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The impact of Conditional Cash Transfer program on stunting in under five year's poor children

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A B S T R A C T

Study objective: As stunting is the most perilous health and nutrition problem for children under five in rural poor households worldwide and CCT programs are normally used to reduce poverty through conditionalities, this study examines the effect of CCT program health conditionality on reducing stunting, considering the longer time perspective which lacks in most available evidence.
Study design: This was quasi-experimental design.
Methods: The study used secondary household data kept by TASAF PSSN in Tanzania, coupled with corresponding children data from their respective clinic cards. The study used Regression Discontinuity Design (RDD) for inferential statistics regarding household stunting.
Results: Children mothers are mostly non-educated with 33 % for control and 23 % for treatment ended in class seven. At 95 % CI and shorter time, the control group were better in stunting by 0.14 points compared to treatment albeit not significant. For longer time, TASAF CCT program through health conditionality compliance reported 0.31 points reduction in stunting significant at 95 % CI.
Conclusion: The results reveal that for the short time, CCT health conditionality does not result in reducing stunting in under-five children. However, given the longer time (more than five years), CCT health conditionalities have the potential to reduce stunting in children and improve children's health status. The study recommends compliance with CCT program conditionalities as one among the means of improving under-five children's health status. Furthermore, the study urges policy makers to rely on longer-time children's health outcomes for policy decisions as shorter time reveals negative and non-significant.

1. Introduction

Developing countries encounter numerous challenges associated with poverty and inequality, such as limited access to education and healthcare [1–4]. A significant proportion of the population in these countries live below the poverty line, which makes it difficult for them to access quality health care services, resulting to several health problems [5,6]. Health problems associated with growth are mostly prevalent in developing countries despite several efforts done; even a decrease in these problems is still at a low rate to reach a status free from these problems [7].

Various interventions, such as programs aimed at improving water supply, sanitation, nutrition, education, and others, have been implemented to address developmental issues in developing countries. Some are currently ongoing, while others have been completed [8]. Despite the efforts made, health problems derived from poverty are still prevalent, which doesn't reflect the achievement of the Sustainable Development Goal (SDGs) by 2030 [7]. These problems affects much children who are vulnerable to the difficulties in growth including poor household's living standard [9]. Ineffective reduction of poverty will not only result in intergenerational poverty but also in other irreversible problems, such as child stunting – a problem resulted from poor nutrition. Stunting – unlike other children's nutrition problems like children being underweight and wasting – has long-term effects that can result in irreversible physical and cognitive developmental delays, which can impact a child's health and well-being throughout their life [10–12]. In that regard, necessary measures and efforts are to be taken focusing on stunting given the available resources.

Conditional Cash Transfer (CCT) programs have been widely used as a means to reduce poverty and inequality problems by imposing conditions [13–15],[15–18] – sometimes the conditions are referred to as conditionalities or co-responsibilities between beneficiaries and CCT programs [19,20]. The conditions compel some beneficial behaviors in either education or health for the poor households. In health conditionalities, groups that are given priorities include elders, pregnant women, those with chronic illnesses, as well as children through compliance [21–23]. The most significant health conditionality for children's health, which requires compliance, is clinic visits – postnatal

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clinics – where monthly attendance is required, but at least six times annual visits is considered as compliance. This facilitates preventive health for children, where vaccinations are completed, and children's mothers are given health and nutritional training [20,24,25]. It is agreed that these programs have the potential to improve children's health and reduce undernutrition health problems such as children's stunting [4,17,18,26–28]. The challenge remains how this can be achieved, which requires a strong theory of change analysis [4].

In Tanzania, TASAF is the full-scaled CCT implemented in phases throughout the country. TASAF targeted poor families, similar to other CCT programs in Africa, Asia, and Latin America [4,16,24,29]. TASAF has been implemented in phases, where its third phase with conditionalities was names Productive Social Safety Net (PSSN) to make TASAF-PSSN [24,30]. Eligible households were all poor households who successfully passed the targeting process. Eligibility involves a community-based targeting approach to create an initial list of the most impoverished and vulnerable households. Then, a proxy means test (PMT) is used to assess the eligibility of the households on the preliminary list. The process is designed to guarantee that the TASAF-PSSN reaches the most vulnerable households [29,30]. Eligibility was inclined to the household as a whole to receive the unconditional transfer, while other additional funds are given based on some conditions, such as school attendance for children and care for children under five [24,29,30]. The conditions are the criteria for subsequent payments, where payments and conditionalities compliance check are done six times a year – once every two months. This additional amount is given based on compliance with the conditions, normally called co-responsibilities or conditionalities [20,29–31].

Previous studies regarding CCT programs and children's stunting have reported both positive evidence, mixed results, and even static results in children's stunting [4,26,32]. Moreover, the studies were either for a short time or focused on the children's health status holistically and provided little detail for evidence regarding CCT health outcomes in children [4,26,27]. These studies might be derived from a weak theory of change, making it difficult to provide a clear picture of how and why outcomes are achieved or not [4,27]. Thus, this study examines the impact of CCT program conditionality on children's stunting for both the short and longer term. The study further asks whether the stunting outcomes obtained in the short term are stable throughout the longer term – whether there are differences in stunting outcomes over time.

2. Methods

2.1. Study area

The study was conducted in two rural districts, Chamwino and Kongwa, in the Dodoma Region. The area was selected due to the fact that Dodoma Region is fully covered by TASAF PSSN – the CCT program scaled throughout the country – implementation and having a large number of beneficiaries [3,30,33–35]. Additionally, poverty is highly prevalent in the area, and there have been reports of high incidences of nutritional problems. Moreover, the poor are found in rural areas where about 80% resides [36,37].

2.2. Data collection and accessibility

The study was conducted using data from TASAF PSSN, a fully-scaled CCT program in Tanzania. Data collected covered both the treatment group (beneficiaries of the program) and the control group (non-beneficiaries) who were not eligible during targeting process. As the CCT program does not keep records of children's clinic attendance, the authors obtained the data from clinic cards in a particular household which consisted of a child's height (cm), weight (kg), and age (months), among other details. Locating households was done with the help of the village chairperson, health officer at the community level, TASAF Monitoring Officers (TMOs), and facilitators at the district level (Waratibu at the district level). In some areas, District Medical Officers (DMOs) provided approval support to ensure accessibility of the clinic cards during clinic visits. Children data were limited to households with worthy index (Proxy Means Test (PMT)) scores, closer to the cutoff point implemented by TASAF PSSN. A total of 617 children's data was collected; 242 children belonging to treatment households and 375 children belonging to the control group.

2.3. CCT conditionality and poor household children stunting

Health conditionality in this study was clinic attendance in health facility centers where children mothers are mostly responsible to ensure attendance – conditionality compliance. Health facility centers have scheduled clinics for every child under five once every month, which are accommodated on any of the clinic days within a week. In this study, height-for-age Z score (HAZ) was used as a measure of stunting, with a Z score of less than −2 indicating stunting and a Z score greater than or equal to −2 indicating no stunting. To facilitate interpretation of the data, a Z score of 06 and a (0,1) for treatment and control was used. Specifically, a child was categorized as "stunted" if their HAZ was less than −2, and as "not stunted" if their HAZ was greater than or equal to −2. This approach allowed for a clear and standardized categorization of the children's growth status based on their HAZ scores.

2.4. Statistical analysis

After coding the data in Stata 15.1, descriptive statistics were generated to provide a summary and trend of the data. In order to perform inferential statistics on the children in households with The Proxy Means Test (PMT) scores around the cutoff point, the regression discontinuity design (RDD) was employed. The RDD method was chosen as it allowed for a comparison between households that were eligible to be enrolled in the program with those ineligible for enrollment after being slightly above the cutoff point. Overall, the statistical analysis provided insight for the impact of the CCT program conditionality compliance on stunting among children in households with PMT score around the cutoff point, which can be used to inform future policies and interventions aimed at improving child health outcomes. The PMT score was a running variable centered at the cutoff point where intercepts were interpreted as the predicted average effect for household's children stunting given TASAF PSSN health conditionality compliance. The following RDD equations as given by Deke and Dragoset [38] guided the study.

$$Y_{ij} = \alpha_L + \beta_L X_{ij} + \mu_j + \varepsilon_{ij}\{i, j | X_{ij} \leq c\} \quad (1)$$

For Treatment group (with PMT score index below or equal to the cutoff point)

$$Y_{ij} = \alpha_R + \beta_R X_{ij} + \mu_j + \varepsilon_{ij}\{i, j | X_{ij} > c\} \quad (2)$$

For Control group (with PMT score index above the cutoff point)

$$\tau = \alpha_L - \alpha_R \quad (3)$$

Where:

Y is the Household children stunting.

X is the PMT score.

μ is the contextual factor

Ɛ is an error term for the location j and household i

α is the constant term for Control and Treatment (Left and Right of the Cut point)

τ is the average stunting effect given an intervention (CCT program with health conditionalities)

Due to their negligible substantive impact on the result of interest, control variables such as age, sex, and mothers' education were excluded from the RDD regression analysis [39–41].

3. Results

Descriptive statistics have been presented in Fig. 1, Fig. 2, Fig. 3 and Table 1. Children's mothers'/guardian's education has been found to be mostly non-educated. Most of them completed class four with 33 % and 23 % for control and treatment groups, respectively, as shown in Fig. 1. The other predominant group is that of mothers who never went to school (none), accounting for 9 % and 5 % in the two groups (control and treatment); similar to class twelve, which is represented by 11 % and 4 % for control and treatment groups, respectively. Again, the results in Table 1 provide sex proportions of the children involved in the study: out of 617 children for control and treatment groups, 293 were male whilst 324 were female.

Stunting and non-stunting trend for the two groups – control and treatment – has been presented in Figs. 2 and 3 for the time involved in this study (2016, 2018/2019 and 2021). The results reveal that, for children who are non-stunted, the control group exhibits a gradual increase in percentage over time, followed by a very slight upward trend. On the other hand, the treatment group displayed a distinct decrease in percentage from time zero to time one, followed by a slight plateau similar to the control group's trend. For children who are stunted, the treatment group depicts an upward trend followed by a slight downward trend, while the control group starts with a downward trend followed by a slight upward trend.

Inferential statistics results have been presented in Fig. 4, Fig. 5 and Table 2. The graphical results (Fig. 4) depicts a minor discontinuity at the cut-off point for time zero to time one while Fig. 5 presents the effect for extended time (zero to two). The stunting status for children in households that were not enrolled in the program (control group) was found to be 0.14 points better than that of children in the households enrolled in the program (treatment group); but this difference was not statistically significant at the 95 % confidence interval (CI) (PE=0.142, p=0.1580). Extending the time, the HAZ value reported to be −0.31 significant at 95 % CI (PE=−0.3148, p<0.000) as indicated in Table 2.

4. Discussion

Children mother's education has been reported to effect children's health status [10,42,43]; higher education better health outcomes. Unfortunately, the education pattern of children's mothers in this study reflects low rates of school completion, with many individuals only attaining primary education. The majority of mothers have only completed up to class seven, with many not continuing with their education beyond this point. A larger group of mothers have either received

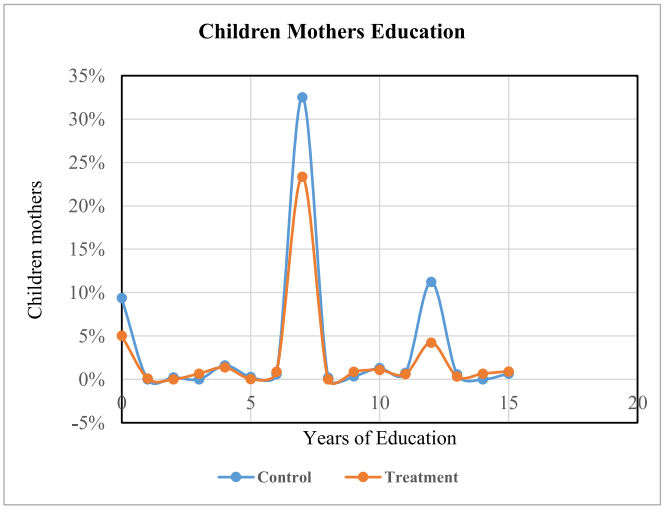

Fig. 1. Children's mothers education.
Source: Survey research & TASAF PSSN data 2021/2022

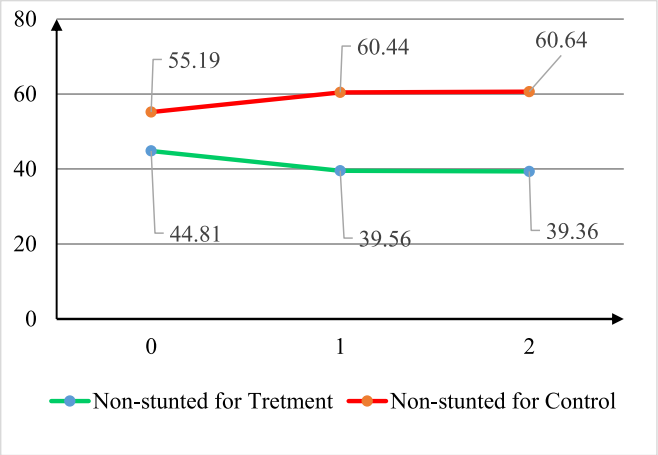

Fig. 2. Non stunted for treatment and control household children.
Source: Survey research & TASAF PSSN data 2021/2022

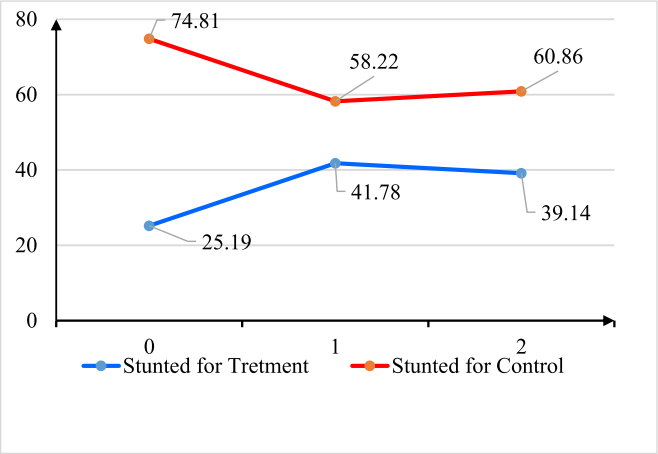

Fig. 3. Stunted for treatment and control household children.
Source: Survey research & TASAF PSSN data 2021/2022

Table 1
Children's sex - Treatment and Control.

Group	Child's sex		Total
	Male	Female	
Treatment	124	118	242
Control	169	206	375
Total	293	324	617

Source: Survey research & TASAF PSSN data 2021/2022

no formal education or completed only lower-level secondary school, equivalent to year twelve of schooling. This is similar to observations made by other reports on education in poor countries [44,45]. Non-stunted trends are consistent with the normal variation observed in stunting over time, similar to what was noted by other studies [26,46]. Descriptive results for stunting have shown variations in the trend over time which is a well-known phenomenon reported in other studies [46]. Children in the control group have been better off in terms of stunting from time zero to time one. These results are consistent with the results by the National Nutrition Council (NNC) [47], which reported that children in control households had better stunting status than those in treatment households.

The graph in Fig. 4 indicates a minor discontinuity at the cut-off point, suggesting a minor average change in stunting as a result of

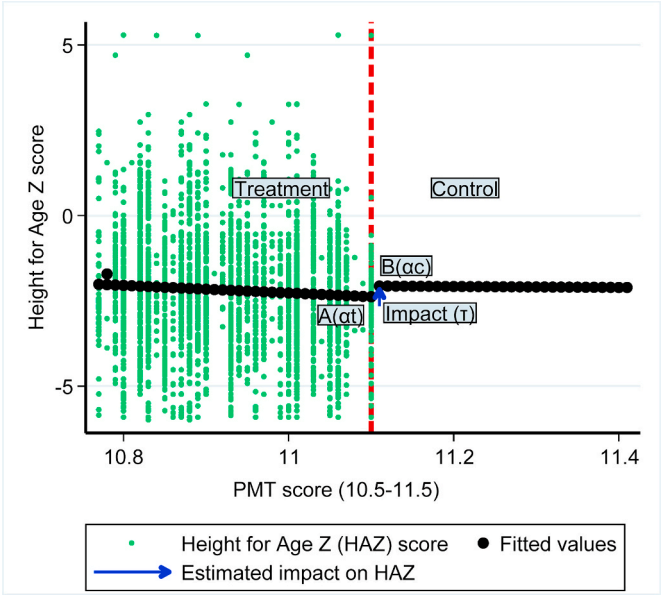

Fig. 4. Conditions compliance effect on household's children stunting (HAZ) from 2016/2017 to 2018/2019.
Source: Survey research & TASAF PSSN data 2021/2022

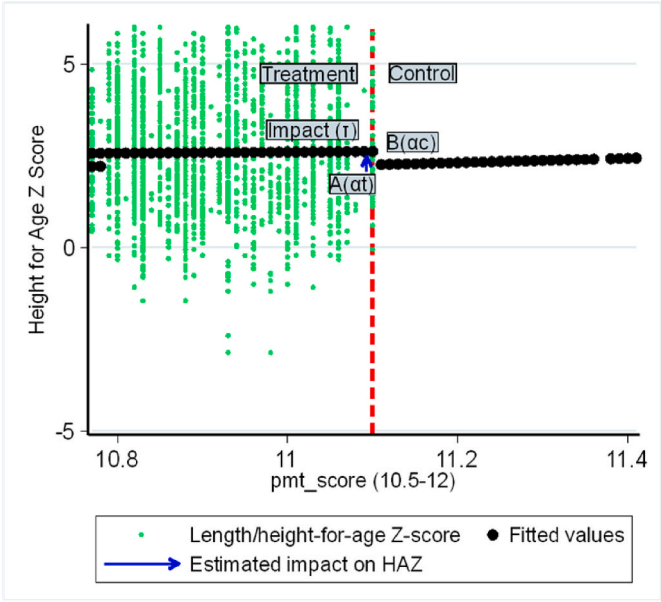

Fig. 5. Conditions compliance effect on household's children stunting (HAZ) from 2016/2017 to 2020/2021.
Source: Survey research & TASAF PSSN data 2021/2022

Table 2
Conditions compliance effect on household's children stunting from 2016/2017–2018/2019.

HAZ	Coef.	Std. Err	P-values
enrolled	0.14283	0.10104	0.1580
Proxy Means Test _score left	0.67707	0.41711	0.1050
Proxy Means Test	0.93563	0.53733	0.0820
_cons	−2.36459	0.06477	0.0000

Number of Obs = 5383; R^2 =0.0014; F(3,5379)=2.55.
Source: Survey research & TASAF PSSN data 2021/2022

program conditionalities compliance, given that the two groups were on average similar during targeting. This change indicates a deviation from the normal – a shift towards low values – reflecting an increase in stunting. The results imply that children in the treatment group do not exhibit a better stunting status compared to the control group. This might be attributed to the observed slightly better education of mothers in the control group compared to those in the treatment group. This fact was reported by other similar studies where educated mothers were having children with better health status [11,48–50]. The results show no statistically significant difference between the treatment and control groups in children's stunting, which is consistent with other studies [49,51,52]. This suggests that the control group had a better stunting status than the treatment group from time zero to time one – the shorter time – where the control group children were better in stunting by 0.14 points. Similarly, other studies – though some in a slightly different setting [46,53–55] – observed comparable results, where a negative or no effect on stunting was realized.

Extending the time period to time two, both treatment and control groups showed a similar downward trend in stunting status, as illustrated in Fig. 5. The graph also indicates a small positive average treatment effect for HAZ, with a minor improvement in stunting status observed around the cut-off point, reflecting the impact of conditionalities in the TASAF CCT program. These results support the intended objective of CCT programs, which is to improve the anthropometry and health outcomes of children under five, as concluded by Awojobi [56]. The results might be attributable to nutritional training, mostly provided during clinic visits, where the treatment group's visitation is in compliance with health conditionalities. These results are consistent with findings in other studies [18,32,46].

Although these training programs facilitate the accumulation of health human capital development, the low level of education among most of the children's mothers creates challenges in knowledge assimilation as well as implementation. Similar limitations have been reported in other studies where better results are obtained through brainstorming, sharing, and offering training materials such as booklets, training guidebooks, leaflets, and other materials. These limitations become more pronounced for non-educated mothers, especially those who have completed none of their schooling [31,57–60].

Table 3 indicates the average effect of TASAF CCT program's health conditionalities compliance on children's stunting. On average, children from households enrolled in the program (treatment group) will have a 0.31 point better position in stunting compared to the control group. This improvement might be due to the knowledge and capacity gained for food diversity through training when beneficiaries utilize health services offered in tandem with cash especially during clinic visits [53,61,62]. The results are consistent with other studies [48,63,64] where cash transfers reduced incidences of children's stunting. The above discussed results inform about the difference in the time dimension and its significance in realizing intervention effects on children's stunting and other third-order health outcomes. Moreover, the results provide insights into the necessity to improve healthcare access and smoothen health facility service utilization for preventive health, which normally includes training on breastfeeding and other nutritional aspects. Additionally, proper dieting for the entire household, and specifically for

Table 3
Conditions compliance effect on household's children stunting covering from 2016/2017 to 2020/2021.

HAZ	Coef.	Std. Err	P-values
enrolled	−0.31481	0.070983	0.0000
Proxy Means Test _score left	−1.10498	0.300758	0.0000
Proxy Means Test _score right	−0.13915	0.37515	0.7110
_cons	−2.06492	0.046579	0.0000

Number of Obs = 8103; F(3,8099)=7.52; R^2 =0.0028.
Source: Survey research & TASAF PSSN data 2021/2022

children under five using locally available dietary options in the rural area, is also provided during clinic visits [18,32,46,56,65].

5. Conclusion

In conclusion, the study highlights the importance of compliance with health measures for the success of CCT programs in reducing stunting among poor children. However, the study also cautions against relying on short-term CCT evaluations regarding children's health status measures. In the short term, the study found a negative effect on reducing stunting, unlike the longer term, which is more reliable. Overall, the study's findings provide important insights for the design and implementation of CCT programs with health conditionalities, and underscore the need for compliance with health conditionalities to benefit children's health status. This helps in disrupting intergenerational poverty among poor households in developing countries worldwide in the long run. The study recommends that policymakers and program implementers ensure strict compliance with health conditionalities for children under five and base their respective health policy decisions on evidence from longer time health outcomes. On the other hand, in Tanzania and similar contexts, like that of African countries, long-term efforts at various dimensions are underway to ensure improvements in both the design of the programs and integration with other food and nutritional programs for easy access to nutritious foods [58,65–68]. Additionally, efforts are being made to connect them with social registry systems that facilitate easy identification and quick access to social services [65,66]. These reports and efforts provide insights on where to focus when making evaluations for the success of these intervention struggles.

Ethical approval

The study was approved by the University of Dodoma.

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CRediT author statement

MDR Conceptualized the study and writing the original draft under supervision of ABSM and JJM. MDR, ABSM and JJM were directly and indirectly involved in methodology, formal analysis, review and editing of the manuscript.

Declaration of competing interest

The author(s) declare that they have no potential conflicts of interest with respect to the research.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.puhip.2023.100437.

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