study was limited to children between the ages of 0–36 months who came from poor households and were not exclusively breastfed as of 2007; the 2009 survey took the same subjects as the 2007 survey. The study intended to provide insight into how the PKH program has helped reduce stunting while simultaneously considering the characteristics of the children and their mothers as well as the conditions of their households. For the first part of this process, a descriptive table was consulted to determine data distribution amongst all variables. Next, a Chi-square analysis was conducted regarding several independent variables to confirm how many children remained stunted and how many had improved their condition. Afterward, the variables were analyzed through logistic regression to identify potential determinants, with a $p < .25$ being deemed sufficient to indicate possible determination. Finally, a multivariable regression analysis was conducted to ascertain the significant variables.

This study considered 510 children, divided among recipients of PKH assistance (treatment group, 255 children) and non-recipients (control group, 255 children). Among the children who received assistance, 59.61% remained stunted, while 40.39% avoided stunting. Similar figures were found among non-recipients: 58.43% remained stunted, while 41.57% escaped stunting (see Table 1). It was discovered that the PKH program did not significantly influence stunting prevalence (OR = 1.14, 95% CI [0.70, 1.88], $p = .596$).

The study found that several variables, namely the mother's education, mother's employment status, location of residence (in Java/outside Java), and sex of the household head, had a significant influence on children's ability to recover from stunting. Mother's education has (OR = 6.05, 95% CI [1.54, 23.81], $p = .010$). Mother's employment status was (OR = 0.39, 95% CI [0.16, 0.95], $p = .039$), while the location of residence in Java/outside Java was (OR = 4.55, 95% CI [1.94, 10.66], $p = .000$). Finally, the sex of the household head was (OR = 0.36, 95% CI [0.12, 1.06], $p = .065$).

Meanwhile, among households that did not receive PKH assistance, variables that significantly influenced the children's ability to escape stunting included the mother's age at childbirth, the mother's education, and the number of household members. These variables were (OR = 2.27, 95% CI [0.94, 5.51], $p = .070$) for the mother's age at childbirth; and (OR = 3.26, 95% CI [1.00, 10.59], $p = .049$) for the level the mother's education; and (OR = 0.36, 95% CI [0.13, 1.12], $p = .081$) for the number of household members. Subsequently, independent variables were tested within the context of the PKH program as an intervening variable. The mother's age at childbirth, the mother's education, the employment status of the children's mothers, the location of the household (in Java/outside Java), and the sex of the household head were found to be significant. The mother's age at childbirth was (OR = 2.02, 95% CI [1.07, 3.83], $p = .031$). Then, for the mother's education, (OR = 4.32, 95% CI [1.77, 810.56], $p = .001$). The mother's employment status was (OR = 0.48, 95% CI [0.25, 0.93], $p = .030$), while the location in Java/outside Java was (OR = 2.63, 95% CI [1.50, 4.63], $p = .001$). Finally, the sex of the household head was (OR = 0.36, 95% CI [0.15, 0.86], $p = .021$).

Table 1: Characteristics of Children, Condition of Mothers, and Households, by Tested Variables

Variable	Number studied	PKH Beneficiaries (n=255)				Non-PKH Beneficiaries (n=255)				Odds Ratio (95% CI)	<i>p</i> value
	N (%)	Still Stunting	Out from Stunting	Odds Ratio (95% CI)	<i>p</i> value	Still Stunting	Out from Stunting	Odds Ratio (95% CI)	<i>p</i> value		
Overall	510 (100)	152 (59.61)	103 (40.39)			149 (58.43)	106 (41.57)			1.14 (0.70, 1.88)	.596
Child's sex				0.98 (0.47, 2.01)	.947			0.84 (0.42, 1.69)	.626	0.90 (0.55, 1.49)	.684
Female	219 (42.94)	62 (40.79)	42 (40.78)			67 (44.97)	48 (45.28)				
Male	291 (57.06)	90 (59.21)	61 (59.22)			82 (55.03)	58 (54.72)				
Received complete immunization				1.45 (0.46, 4.56)	.527			1.51 (0.39, 5.76)	.545	1.44 (0.61, 3.44)	.407
No	54 (10.59)	19 (12.50)	9 (8.74)			16 (10.74)	10 (9.43)				
Yes	456 (89.41)	133 (87.50)	94 (91.26)			133 (89.26)	96 (90.57)				
Mother's age at childbirth				1.838 (0.72, 4.69)	.202			2.27 (0.94, 5.51)	.070*	2.02 (1.07, 3.83)	.031*
Non, Ideal (<20 & >35 Years old)	120 (23.53)	40 (26.32)	20 (19.42)			37 (24.83)	23 (21.70)				
Ideal (21, 35 Years old)	390 (76.47)	112 (73.68)	83 (80.58)			112 (75.17)	83 (78.30)				
Mother's Education				6.05 (1.54, 23.81)	.010***			3.26 (1.00, 10.59)	.049**	4.32 (1.77, 10.56)	.001***
Not Finished Compulsory Education	79 (15.49)	24 (15.79)	12 (11.65)			33 (22.15)	10 (9.43)				
Finished Compulsory Education	431 (84.51)	128 (84.21)	91 (88.35)			116 (77.85)	96 (90.57)				
Mother's working status				0.39 (0.16, 0.95)	.039**			0.57 (0.21, 1.53)	.263	0.48 (0.25, 0.93)	.030*
No.	404 (79.22)	106 (69.74)	86 (83.50)			124 (83.22)	88 (83.02)				

Variable	Number studied	PKH Beneficiaries (n=255)				Non-PKH Beneficiaries (n=255)				Odds Ratio (95% CI)	p value
	N (%)	Still Stunting	Out from Stunting	Odds Ratio (95% CI)	p value	Still Stunting	Out from Stunting	Odds Ratio (95% CI)	p value		
Yes	106 (20.78)	46 (30.26)	17 (16.50)			25 (16.78)	18 (16.98)				
Rural/urban areas				1.23 (0.45, 3.39)	.690			1.07 (0.43, 2.64)	.880	1.11 (0.57, 2.15)	.765
Rural	431 (84.51)	137 (90.13)	84 (81.55)			119 (79.87)	91 (85.85)				
Urban	79 (15.49)	15 (9.87)	19 (18.45)			30 (20.13)	15 (14.15)				
Java/Non, Java island				4.55 (1.94, 10.66)	.000***			1.63 (0.75, 3.53)	.218	2.63 (1.50, 4.63)	.001***
Non, Java	178 (34.90)	69 (45.39)	32 (31.07)			51 (34.23)	26 (24.53)				
Java	332 (65.10)	83 (54.61)	71 (68.93)			98 (65.77)	80 (75.47)				
Access to sanitation				0.60 (0.20, 1.77)	.354			0.766 (0.31, 1.89)	.563	0.68 (0.34, 1.36)	.282
No	429 (84.12)	131 (86.18)	90 (87.38)			119 (79.87)	89 (83.96)				
Yes	81 (15.88)	21 (13.82)	13 (12.62)			30 (20.13)	17 (16.04)				
Access to drinking water				2.26 (0.82, 6.24)	.116			1.19 (0.53, 2.64)	.675	1.47 (0.79, 2.73)	.226
Not proper	415 (81.37)	136 (89.47)	88 (85.44)			115 (77.18)	76 (71.70)				
Proper	95 (18.63)	16 (10.53)	15 (14.56)			34 (22.82)	30 (28.30)				
Basic health facilities				1.42 (0.41, 4.88)	.579			1.49 (0.46, 4.84)	.507	1.48 (0.64, 3.44)	.359
Not available	58 (11.37)	14 (9.21)	12 (11.65)			24 (16.11)	8 (7.55)				
Available	452 (88.63)	138 (90.79)	91 (88.35)			125 (83.89)	98 (92.45)				
Sex of household head				0.36 (0.12, 1.06)	.065*			0.38 (0.90, 1.64)	.196	0.36 (0.15, 0.86)	.021*
Female	48 (9.41)	12 (7.89)	16 (15.53)			9 (6.04)	11 (10.38)				
Male	462 (90.59)	140 (92.11)	87 (84.47)			140 (93.96)	95 (89.62)				

Variable	Number studied	PKH Beneficiaries (n=255)				Non-PKH Beneficiaries (n=255)				Odds Ratio (95% CI)	p value
	N (%)	Still Stunting	Out from Stunting	Odds Ratio (95% CI)	p value	Still Stunting	Out from Stunting	Odds Ratio (95% CI)	p value		
Number of toddlers in the household				1.39 (0.67, 2.85)	.376			1.11 (0.55, 2.25)	.775	1.23 (0.74, 2.04)	.417
> 1 toddler	239 (46.86)	77 (50.66)	48 (46.60)			69 (46.31)	45 (42.45)				
1 toddler	271 (53.14)	75 (49.34)	55 (53.40)			80 (53.69)	61 (57.55)				
Number of household members				1.08 (0.43, 2.75)	.866			0.38 (0.13, 1.12)	.081*	0.69 (0.34, 1.39)	.229
> 4 People	422 (82.91)	125 (82.78)	89 (86.41)			121 (81.21)	87 (82.08)				
≤ 4 People	87 (17.09)	26 (17.22)	14 (13.59)			28 (18.79)	19 (17.92)				

Note: * Significance of $p < .10$; ** significance of $p < .05$; *** significance of $p < .01$; primary data

Several prospective variables ($p < .25$) were identified: age of the mother at the time of childbirth, mother's education, employment status of the mother, location (in Java/outside Java), and sex of the household head. These variables were tested using multivariable logistic regression analysis (see Table 2). The study showed that the mother's age at the time of childbirth, education, employment status, location of residence in Java/outside Java, and the sex of the household head were significant in reducing stunting.

The age of the mother at the time of childbirth was (OR = 2.05, 95% CI [1.14, 3.69], $p = .016$), indicating that the children born from the ideal age of the mother at the time of childbirth were 2.05 times as likely to escape stunting than the children born from non-ideal age of the mother at the time of childbirth. The mother's education was (OR = 3.20, 95% CI [1.67, 6.12], $p = .000$), indicating that the children whose mothers had completed compulsory education were 3.20 times as likely to escape stunting than the children whose mothers did not finish compulsory education. The mother's employment status was (OR = 2.15, 95% CI [1.18, 3.90], $p = .012$), indicating that the children of unemployed mothers were 2.15 times as likely to escape stunting than the children of working mothers.

Meanwhile, the location of the residence in Java/outside Java was (OR = 2.13, 95% CI [0.58, 3.57], $p = .004$), indicating that children living in Java were 2.13 times more likely to recover from stunting than children living outside Java. Finally, the sex of the household head was (OR = 2.82, 95% CI [1.51, 5.27], $p = .001$), which showed that the children from families headed by women were 2.82 times more likely to escape stunting than those from families headed by men.

Table 2: Prospective Variables for Multivariable Logistic Regression Analysis

The Condition of Stunted Children in 2007 and 2009	Odds Ratio (95% CI)	p value	Coef.	Odds Ratio (95% CI)	p value
1	2	3	4	5	6
PKH Beneficiaries			0.178	1.19 (0.71, 2.02)	.504
Child's sex	0.90 (0.55, 1.48)	.676			
Received complete immunization	1.47 (0.62, 3.49)	.388			
Mother's age at childbirth	2.01 (1.06, 3.80)	.032*	0.720	2.05 (1.14, 3.69)	.016*
Mother's Education	4.32 (1.76, 10.60)	.001***	1.164	3.20 (1.67, 6.12)	.000***
Mother's working status	0.47 (0.24, 0.92)	.025*	0.764	2.15 (1.18, 3.90)	.012*
Rural/urban areas	1.11 (0.57, 2.18)	.746			
Java/Non-Java island	2.67 (1.52, 4.70)	.001***	0.757	2.13 (0.58, 3.57)	.004***
Access to sanitation	0.69 (0.35, 1.38)	.297			
Access to drinking water	1.52 (0.81, 2.85)	.192	0.131	1.14 (0.58, 2.23)	.703
Basic health facilities	1.48 (0.63, 3.45)	.364			
Sex of household head	0.36 (0.15, 0.87)	.023*	1.037	2.82 (1.51, 5.27)	.001***
Number of toddlers in the household	1.24 (0.75, 2.04)	.407			
Number of household members	0.69 (0.34, 1.37)	.292			

Note: * significance of $p < .10$; ** significance of $p < .05$; *** significance of $p < .01$; OR and p value in Columns 5–6 are prospective variables ($p < .25$ in Column 3); primary data

Discussion

This study found that PKH, a program that relies on CCTs, was not directly correlated with stunting between 2007 and 2009. These findings support the previous research conducted by Alatas (2012). Cahyadi et al. (2018) concluded that PKH reduced stunting by 9%–11% only from 2007–2013. This different conclusion may be attributed to the different temporal scopes of these studies. This research only used the 2007 and 2009 surveys and, thus, did not extend to 2013 due to the difficulty of ensuring that the same children were represented. When selecting informants, several stages of filtration were conducted, producing a sample of 255 children from beneficiary households and 255 children from households who did not receive PKH support. Furthermore, these studies used different analytical techniques; the current research employed multivariable logistic regression analysis, while Cahyadi et al. (2018) in the National Bureau of Economic Research (NBER) report used Instrumental Variable (IV) Regression. These findings reinforce earlier studies, such as Ruel and Alderman (2013) and Tonguet-Papucci et al. (2015), who found that CCTs were not correlated with stunting. Furthermore, CCTs are not designed directly to improve nutrition (Bailey & Hedlund, 2012; Harvey & Bailey, 2011) but, rather, as investments in family education and health (Kusuma et al., 2017; Macours et al., 2012).

This study found that maternal age at delivery correlated with stunting prevalence. Children born to an ideal maternal-aged mother when giving birth (21–35 years old) tend to be more able to escape from stunting than children born to a mother whose age is not ideal when giving birth (< 20 & > 35 years old). The findings of this study are related to the results of the survey by Danaei et al. (2016), who found, in the case of Indonesia, that 0.6% of mothers who gave birth in 2011 were < 20 years old (teenage motherhood). Another interesting finding from this case study was that the mother's education level was correlated with the prevalence of stunting in children. Those children born to mothers who had completed compulsory education tended to be more able to escape stunting than those born to mothers who did not complete mandatory education. This study found the same conclusion as several previous studies conducted by Glewwe (1999), Abuya et al. (2011), Semba et al. (2008), and Handayani et al. (2017), who showed that parents' education level determines the health status of their children.

Concerning mothers' characteristics, this study finds that children whose mothers did not work were more likely to be free from stunting than the children of working mothers. This conclusion could be drawn because stay-at-home mothers have more time to spend on childcare (Ukwuani & Suchindran, 2003). In addition, culturally, mothers are expected to contribute more to childcare than other members of their households; when mothers work, the quality of childcare is affected (Waldfoegel, 2002). During childcare, children are given food, provided with healthcare, and taught psychosocial skills. As a result, unemployed mothers have more time to ensure that their family's nutrition needs are met (Attorp et al., 2014). Furthermore, such mothers tend to prepare healthier foods, enabling children to grow stronger and healthier. At the same time, intense interactions between mothers and children provide visual, verbal, and kinetic stimuli, which influence their energy and immune systems and stimulate the release of growth hormones (World Health Organization, 2015).

This study also finds that children who live in houses headed by women were more likely to recover from stunting than children in male-headed households. Women household heads tend to focus more on ensuring that their families' food and nutrition needs are met (Ali et al.,

2014). In short, women have an essential role in acquiring and managing the family's food stocks and generally spend more on food, health services, and other household needs (Gram et al., 2019).

Households' location in Java and outside Java significantly influenced the children's potential to evade stunting, a fact that can be attributed to the disparities in the availability of medical staff in Indonesia's islands. According to the Ministry of Health Indonesia (2013), there is one doctor for every 1.18 km² in Java, while outside Java, there is only one doctor for every 10.88 km². The greater the distance traversed and the time required to access medical staff and health services, the more difficult it is for low-income families to seek medication for themselves.

The influence of these variables on the effectiveness of CCT in reducing the prevalence of stunting may also apply more broadly in Indonesia. For example, this study highlighted the significance of the mothers' role in reducing the prevalence of stunting. Likewise, it has shown that the sex of the household head and geographical condition significantly correlate-with the prevalence of stunting. As such, the government must consider these variables when designing a universal program to reduce stunting (rather than only among low-income families).

Conclusion

This study clearly shows that conditional cash transfers (CCT) alone cannot effectively reduce the prevalence of stunting between 2007 and 2009. The CCTs may reduce the prevalence of stunting when several other factors are considered: the mother's education, the mother's age at childbirth, the mother's employment status, the sex of the household head, and the location of residence in Java/outside Java. For example, an educated mother and the ideal age of a mother at childbirth are beneficial for their children to avoid stunting. Likewise, unemployed mothers and families headed by women are more likely to be released from stunting. Finally, households' location in Java/outside Java correlates with the medical staff and service availability. Since Java is relatively better developed than Indonesia's other islands, families in Java enjoy greater access to health facilities than households located elsewhere. Therefore, this study concludes that the five variables above are the most determinant factors outside infants. The argument is that this study had deliberately selected infants who did not receive exclusive breastfeeding from their mothers.

Suppose the government wishes to accelerate its efforts to reduce stunting, especially in poor households. In that case, the CCT program must be designed in such a way as to ensure that the children's nutritional needs are fulfilled. The CCT programs should be linked closely in design with effective social behavior change programs. In effect, this relates to uptakes of services and equally essential links to other systems such as education, food systems, water sanitation, and hygiene (WASH) programs. In addition, CCT should also link to other social protection components such as economic empowerment, jobs, social insurance, and childcare policies. In other words, CCT could effectively reduce the prevalence of stunting if it is integrated with other sectors to improve the welfare of Indonesia's poor.

The limitation of this study is that it has not been able to analyze the differences in poverty levels among low-income families who received CCT and their ability to escape from stunting. This difference in poverty levels is predicted to be an independent variable that affects the

prevalence of stunting. The findings of this study recommended that further studies examine how CCT will impact stunting among groups in low-income families.

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