Unconditional Cash Transfers Do Not Prevent Children’s Undernutrition in the Moderate Acute Malnutrition Out (MAM’Out) Cluster-Randomized Controlled Trial in Rural Burkina Faso

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Abstract
Background: Limited evidence is available on the impact that unconditional cash transfer (UCT) programs can have on child nutrition, particularly in West Africa, where child undernutrition is still a public health challenge.
Objective: This study examined the impact of a multiannual, seasonal UCT program to reduce the occurrence of wasting (weight-for-height, midupper arm circumference), stunting (height-for-age), and morbidity among children <36 mo old in Tapoa Province, in the eastern region of Burkina Faso.
Methods: The study was designed as a 2-arm cluster-randomized controlled trial, with 32 villages randomly assigned to either the intervention or the control group. The study population comprised households that were classified as poor or very poor according to household economy approach criteria and that had ≥1 child <1 y of age at inclusion. The intervention consisted of seasonal UCTs, provided monthly from July to November, over 2 y (2013 and 2014). A monthly allowance of 10,000 West African Financial Community of Africa francs (~US$17) was given by mobile phone to mothers in participating households. Anthropometric measurements and morbidity were recorded on a quarterly basis.
Results: We found no evidence that multiannual, seasonal UCTs reduced the cumulative incidence of wasting in young children [incidence rate ratio: 0.92 (95% CI: 0.64, 1.32); P = 0.66]. We observed no significant difference (P > 0.05) in children’s anthropometric measurements and stunting between the 2 groups at the end point. However, children in the intervention group had a lower risk [21% (95% CI: 18.6%, 21.3%); P < 0.001] of self-reported respiratory tract infections than did children in the control group.
Conclusions: We found that seasonal UCTs in the framework of safety nets did not result in a significant decrease in the incidence of acute malnutrition among children in Tapoa Province. Cash transfers combined with complementary interventions targeted to child nutrition and health should be investigated further. This trial was registered at clinicaltrials.gov as NCT01866124. J Nutr 2017;147:1410–7.

Keywords: seasonal unconditional cash transfers, children, Burkina Faso, nutritional status, morbidity

Introduction
Child undernutrition remains a serious health problem in developing countries, especially in West Africa, where it is still a public health challenge (1). Although encouraging progress has been made in reducing the proportion of hungry people and the number of undernourished people in the past 2 decades, 4.95 million children <5 y of age in West Africa are still wasted (2). West African countries with a sub-Saharan tropical climate have a wet season from June to September and a dry season during the remaining 8 mo. Trends in children’s morbidity and nutritional status vary according to these seasons, with increased rates during the rainy season (3, 4). Among West African children <5 y of age, 20% are underweight (2), and the prevalence of acute malnutrition is 9%, nearly reaching a value constituting a public health emergency (5). Given that acute malnutrition is associated with increased risks of morbidity and mortality (6), effective interventions are urgently needed. The introduction of the community-based management of acute malnutrition model in many sub-Saharan African countries, including the use of ready-to-use therapeutic foods, made the treatment of acute
malnutrition more accessible and convenient to beneficiaries (7). However, low coverage of scaled-up community-based management of acute malnutrition programs in a number of countries implies that room for improvement remains (8). Complementary strategies aimed at preventing acute malnutrition can therefore play an important role.

During the past decade, social safety nets and cash-based interventions have gained attention in developing countries. Cash transfer programs are increasingly implemented in emergencies (9–12) and in developing contexts (13–15) to alleviate poverty and food insecurity in vulnerable households. Large-scale conditional cash transfer programs first showed efficacy in Latin America, improving food security (16), health care utilization (17–19), health outcomes (20), and child nutritional status (21, 22). Less evidence is available regarding unconditional cash transfers (UCTs). Only a few studies, to our knowledge, showed positive effects of UCTs on food access and diversity (13, 14), health expenditures (13), and preventive visits to health centers (23). In the 2013 *Lancet* series on child and maternal health, cash transfer programs designed with a nutritional objective were highlighted as having the potential to prevent child undernutrition (24). To date, however, few rigorous studies have evaluated the impact of UCTs on child nutrition. On the basis of the comprehensive conceptual model of undernutrition proposed by Black et al. (6), the MAM*Out* (Moderate Acute Malnutrition Out) study implemented in rural Burkina Faso was intended to influence several underlying causes of undernutrition during the lean season, when the prevalence of undernutrition is high, by delivering a cost-efficient intervention. The study aimed to assess the impact of a cash transfer program in reducing the incidence of acute malnutrition and morbidity and the prevalence of stunting in children <36 mo old.

**Methods**

**Study design and participants.** Burkina Faso is a landlocked country located in the Sahel region of West Africa. A national social protection policy that promotes social transfer mechanisms to the poorest and most vulnerable was adopted in 2012 to enhance food security among the population (25). The study was carried out in the north of Tapoa Province, which is characterized by inappropriate child feeding practices (such as nonexclusive breastfeeding and low diet diversity after 1 y of age) and insufficient access to sanitation and safe water (26, 27).

The study was designed as a 2-arm cluster randomized controlled trial, in which 32 villages in 3 municipalities were randomly assigned to either the intervention (*n* = 16) or the control group (*n* = 16). With a type I error of 5%, a statistical power of 90%, and a minimum follow-up time of 24 mo, assuming a 33% reduction in the cumulative incidence of wasting, a CV of 0.25, and an anticipated 25% dropout, 16 clusters with 50 children were required in each study group (28). Villages were randomly assigned to the intervention and control groups during a ceremony in order to keep the allocation of cash transparent and fair. Representatives of each of the 32 villages drew blindly from a bag one of the 32 identical papers with “cash” or “no cash” written on it.

Within villages, household participation in the study was voluntary and based on the following inclusion criteria: household classified as poor or very poor according to household economy approach criteria (29), and ≥1 child <1 y old in the household at inclusion, regardless of his or her nutritional status. Study objectives and implementation were explained to both wives and husbands, and informed consent was obtained from the heads of household by signature or fingerprint.

**Intervention.** Before the MAM*Out* study, a needs assessment was conducted in 2 steps at the end of 2012: an analysis of the causes of undernutrition using nutrition causal analysis methodology (30), and formative research related to the cash transfer intervention. Results of the nutrition causal analysis showed that financial insecurity of women, birth spacing, and access to potable water were perceived causes of malnutrition (31). Based on the existing literature and reports from the study area, we constructed a theoretical framework of pathways through which cash transfers can affect acute malnutrition. The hypothesized framework was that handing out cash during the lean season can ensure that the direct determinants of child nutrition (child food intake, child care, and child morbidity) are safeguarded (28). The formative research assessed the relevance of a cash-based intervention and provided detailed operational guidance on the study area, the target population, the type of cash transfer, the seasonality, the amount of the cash transfer, and the delivery mechanism.

The intervention consisted of seasonal UCTs provided monthly from July to November over 2 y (2013 and 2014) (28). This period partly overlapped with the annual rainy season (May to August), perceived as the “hunger” season because of the cereal shortage observed at the household level (4, 32). Because there was no national transfer size defined for cash transfer programs in Burkina Faso, the MAM*Out* transfer size was defined during formative research performed jointly with the Action Against Hunger operational team in Burkina Faso, and was based on previous cash transfer experiences in Burkina Faso and in the sub-Sahara African countries. A monthly allowance of 10,000 West African Financial Community of Africa francs (XOF) (≈US$17) was given by mobile phone (offered by the project) to participating households. Over 1 y, a total amount of 50,000 XOF (≈US$85) was transferred to each eligible household, representing ~33% of the 2014 national poverty line, estimated at 153,530 XOF (≈US$260) (33). On average, the grant value allowed coverage of the survival gap and 85% of the livelihood gap for the very poor households, and the entire livelihood gap of poor households. We specifically designated mothers as the primary recipients of the transfer because they are usually in charge of child care (34). Mothers were told that the cash was given to them to support their child’s development and to prevent malnutrition.

A dedicated team supervised and followed up cash transfer activities jointly with the research team. A partnership with a mobile phone company enabled cash distribution via mobile phone. Before the intervention, all mothers in the intervention group received an identity card provided by the field teams, a mobile phone, and a subscriber identification module card linked to an electronic account. At the time of distribution, mothers received a text message providing a code and notifying them that their account was credited. Mothers were thus invited to visit cash withdrawal points to collect their money. Presentation of the identity card and the code granted access to the money. Mothers confirmed the cash withdrawal by signing follow-up lists. All study participants in the intervention group (100%) received their monthly allowance within a week’s time. Operational constraints such as mothers’ limited knowledge about the use of mobile phones, difficulty charging the mobile phones because of the lack of electricity, and low literacy rate among mothers were encountered during the delivery of cash. Sessions demonstrating basic uses of a

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Abbreviations used: BCC, behavior change communication; HAZ, height-for-age *z* score; MAM*Out*, Moderate Acute Malnutrition Out; MUAC, midupper arm circumference; SES, socioeconomic status; UCT, unconditional cash transfer; WAZ, weight-for-age *z* score; WHZ, weight-for-height *z* score; XOF, West African Financial Community of Africa franc.
moible phone, home visits by cash transfer supervisors to inform households about the scheduled dates for cash transfers, switching subscriber identification module cards from one phone to another at cash withdrawal points, and direct transfers in remote villages were mitigation strategies put in place to tackle these difficulties.

Mothers of children in the control group did not receive a cash grant. Incentives (e.g., a cooking kit, fabrics) were given to households in the control group to compensate for the time they spent answering the MAM’Out questionnaires. In addition to approval by the ethics committee of the Ghent University Hospital (Belgium) and the Burkinabe national ethics committee, administrative authorities and all heads of villages gave their consent before the study began. The trial was registered at clinicaltrials.gov as NCT01866124.

Measurements. Trained fieldworkers performed quarterly home visits to collect data. A pretested questionnaire was used to collect socioeconomic (education, occupation, and asset ownership) and demographic data on a biannual basis, whereas anthropometric and morbidity (diarrhea, fever, and respiratory tract infections) data were collected on a quarterly basis. All anthropometric measurements were taken in duplicate by team members. The mean of the 2 values was used for analysis. A diarrheal episode was defined as having ≥3 loose stools within a day. A tactile assessment technique was used to identify fever. A respiratory tract infection episode was defined as persistent cough and/or quick or difficult breathing. Morbidity episodes over the past 7 d were recalled by mothers. Child age at recruitment was estimated from a birth certificate or using a locally adapted special events calendar. The protocol provides more details on the measurement tools and standardization procedures used to ensure good data quality (28). Baseline data were collected 1 mo earlier in the intervention group than in the control group in order to enable cash transfer to start on time. Follow-up visits were performed at the same time in the 2 groups. Data collection lasted 29 mo (June 2013 to October 2015).

Weight-for-height z score (WHZ), height-for-age z score (HAZ), and weight-for-age z score (WAZ) were calculated according to 2006 WHO growth standards in order to conform with the Burkinabe national protocols for the management of acute malnutrition. Wasting was defined as a WHZ < −2 or the presence of bilateral pitting edema, stunting as a HAZ < −2, and underweight as a WAZ < −2 (35). All children identified as wasted were referred to the nearest health centers for adequate nutritional care, per national protocol. If a child was absent from home, another home visit was planned within the round of data collection to ensure complete measurements of the child. In the case of a child’s death, a verbal autopsy was adapted from WHO standards (36, 37).

![FIGURE 1 Moderate Acute Malnutrition Out study flow diagram.](https://academic.oup.com/jn/article-abstract/147/7/1410/4743674)
In the first round, data were collected on paper forms and entered in duplicate using EpiData version 3.1 (EpiData Association) by 2 groups of data clerks. From the fifth round on, we switched to computer-assisted personal interviews with tablets using an open data kit application (Core ODK; Department of Computer Science and Engineering, University of Washington) to allow real-time follow-up of collected data. The lot quality assurance sampling method was applied on a monthly basis to ensure both good-quality data collection and data entry.

### Statistical analysis

Our primary outcome was the cumulative incidence of wasting. Secondary outcomes included the mean WHZ change over time, the mean HAZ change over time, the prevalence of stunting at the end point, and the cumulative incidence of morbidity episodes (28). z scores were calculated using the zscore06 command in Stata 14.2 (38).

We described baseline characteristics using proportions, means, and SDs. A household socioeconomic status (SES) proxy was created using a principal component analysis based on declared asset ownership, which was recorded as a binary variable (possessed or not) and collected throughout the intervention. A principal component analysis was applied to 20 asset indicator variables that showed a relevant contribution (>10% of the variability of the component) to the combined SES score factor. The first principal component (explaining 18% of the variation in the data set) with the highest eigenvalue (3.61) was categorized into tertiles (low, middle, and high) and used as a proxy indicator for the household SES (39).

### Results

A total of 1278 children from the 32 selected villages were enrolled in the study in May 2013, after their parents gave informed consent at home. During the course of the study, 99 children, of whom 57.6% were in the intervention group, dropped out for different reasons, mainly related to child death or leaving the study area (Figure 1).

A total of 1250 children aged 0–15 mo from 1162 households (630 children in the intervention group and 620 children in the control group) provided ≥2 measurements and were accounted for in the analyses. This sample size was equivalent to the necessary size required to ensure enough statistical power. Overall, baseline characteristics were balanced between the intervention and the control groups (Table 1). Children in the intervention group were more likely to be 1 mo younger and more wasted than children in the control group. At study enrollment, among all children enrolled, ~31.7% were <6 mo old, and 8% were aged ≥12 mo.

Children contributed to 15,394 and 14,458 mo of follow-up in the intervention and control groups, respectively (Table 2). The nonresponse rate was similar in the intervention (2.17%) and the control groups (2.21%) (P = 0.93). We observed no difference in the mean change in WHZ in the intervention and the control groups over the 24 mo of follow-up. We found no difference in the incidence of wasting episodes in the intervention and the control groups [incidence rate ratio: 0.92 (95% CI: 0.64, 1.32); P = 0.66]. Similar results were obtained when we broke down the analysis for moderate and severe wasting, and by sex (data not shown). The longitudinal analysis of child MUAC showed results similar to those for WHZ, with the absence of a difference in the mean MUAC change over time (−0.02 mm/mo (95% CI: −0.08, 0.02 mm/mo); P = 0.33). The mean change in HAZ was similar (P = 0.78) in the control and the intervention groups over the 24 mo of follow up. The odds of stunting at the end of the intervention in the 2 groups [OR: 0.73 (95% CI: 0.47, 1.14); P = 0.17] was comparable.

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**Table 1** Baseline characteristics of children enrolled in the MAM’Out study

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Control arm (n = 620)</th>
<th>Intervention arm (n = 630)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child’s age, mo</td>
<td>7.79 ± 2.93</td>
<td>6.83 ± 3.29</td>
</tr>
<tr>
<td>Child’s age categories</td>
<td>&lt;6 mo: 161 (26.0)</td>
<td>236 (37.5)</td>
</tr>
<tr>
<td></td>
<td>6–11 mo: 296 (48.3)</td>
<td>358 (56.8)</td>
</tr>
<tr>
<td></td>
<td>12–15 mo: 102 (16.7)</td>
<td>36 (5.7)</td>
</tr>
<tr>
<td>Child’s sex</td>
<td>Male: 313 (50.5)</td>
<td>349 (55.4)</td>
</tr>
<tr>
<td></td>
<td>Female: 307 (49.5)</td>
<td>281 (44.6)</td>
</tr>
<tr>
<td>Child’s anthropometric measurements</td>
<td>Weight, kg: 6.7 ± 1.12</td>
<td>6.3 ± 1.22</td>
</tr>
<tr>
<td></td>
<td>Height, cm: 65.8 ± 4.25</td>
<td>64.4 ± 5.10</td>
</tr>
<tr>
<td></td>
<td>MUAC, mm: 133.1 ± 11.7</td>
<td>131.3 ± 12.8</td>
</tr>
<tr>
<td></td>
<td>WHZ: −1.07 ± 1.12</td>
<td>−1.24 ± 1.23</td>
</tr>
<tr>
<td></td>
<td>HAZ: −1.33 ± 1.24</td>
<td>−1.18 ± 1.44</td>
</tr>
</tbody>
</table>

Wasting among children

- Wasted children with WHZ < −2: 119 (19.2) vs 164 (26.0)
- Severely wasted children with WHZ < −3: 22 (3.55) vs 44 (7.00)
- Wasted children with MUAC < 125 mm: 82 (13.2) vs 115 (29.2)
- Severely wasted children with MUAC < 115 mm: 19 (3.29) vs 39 (9.92)

Stunting among children

- Stunted children with HAZ < −2: 169 (27.2) vs 175 (27.7)
- Severely stunted children with HAZ < −3: 56 (9.03) vs 64 (10.1)

Households’ SES category

- Low: 248 (40.1) vs 288 (45.7)
- Middle: 205 (33.1) vs 224 (35.6)
- High: 166 (26.8) vs 118 (18.7)

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1. Data are frequencies (percentages) or means ± SDs. HAZ, height-for-age z score; MUAC, midupper arm circumference; SES, socioeconomic status; WHZ, weight-for-height z score.
2. MUAC was measured in children ≥6 mo old.
3. SES data were missing for 1 child in the control group.
Children in the intervention group had a lower risk [21% (95% CI: 18.6%, 21.3%); P < 0.001] of self-reported respiratory tract infections than did children in the control group (Table 3). No difference in other self-reported morbidity outcomes was observed between the study groups. Death incidence was similar between the 2 groups [incidence rate ratio: 0.95 (95% CI: 0.92, 1.02); P = 0.308] (data not shown).

### Discussion

This study assessed the effectiveness of multiannual, seasonal UCTs to prevent acute malnutrition in young children in Tapoa Province, in the eastern region of Burkina Faso. We were unable to demonstrate a significant reduction in the incidence of wasting among children belonging to households that received the seasonal cash transfers compared with children in the control group. In addition, we did not find any intervention effect on children’s linear growth, resulting in similar odds of stunting at the end of the intervention. However, distributing cash reduced the incidence of self-reported episodes of respiratory tract infections.

The absence of evidence of the impact of the intervention on children’s anthropometrics is consistent with results reported in the few available impact studies of UCTs. Previous randomized controlled intervention studies of UCTs in Zambia, Kenya, and Burkina Faso (after the inception of the MAM’Out study) reported the absence of significant improvements on wasting, stunting, and mean HAZ of children <5 y of age (42–45).

Different reasons could explain the absence of evidence of an effect of the MAM’Out intervention on child anthropometrics. First, the money received by the participating mothers was not (only) used for the child’s needs. Although program staff emphasized during cash distributions and home visits that the money should be used for the targeted child, no mechanism was in place nor conditions imposed to guarantee the exclusive use of the money for the targeted child. Qualitative and study expenditure data collected during the MAM’Out intervention revealed that the first 2 investment domains for the cash received were food and health, not only for the child, but for the whole family. Women reported using approximately one-quarter of the monthly allowance to buy food for the child, whereas the main portion was used to increase the household food stock.

### Table 2

Effect of multiannual seasonal UCTs on children’s anthropometric measurements and their nutritional status

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Control arm (n = 620)</th>
<th>Intervention arm (n = 630)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child wasting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End point of mean WHZ</td>
<td>−0.61 ± 0.93</td>
<td>−0.56 ± 0.95</td>
<td></td>
</tr>
<tr>
<td>Intervention effect on WHZ, z score/mo</td>
<td>Reference</td>
<td>−0.003 (−0.008, 0.003)</td>
<td>0.07</td>
</tr>
<tr>
<td>Cumulative episodes of WHZ &lt;-2, n</td>
<td>542</td>
<td>537</td>
<td></td>
</tr>
<tr>
<td>Child-months observed, n</td>
<td>14,458</td>
<td>15,394</td>
<td></td>
</tr>
<tr>
<td>Episodes per child-month, n (95% CI)</td>
<td>0.045 (0.038, 0.057)</td>
<td>0.039 (0.031, 0.051)</td>
<td></td>
</tr>
<tr>
<td>Incidence rate ratio²</td>
<td>Reference</td>
<td>0.92 (0.64, 1.32)</td>
<td>0.66</td>
</tr>
<tr>
<td>Child stunting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End point of mean HAZ</td>
<td>−1.99 ± 1.04</td>
<td>−1.96 ± 1.03</td>
<td></td>
</tr>
<tr>
<td>Intervention effect on HAZ, z score/mo</td>
<td>Reference</td>
<td>−0.0005 (−0.004, 0.003)</td>
<td>0.78</td>
</tr>
<tr>
<td>OR of the end point stunting⁶</td>
<td>Reference</td>
<td>0.73 (0.47, 1.14)</td>
<td>0.17</td>
</tr>
<tr>
<td>MUAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End point of MUAC, mm</td>
<td>144.2 ± 10.3</td>
<td>144.3 ± 11.0</td>
<td></td>
</tr>
<tr>
<td>Intervention effect on MUAC, mm/mo</td>
<td>Reference</td>
<td>−0.02 (−0.08, 0.02)</td>
<td>0.33</td>
</tr>
</tbody>
</table>

1 Values in parentheses are 95% CIs. HAZ, height-for-age z score; MUAC, midupper arm circumference; SES, socioeconomic status; UCT, unconditional cash transfer; WHZ, weight-for-height z score.
2 Mean ± SD (all such values).
3 Mean ± SD (all such values).
4 CIs are estimated from a mixed Poisson model with cluster, household, and child random effects.
5 CIs are estimated from a mixed Poisson model with random effects, household, and child.
6 Analyzed by using a mixed logistic model with cluster and household as random effects, adjusted for child’s age at baseline, child’s sex, SES at inclusion, and baseline value of the outcome under analysis.

### Table 3

Effect of multiannual, seasonal UCTs on children’s self-reported morbidity

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Control arm (n = 620)</th>
<th>Intervention arm (n = 630)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child-months recalled, n</td>
<td>1261</td>
<td>1266</td>
<td></td>
</tr>
<tr>
<td>Diarrhea</td>
<td>1049</td>
<td>1083</td>
<td></td>
</tr>
<tr>
<td>Episodes, n</td>
<td>2.03 (1.99, 2.08)</td>
<td>1.81 (1.78, 1.85)</td>
<td>0.31</td>
</tr>
<tr>
<td>Incidence rate ratio²</td>
<td>Reference</td>
<td>0.98 (0.96, 1.03)</td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td>2574</td>
<td>2302</td>
<td></td>
</tr>
<tr>
<td>Episodes, n</td>
<td>0.83 (0.80, 0.85)</td>
<td>0.85 (0.82, 0.88)</td>
<td>0.89</td>
</tr>
<tr>
<td>Incidence rate ratio²</td>
<td>Reference</td>
<td>1.00 (0.97, 1.03)</td>
<td></td>
</tr>
<tr>
<td>Respiratory tract infections</td>
<td>1198</td>
<td>1106</td>
<td></td>
</tr>
<tr>
<td>Episodes, n</td>
<td>0.95 (0.92, 0.97)</td>
<td>0.87 (0.84, 0.89)</td>
<td></td>
</tr>
<tr>
<td>Incidence rate ratio²</td>
<td>Reference</td>
<td>0.79 (0.78, 0.81)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

1 Values in parentheses are 95% CIs. UCT, unconditional cash transfer.
2 Calculated by multiplying the number of recalls by the recall duration.
3 CIs are estimated from a mixed Poisson model with cluster, household, and child random effects.
4 Analyzed by using a mixed Poisson regression model with cluster, household, and child as random effects, adjusted for child’s age at baseline, child’s sex, socioeconomic status at inclusion, and morbidity status at baseline.
child cash transfer may not have been enough to cater to both the sequence, this might have diluted the cash-related impact on cash transfers benefited all household members; as a consequence, it might have been insufficient to translate into a sustained improvement in children’s nutritional status. A quantitative 24-h dietary recall implemented during the UCT study reported better dietary quality in children belonging to the intervention group than in children in the control group. More specifically, children receiving the intervention consumed foods from animal sources more frequently and demonstrated higher intakes of vitamins B-12 and E. However, no difference in energy and protein intakes between the intervention and the control groups was observed (A Tonguet-Papucci, F Houngbe, L Huybregts, MA Aissa, C Altare, P Kolsteren, JF Huneau, unpublished results, 2017). The positive effect of the intervention on diet quality might have been too small (in both the percentage of children and the amount of nutrients) to affect child anthropometry. Furthermore, the high number of cumulative morbidity episodes emphasizes the high frequency of illness (Table 3). The cyclic interaction between undernutrition and infections is widely recognized (1, 46, 47). Previous studies showed that diarrheal illnesses can prevent weight gain as well as height gain, with the greatest effects when illnesses are recurrent (48). Infections can further reduce food intake and increase the energy and nutrients needed to fight infection, maintaining tissue repair and constraining body resources to be used for basic maintenance (49, 50). The faltering cumulative growth may have hampered improvements in the children’s nutritional status in both groups. Finally, seasonal UCTs may not have been a sufficient intervention to prevent acute malnutrition in children. Future studies of the prevention of child malnutrition should evaluate cash transfer interventions combined with other child nutrition–sensitive interventions with or without conditions. One possible complementary intervention could be the behavior change communication (BCC) for better nutrition and health, which fosters behavior change at the individual household and community levels through behavior change training, monitoring and evaluation, and a sustainability component (51). The effectiveness of a similar approach (combining cash transfers with nutrition BCC) for the prevention of undernutrition is currently being assessed by the Transfer Modality Research Initiative in Bangladesh (clinicaltrials.gov, identifier NCT02237144).

Multiannual, seasonal UCTs that targeted mothers in vulnerable households in Tapoa Province significantly reduced episodes of respiratory tract infection in the 7 d before the interview, as reported by mothers. Because methods vary among studies, we found it difficult to compare our findings with those of the relatively small body of literature on UCTs. Most studies reported an effect of UCTs on children’s overall well-being and health outcomes, but few looked at the child morbidity indicators as defined by our study. After 24 mo of implementation, the Zambian Child Grant Program reported that the intervention group of children had a prevalence of diarrhea 4.9 percentage points lower than that of the control group, but the program did not find any intervention effect on cough (52). After 2 y of cash transfers in a program for orphans and vulnerable children in Kenya, the evaluation team reported no effect of the intervention on morbidity indicators (diarrhea, fever, and cough) in children ≤5 y old who sought care when sick compared with children belonging to a control group (53). A randomized controlled trial in Malawi did find that children 6–17 y (older than the children in our study) included in a cash transfer program were less likely to be sick (respiratory infections, malaria, and abdominal pain were the most common reported illnesses), but did not provide insights on the pathways (23). Although respiratory tract infection episodes among children in our study were apparently reduced, it is difficult to support our findings with previous evidence. Therefore, the impact pathway for such an effect remains to be elucidated.

Our study has some limitations that need to be addressed. First, the sample size attained was smaller than foreseen, mainly because of logistical constraints (security, accessibility). Loss to follow-up was, however, lower than expected, and the proportion of missing data was small thanks to the extra time invested in additional home visits when the participant was absent. In addition, adjustment for important prognostic covariates prespecified in the protocol likely outweighed the loss of power as a result of the reduction in the sample size (54). Second, child morbidity was recalled by mothers, which could have resulted in underestimation or overestimation. Finally, concerns about contamination between individuals arise when it comes to the distribution of cash or food supplements. We chose a prospective interventional study with randomization at the village level to limit these biases. However, we could not blind the study participants and the fieldworkers to the intervention assignment because of the nature of the intervention (cash).

In conclusion, we did not find evidence of the effectiveness of multianual, seasonal UCTs in preventing acute malnutrition in young children in Tapoa Province. However, the UCTs did result in a reduction in respiratory tract infection episodes. A cash-based program combined with a child nutrition and health BCC component is a good compromise that requires further investigation.

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