



Graduating from food insecurity: evidence from graduation projects in Burundi and Rwanda

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Abstract

Graduation model programmes deliver a package of support to poor households, including cash and asset transfers, training and coaching, and access to savings facilities. They have been shown to reduce extreme poverty but evidence for their impacts on household food security is limited. Drawing on multiple-round evaluations of graduation projects in Burundi and Rwanda, this paper demonstrates statistically significant impacts on several food security indicators, including months of hunger, meals per day and dietary diversity. Importantly, positive impacts were sustained for households that were re-interviewed 2 years after they exited the programme.

Keywords Cash transfers · Dietary diversity · Food security · Graduation model · Impact evaluation · Burundi · Rwanda

1 Introduction

Food insecurity is a persistent challenge, especially in sub-Saharan Africa, where the estimated prevalence of undernourishment fell from 30% to 23% between 2002–04 and 2014–16, but the number of people who are undernourished increased from 204 million to 220 million – contrary to the trend in every other region (FAO, IFAD and WFP 2015: 8). Achieving the second Sustainable Development Goal (SDG 2) – “End hunger, achieve food security and improved

nutrition, and promote sustainable agriculture” is likely to be most challenging in sub-Saharan Africa.¹

Since the late 1990s social protection programmes, especially cash transfers, have proliferated across the world, including in sub-Saharan Africa (García and Moore 2012; World Bank 2015). Social protection programmes alleviate poverty and enable vulnerable people to manage risk. There is also a persuasive body of evidence that they reduce hunger and food insecurity. “In Africa, Asia and Latin America, cash transfers have been shown to improve both the quantity and the diversity of food consumption, and to protect food consumption during shocks or lean periods” (ILO 2014: 155). Conversely, “countries where progress has been insufficient or where hunger rates have deteriorated are often characterised by weak agricultural growth and inadequate social protection measures” (FAO, IFAD and WFP 2015: 14).

There are several pathways from social protection programmes to improved food security (HLPE 2012), where food security can be defined as “secure access by all people at all times to enough food for an active, healthy life” (World

¹ The first two targets under SDG 2 are: “2.1. by 2030 end hunger and ensure access by all people, in particular the poor and people in vulnerable situations including infants, to safe, nutritious and sufficient food all year round; 2.2. by 2030 end all forms of malnutrition, including achieving by 2025 the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women, and older persons” (<https://sustainabledevelopment.un.org/?page=view&nr=164&type=230&menu=2059>. Accessed 10 Dec 2016).

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Bank 1986: 1). Food-based transfers (food aid, school meals, supplementary feeding, food-for-work, food vouchers) can be consumed directly. Cash transfers, which have become common in non-emergency contexts but are also increasingly distributed as an alternative to emergency food aid, can be used for purchasing food or for investing in income-generating activities or food production. Poorer households have a higher marginal propensity to consume incremental income, so social transfers tend to have bigger impacts on food consumption “at lower levels of baseline household food security” (Hidrobo et al. 2014: 2).

Graduation programmes are more complex than mainstream social protection because they combine several instruments, cash transfers being only one. At the conceptual level, graduation programmes implicitly recognise that achieving food and nutrition security is more complex than improving access to food, which is the focus of agricultural interventions that support food production, and of mainstream social protection programmes that deliver food or cash transfers to buy food. Conceptual frameworks for nutrition outcomes identify multiple determinants of malnutrition, only one of which is inadequate food intake – other drivers include inadequate healthcare and sanitation facilities, poor hygiene and childcare practices, and under-educated mothers (Bhutta et al. 2008; HLPE 2017). Graduation programmes have potential to influence several of these drivers, in addition to enhancing access to food. In fact, ‘graduation model’ programmes have greater potential to improve food and nutrition security than is usually realised, through their income effects and non-income effects, as well as synergies among programme components.

The ‘graduation model’ was pioneered in Bangladesh in the early 2000s, through an innovative programme called ‘Challenging the Frontiers of Poverty Reduction – Targeting the Ultra-Poor’ (CFPR-TUP), which was devised and implemented by the non-governmental organisation BRAC. The CFPR-TUP delivers a package of support to ‘ultra-poor’ households over a period of 2 years, including consumption support in the form of monthly cash transfers but also access to savings facilities, asset transfers, livelihood training and regular coaching or mentoring (de Montesquiou and Sheldon 2014). Each component of the graduation model has the potential to contribute to enhanced food security in participating households.

Productive assets transferred by the CFPR-TUP programme are intended to generate streams of income – e.g. from sales of milk or eggs (which can also be consumed as food) when cows or chickens are given to participants – especially when supported by training in asset management and financial literacy, and underpinned by a value chain analysis and strategies to link participants to local markets. The coaching provided by BRAC caseworkers includes nutrition-related behaviour change communication (BCC) that advises participants about the importance of dietary

diversity, exclusive breastfeeding, hygienic practices such as washing hands before cooking and other behaviours that should result in healthier and better nourished families. Thanks to this holistic package of transfers plus personalised support, an evaluation of BRAC’s CFPR-TUP programme recorded a fall in self-reported chronic food deficits among participating households, from about 60% at baseline in 2002 to 20% in 2008 (Hashemi and Umaira 2011: 8).

Enhanced food security is also an explicit objective of graduation-oriented programmes in other countries. For example, graduation from Ethiopia’s ‘Productive Safety Net Programme’ (PSNP), which targets chronically food insecure households, is defined as follows: “A household has graduated when, in the absence of receiving PSNP transfers, it can meet its food needs for all 12 months and is able to withstand modest shocks” (FSCB 2007: 1). An evaluation of the PSNP found that: “Across all households, the food gap – the number of months that the household is unable to satisfy its food needs – fell from 3.6 to 2.3 months” (Berhane et al. 2011: 42). Randomised control trials of graduation model pilot projects in six countries – Ethiopia, Ghana, Honduras, India, Pakistan and Peru – also found statistically significant improvements in several self-reported indicators of food security, including ‘household gets enough food’, ‘no children skipped meals’, and ‘everyone gets two meals every day’ (Banerjee et al. 2015: 772).

Nonetheless, the evidence base on household food security impacts of graduation model programmes remains limited. This paper presents findings from evaluations of two such programmes in central Africa. Our hypothesis was that households participating in the programmes in Burundi and Rwanda would register higher levels of food security than at baseline, in comparison to control group households, and that these improvements would be sustained even after programme support was terminated. To test this hypothesis, seven indicators were monitored before, during and after programme implementation: three indicators of quantity of food consumption (months of hunger, meals per day, and food expenditure), three indicators of quality of food consumption (dietary diversity, consumption of meat and milk, and production of vegetables and fruit), and one subjective indicator of food security outcomes (perceived malnutrition).

Apart from contributing empirical findings from two new countries to the nascent evidence base on this topic, this article builds on the existing literature in two important respects: (1) by comparing a wider range of food security indicators; and (2) by adding a fourth data-point (in Rwanda) 2 years after participants exited from the graduation programme, to assess the sustainability of programme impacts. Beyond these empirical contributions, the case study graduation programmes also offer an opportunity to reflect on the theoretical linkages between social protection and food security.

2 Food insecurity in Burundi and Rwanda

Despite being neighbours and sharing many characteristics, Rwanda and Burundi have followed different trajectories. Rwanda has achieved rapid economic growth since the genocide of 1994, the government and its development partners have invested in social protection, and Rwanda has implemented a national graduation-oriented programme since 2008 – the Vision 2020 Umurenge Programme (VUP). By contrast, Burundi is in protracted crisis and spends only a tiny proportion of GDP on social protection (ILO 2014).

In 2013 Burundi had the highest (worst) Global Hunger Index (GHI)² score out of 120 countries assessed (von Grebmer et al. 2013: 15). More than 70% of Burundi’s population was undernourished, 29% of children were underweight and levels of hunger were described as “extremely alarming” (von Grebmer et al. 2013: 5, 51). Conversely, Rwanda was ranked at 81 out of 120 countries in 2013 by GHI score, <30% of its population was undernourished, 12% of its children were underweight and levels of hunger had fallen from “alarming” in 2005 to “serious” in 2013 (von Grebmer et al. 2013: 9).

It is interesting to note that Burundi and Rwanda had similar prevalence of undernourishment (PoU) rates and GHI scores in 1990 (Table 1). However, while Burundi’s GHI and PoU were both higher in 2013 than in 1990, Rwanda has made significant progress in reducing both (in fact, all four) of the indicators of hunger listed in Table 1. Rwanda’s GHI score has halved and Rwanda is one of the top ten countries in terms of improved GHI score since 1990 (von Grebmer et al. 2013: 5). Nonetheless, food insecurity persists as a serious development challenge in Rwanda as well as Burundi, and the graduation projects discussed in this paper targeted some of the poorest and most food insecure people in both countries.

Local wealth classifications in Burundi and Rwanda include household characteristics that relate to food security. The poorest household categories in rural Burundi (*umutindi* and *umworo*) are landless and don’t produce any food. They rely almost entirely on support from others, so their access to food derives from transfers and the market. (“*They have little choice in what they eat – they eat whatever they can find.*”) The two middle wealth categories (*ntaho nikora* and *umukene*) are deficit food producers who do casual labour to supplement their harvests and bridge seasonal food gaps. (“*When he gets sick he cannot work and cannot eat because he lives on his casual work.*”) The wealthiest households

² “A country’s GHI score is calculated by averaging the percentage of the population that is undernourished, the percentage of children younger than five years old who are underweight, and the percentage of children dying before the age of five” (von Grebmer et al. 2013: 8).

Table 1 Indicators of hunger and food insecurity in Burundi and Rwanda, 1990–2013

Indicator	Country	1990	1995	2000	2005	2013
PoU	Burundi	49.0%	58.4%	63.0%	67.9%	73.4%
	Rwanda	52.6%	60.1%	46.5%	42.1%	28.9%
Underweight	Burundi	34.2%	38.3%	38.9%	35.2%	29.1%
	Rwanda	24.3%	24.2%	22.2%	18.0%	11.7%
U5MR	Burundi	18.3%	17.7%	16.5%	15.3%	13.9%
	Rwanda	15.6%	27.5%	18.3%	10.8%	5.4%
GHI	Burundi	33.8	38.1	39.5	39.5	38.8
	Rwanda	30.8	37.3	29.0	23.6	15.3

Source: Compiled from Von Grebmer et al. (2013), Appendix A

‘PoU’: Proportion of undernourished in the population (%)

‘Underweight’: Prevalence of underweight in children under 5 years (%)

‘U5MR’: Under-five mortality rate (%)

‘GHI’: Global Hunger Index (0 < GHI < 100, higher is worse)

(*abatunzi* and *umukungu*) – a small minority – are surplus producers who harvest more food than they need (Table 2).

3 Evaluation methodology

This article is based on findings from independent impact evaluations, conducted by the Centre for Social Protection at the UK Institute of Development Studies, of two graduation projects implemented by Concern Worldwide, in Burundi (Devereux and Sabates 2016) and Rwanda (Devereux et al. 2015). Household food security was one outcome of interest

Table 2 Community wealth ranking in rural Burundi

Category	Description	Food security
<i>Umutindi</i>	Poorest: physically unable to work, has no family looking after them	Eats only one meal a day, or sometimes nothing all day
<i>Umworo</i>	Poor: physically unable to work, but has family to support them	Eats one or two meals a day, it depends
<i>Ntaho Nikora</i>	Working poor: works but earns too little to escape poverty	Eats twice a day, but does not have enough to eat
<i>Urukene</i>	Better off: not rich but not poor either	Eats twice a day and is satisfied, but rations portions during the hungry season
<i>Abatunzi</i>	Rich: owns assets and money but still needs to work	Eats three times a day and has enough food to eat
<i>Umukungu</i>	Super-rich: owns so much that he has no need to work; he pays other people to work for him	Eats three times a day and has more than enough food

Source: Fieldnotes from a focus group discussion in Cibitoke, Burundi

among many others in both projects. This article extracts relevant findings on food security from each evaluation report, and compares findings across the Burundi and Rwanda contexts.

Treatment households in both Burundi and Rwanda received a package of support over a period of time, based on the ‘graduation model’ developed in Bangladesh. The package included cash transfers, savings facilities, health insurance, support for income-generating activities (IGAs), livelihood training and coaching. Some of the IGAs supported by the two programmes were food-related – retailing cassava flour, vegetables, cooked bananas or banana juice. Concern also promoted kitchen gardens and encouraged participants to cultivate fruit and vegetables for improved household food security and nutrition.

In Rwanda, the first cohort of 400 households received income support (cash transfers) for 18 months, followed by livelihood support (asset transfers and training), between 2011 and 2015. The second cohort of 800 households entered the programme 1 year after the first and received income support for 16 months followed by asset transfers, between 2012 and 2015. In Burundi, 2000 poor households received cash transfers and training for 14 months in 2013–2014, followed by working capital for an approved livelihood activity in three instalments between 2014 and 2015.

Both impact evaluations followed a quasi-experimental research design and a difference-in-differences methodology.³ By measuring indicators of interest before, during and after the programme implementation period, significant changes in treatment households can be observed. By comparing changes in treatment and control group households at each point in time, the net attributable impact of each programme can be estimated. Qualitative fieldwork – focus group discussions, case studies and key informant interviews, as well as participatory techniques such as seasonal calendars – was undertaken in both countries, to add explanatory depth to the quantitative data (Ajambo Akaliza et al. 2016). A notable feature of the Rwanda evaluation was the addition of a fourth round of data collection for first cohort households, 2 years after their participation in the programme ended, to allow some conclusions to be drawn about the sustainability of programme impacts.

3.1 Burundi evaluation

The *Terintambwe* programme (‘take a step forward’ in Kirundi) was implemented in two provinces of Burundi: Cibitoke and Kirundo, ranked as the most ‘poor-vulnerable’ and the fifth most ‘poor-vulnerable’ province, respectively. Population density is high and many households are land poor (they have insufficient land to meet their subsistence needs) or

functionally landless (the only land they have is that around their homestead), so they depend on casual labour for income and food security (McAlpine 2011; Humphrey 2012). Because graduation programmes support livelihood activities, *Terintambwe* targeted *ntaho nikora* households in Burundi, as the poorest category with labour capacity, with the objective of ‘graduating’ them sustainably into the *umukene* or *abatunzi* category.

A total of 2600 extremely poor households were selected for the programme in Cibitoke and Kirundo provinces, using community-based targeting. A unique feature of the *Terintambwe* design was that treatment households were divided into two groups. All participants received the same amount of material assistance (cash and asset transfers), but ‘high treatment’ households (T1 = 1000) received more visits from Concern case managers than ‘low treatment’ households (T2 = 1000). The remaining households were assigned to the control group (C = 600). The intention was to evaluate whether the training and coaching provided by case managers is the ‘X-factor’ that explains the positive outcomes achieved by graduation programmes. Random allocation of households to T1, T2 or C maximised the heterogeneity within each group and reduced the potential design effect. However, the participation of households from the same community in all three study groups increased the risk of spillover effects.

Three survey rounds were undertaken. The baseline survey was conducted in December 2012, before the *Terintambwe* programme started. The midline survey was conducted in June 2014, after the end of the cash transfers phase. The endline survey was conducted in April 2015, towards the end of the programme cycle, when first cohort *Terintambwe* households were preparing to exit the programme.⁴ All 2600 households were interviewed at baseline, 2508 at midline (attrition rate of 3.5%) and 2333 at endline (total attrition rate of 10.3%).

Three indicators were tracked to assess the *Terintambwe* programme’s impact on food security: the number of meals eaten in a day, the number of months in the year that the household experiences hunger, and the diversity of household members’ diets.⁵

3.2 Rwanda evaluation

Concern Worldwide’s Graduation Programme in Rwanda was called ‘Enhancing the Productive Capacity of Extremely Poor People’ and was implemented in two rural districts of Southern Province. Communities were selected for inclusion based on their poverty and vulnerability profiles, and on

⁴ The endline survey was conducted slightly before the programme cycle ended, in order to avoid the election period that started in May 2015.

⁵ Note that these indicators of household food insecurity differ from indicators such as the GHI scores and POU rates that were reported earlier, as those indicators apply only to the national level.

³ Details of the evaluation design can be found in each country report.

condition they were not already benefiting from the VUP. Households targeted for inclusion were drawn from the two poorest categories in a traditional community wealth classification system called *Ubudehe*.

For the first cohort a 100% census of all 400 beneficiary households (200 in each district) was tracked over time for changes in key indicators, and the findings were compared to changes in the same indicators among 200 control group households (100 in each district), to estimate the attributable impacts of the Graduation Programme. For the second cohort a 50% sample of 400 randomly selected beneficiaries (200 from each district) and 200 control group households (100 from each district) were surveyed. The control groups were selected from different communities in non-adjacent sectors, to minimise the risk of spillover or contamination.

For the first cohort of participants, four rounds of data collection were undertaken: at baseline (0 months), midline (12 months), endline (36 months) and follow-up (48 months). The addition of the fourth round some 2 years after participants exited the programme allows for an assessment of sustainability of programme impacts. For the second cohort of participants, three rounds of quantitative data were collected: at baseline (0 months), midline (12 months), and follow-up (36 months) – 2 years after the cash transfers ended. Attrition rates for the first cohort (from baseline to the fourth round) were 6% for participants and 12% for the control group, and for the second cohort (from baseline to the third round), 9% of participants and 11% of control group households.

One hypothesis tested was that Graduation Programme participants will improve their food security over time, relative to the control group. Different indicators of food security were collected from cohort 1 and cohort 2 households, which means that findings are not comparable across cohorts, but allows a more diverse set of impacts to be reported. These include: whether households increased their consumption of meat and milk, whether they started fruit and vegetable kitchen gardens, and whether they perceived that fewer children or other household members suffered from symptoms of malnutrition over time.

4 Findings

The 1996 World Food Summit defined food security as a situation when “all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO 1996). Food is a daily necessity for life, and definitions of food security rightly emphasise the time dimension – “at all times”. Food deficits can occur over different durations: food insecurity can be long-term (chronic), cyclical (e.g. seasonal), or short-term (transitory). Chronic food insecurity refers to “a persistent inability on the part of

the household to provision itself adequately with food” (FAO 2005). Conversely, seasonal food insecurity refers to “a cyclical pattern of inadequate access to food (e.g. food shortages in pre-harvest period)” (FIVIMS 2002). Food security can be measured in terms of the adequacy of the diet in terms of both quantity and quality. Measures of quantity of diet include months of hunger in the year and number of meals consumed per day. Measures of quality of diet include dietary diversity.

4.1 Quantity of diet

This section presents evidence on two indicators of chronic, seasonal or transitory food consumption deficits – months of hunger, and meals per day.

4.1.1 Months of hunger

One self-reported indicator of chronic or seasonal food insecurity is the annual ‘hunger gap’ – the number of months in the past year that the household experienced hunger. In self-provisioning farming communities – as in rural Burundi and Rwanda – seasonal food insecurity follows a predictable annual pattern, dictated by the agricultural calendar.

Because Burundi and Rwanda are in the tropics they enjoy two rainy seasons each year, and seasonal hunger is not as severe as in semi-arid areas with a single rainy season elsewhere in Africa, such as the West African Sahel or parts of the Horn of Africa. Figure 1 presents a seasonal calendar from one study site in rural Burundi. There are two periods of hunger annually, both associated with heavy rains and occurring during the growing season before each harvest. Seasonal hunger peaks in October–November and April–May each year, when household granaries are empty and market prices for food are high. Sweet potato is an important secondary food crop and an antidote to seasonal hunger. As one farmer graphically explained: “*If you don’t have sweet potato in April, you die*”.

Seasonality is experienced differently across the wealth groups. Poor farmers survive in these months by doing casual agricultural labour on their wealthier neighbours’ farms – planting, weeding and harvesting.

For Ntaho Nikora the hungry season is an opportunity because he gets casual work. But for the poorest it is a tough time because the well-off are not willing to give help at these times. The well-off employ the poor who can work, but they won’t give free help to the poor who cannot work.

What was the impact of the Terintambwe programme on seasonal hunger at the household level? At baseline, households surveyed in Burundi reported experiencing 7.3 months of hunger during the previous 12 months, on average, with no

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rain	Short rains (light)		Heavy rains			Light rains	No rain		Main rains (heavy)			
Food security	Enough food				Severe hunger (growing season)		Enough food – harvest (more food than January)		Hunger (post-planting)		Severe hunger	
Beans	2 nd harvest	1 st planting				1 st harvest				2 nd planting		
Cassava							Harvest →		Planting			
Sweet potato			2 nd harvest →		1 st planting		1 st harvest				2 nd planting	
Casual work	Land clearing		Harvesting beans	Planting	Planting + Weeding		Harvesting beans	No work	Weeding			Harvest
Food prices	Cheap food (Cassava stays high until June)		High prices: Beans = 1300/kg Cassava flour = 700-800/kg				Low prices: Beans = 500/kg Cassava flour = 500/kg			High prices: Beans = 1300/kg Cassava flour = 700-800/kg		

Source: Qualitative fieldwork data, Burundi.

Fig. 1 Seasonal calendar, Kirundo province, Burundi

statistical difference between the treatment and control group. The modal response was in fact 12 months out of 12, reported by one in four households. At endline, control households reported a slight decline, to 6.1 months of hunger in the previous 12 months.⁶ For treatment households, however, a strong positive impact was evident, with the average duration of hunger during the past year falling to just 1.6 months.

Figure 2 presents the distribution of treatment households self-reporting different durations of hunger, between 0 and 12 months of the previous year, at baseline (top) and at endline (below). The shift leftward towards fewer months of hunger is clearly visible. The modal months of hunger switched from 12 months (25% of households) to 0 months (35% of households), suggesting that Terintambwe effectively eradicated seasonal hunger for one-third of participants, at least while they were benefiting from the programme.

Using a two-period difference-in-differences estimation, it appears that this reduction in months of hunger is not homogeneous across provinces. On average, households in Cibitoke who received either treatment reported being in hunger for 5 months less than at baseline. In Kirundo, however, the reduction was limited to 3.3 and 3.9 months, for T2 and T1 respectively (see Table 3). High treatment households in Kirundo benefited by 0.63 months (19 days) less hunger in the previous 12 months than low treatment households. This difference is statistically significant (5%).

4.1.2 Meals per day

Meals consumed per day is a simple self-reported indicator of food insecurity that is well correlated with other indicators, such as dietary diversity (Devereux 2006). If household members are eating three meals a day this is considered the

⁶ This question was asked only at baseline and endline; there are no data on this indicator for the midline.

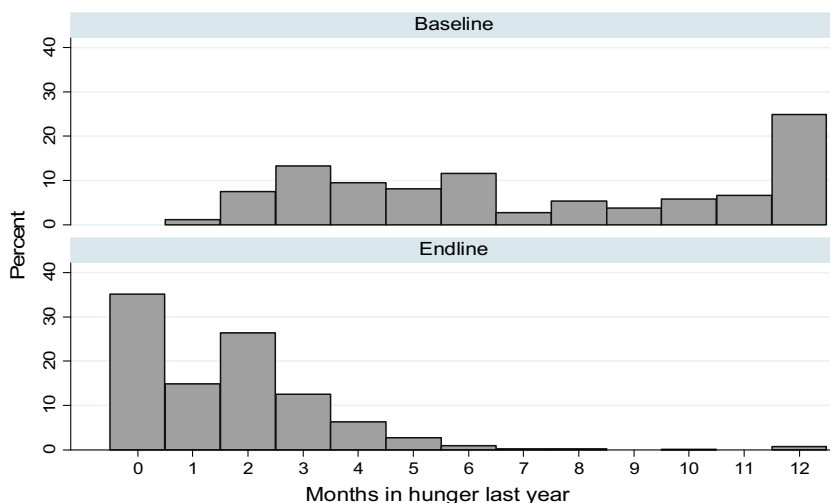
benchmark for household food security; while fewer than three meals a day, especially for children, suggests the household is unable to meet its consumption needs. Self-reported meals per day was collected at baseline, midline and endline in Burundi, and at baseline, after 12 months and after 36 months for the 2nd cohort (but not 1st cohort) in Rwanda.

At baseline in Burundi, adults in treatment and control households reported eating only 1.2 meals per day, on average, with no significant difference between the treatment and control group. A substantial programme impact was recorded for this indicator, especially between baseline and midline (as illustrated in Fig. 3). Adults in treatment households increased their meals from 1.2 to 1.9, and this continued to improve between midline and endline, to 2 meals a day. (“I used to eat once or not at all, but now I eat twice a day.”) Adults in control group households displayed a small but statistically insignificant rise in meals per day, from 1.2 to 1.3 between baseline and midline, but no further increase between midline and endline (Fig. 3a).

The increases recorded for meals per day for children in Burundi are comparable to the trends for adults. However, children started at a higher level (1.4 meals a day at baseline) and ended at a higher level (2.2 meals a day at midline and 2.4 meals at endline – a full meal per day more than at baseline (Fig. 3b)). (“My children now go to school after having eaten breakfast and they eat three times a day.”) Again, most of the increase occurred in the first phase of the programme. Disaggregating these results by province, significant increases in Cibitoke and Kirundo are observed only from baseline to midline (Table 5). As with adults in the control group, children in control households recorded a much smaller increase in their consumption, from 1.4 meals per day at baseline to 1.5 at midline and endline.

Difference-in-differences estimations confirmed that the increased consumption of meals by both adults (Table 4) and children (Table 5) in Terintambwe households is attributable

Fig. 2 Distribution of months of hunger in treated households at baseline and endline, Burundi



to the programme. The positive impact holds for both high treatment (T1) and low treatment (T2) households in both provinces, and is robust across all time periods, but is stronger from baseline to midline than midline to endline, especially for children. There is no significant difference in impact between high and low treatment households. This is not unexpected as both treatment groups received the same quantity and value of material transfers (cash and assets) – the differences between treatments were mainly in terms of non-material support (training and messaging).

Findings on meals per day in Rwanda are initially similar to the findings in Burundi, but then diverge. For 2nd cohort households, adults in treatment households were consuming, on average, 1.3 meals per day at baseline,⁷ and this increased to 1.8 meals at midline, 12 months later. Over the same period, adults in the control group displayed a marginal increase in their consumption, from 1.2 to 1.3 meals a day, on average. This pattern is the same for children, but again at a higher level. Children in treatment households started at 1.6 meals per day and increased to 2.5 meals per day after 12 months in the Graduation Programme, while children in the control group reported a marginal rise from 1.6 to 1.7 meals a day over this period.

For Rwanda, data was also collected for the 2nd cohort 36 months after baseline, 1 year after treatment households exited the Graduation Programme. For both adults and children in these households, a similar trend was observed: meals per day increased during the first year, but some of these gains were lost in the next 2 years. Meals per day for adults fell from 1.8 to 1.6 – still higher than baseline (Fig. 4a) – while meals per day for children declined from 2.5 to 2.1 – also higher than at baseline (Fig. 4b). Control group households showed no

significant change during this period, so the programme impact is significant and sustained but declining.

In sum, the graduation projects in Burundi and Rwanda not only succeeded in increasing the frequency of meals consumed in treated households, they also reduced the annual ‘hunger gap’ by several months. The main factor explaining this consistent evidence of reductions in hunger is probably the injection of resources into these chronically poor households, mostly in the form of monthly cash transfers, which financed more food purchases than the treatment households could otherwise have afforded.

This is confirmed by data on food expenditure for 2nd cohort households in Rwanda (Table 6), which reveals a 40% rise in food spending during the cash transfers phase of the programme. Although this fell back to some extent between the 12-months and 36-months surveys, food spending remained 29% above baseline, 3 years after participants joined the Graduation Programme. Conversely, control group households increased their spending on food by a more modest 17% in the first year, but this declined by 27%, to 14% below baseline spending after 3 years.

4.2 Quality of diet

Having established that the graduation projects in Burundi and Rwanda had positive impacts on access to food and the amount of food consumed, in this section we analyse their impacts on the quality of diets.

4.2.1 Dietary diversity

Dietary diversity has proven to be a robust indicator of food security: “a 1 percent increase in dietary diversity is associated with a 1 percent increase in per capita consumption” (Hoddinott and Yohannes 2002: iii). The greater the number

⁷ No-one actually eats 1.3 meals: 70% of adults from treatment households reported eating one meal on the day before they were interviewed.

Table 3 Treatment effect on the number of months of hunger, Burundi

Cibitoke	Baseline–Endline
T1 vs C	–5.143***
T2 vs C	–5.191***
sig. Test T1 vs T2	ns
Kirundo	Baseline–Endline
T1 vs C	–3.918***
T2 vs C	–3.291***
sig. Test T1 vs T2	**
Total	Baseline–Endline
T1 vs C	–4.547***
T2 vs C	–4.240***
sig. Test T1 vs T2	*

Source: Concern Worldwide data, Burundi

Note: Asterisks (*, **, ***) indicate statistical significance at 10%, 5% and 1% level respectively

of food groups a person or household consumes in a day, the more food secure they are. The Household Dietary Diversity Index (HDDI) is calculated as the sum of discrete food groups consumed by adult members of the household in the past 24 hours, out of 12 food groups.⁸ The index therefore ranges from 0 to 12, where 0 signifies that no food was consumed within the previous 24 hours. Dietary diversity can be assessed as low (<4 food groups), borderline (4–6 food groups), or high (>6 food groups) (WFP 2005).

In Burundi, adults in Terintambwe households more than doubled their dietary diversity between baseline and endline, from 2.3 to 5.1 food groups. Adults in control group households also improved their dietary diversity, but by much less: from 2.3 to 3.1 food groups. In Rwanda, dietary diversity for adults in 2nd cohort Graduation Programme households almost doubled, from 2.3 to 4.5 food groups, between baseline and 12 months later, while adults in control group households in Rwanda reported only a modest increase, from 2.4 to 2.5 food groups (Table 7). In both countries, therefore, average dietary diversity for adults participating in the graduation programmes moved from low to borderline, but it remained low for adults in control households. These improvements can be explained partly by the income effect – cash transfers and income earned from programme-supported IGAs financed purchases of more varied food items – and partly by BCC messaging about the importance of a diversified diet.

Changes in average dietary diversity mask nuanced shifts in the distribution of food groups consumed over time. Figure 5 shows a flattening of the spikes between baseline and endline for adults in treatment households in Burundi, revealing a widening dispersion in the number of food groups

⁸ The 12 food groups are: cereals; tubers and roots; legumes, nuts and seeds; milk and milk products; eggs; fish; meat; sweets; oils and fats; vegetables; fruit; spices, condiments and beverages (FAO 2010).

consumed. At baseline at least 10% of adults were consuming each of 1, 2 or 3 food groups, but at endline at least 10% of adults were consuming each of 3, 4, 5, 6 or 7 food groups, signifying a substantial improvement in food security for the majority of Terintambwe participants.

Econometric analysis confirms a statistically significant improvement in dietary diversity for treatment households, in both provinces of Burundi (Table 8). The impact is not homogeneous across regions. It is almost twice as big in Cibitoke (+2.6 food groups for T1, +2.3 for T2) as in Kirundo (+1.5 and +1.3). It also differs by treatment. Adults in households that received the high treatment intervention (T1) experienced a significantly bigger increase in dietary diversity than low treatment households (T2), by 13% on average.

4.2.2 Consumption of meat and milk

Households were asked specifically about their consumption of meat and milk, because these foods are generally associated with a rising standard of living and because many participants used some of their programme resources to purchase livestock for sale and consumption. For the proportions of treatment households in Rwanda eating meat at least once a month and drinking milk at least once a week, there were significant increases in the first 12 months, from 8% to 41% and 4% to 20%, respectively. (“*We used to eat cassava leaves cooked without oil, but now we even eat meat.*”) Meat consumption held steady while milk consumption continued to rise between 12 and 36 months, but both fell back by 48 months, though remaining significantly higher than baseline levels (Table 9).

Control group households displayed a more erratic pattern, but were consuming meat and milk less frequently during the final survey round than at baseline. This implies that the income effect dominated initially, with cash transfers financing better quality diets among Graduation Programme participants, but that this attributable impact dissipated to some extent after cash transfers and other programme support stopped.

4.2.3 Production of vegetables and fruit

Kitchen gardens were promoted by Concern Worldwide as a secondary component of the graduation programme, in order to diversify diets and improve household food security. Households in Rwanda were asked during impact evaluation surveys whether they were growing their own vegetables and fruit. There was a surge in the proportion of participants growing vegetables from baseline (29%) to midline (74%) to endline (89%), falling back slightly in the follow-up survey (80%) but remaining significantly above the baseline level. The same pattern was found with respect to fruit production, though the increase was more modest (from 29% to 53% to 71% at 36 months, dropping back to 55% after 48 months) (Table 10).

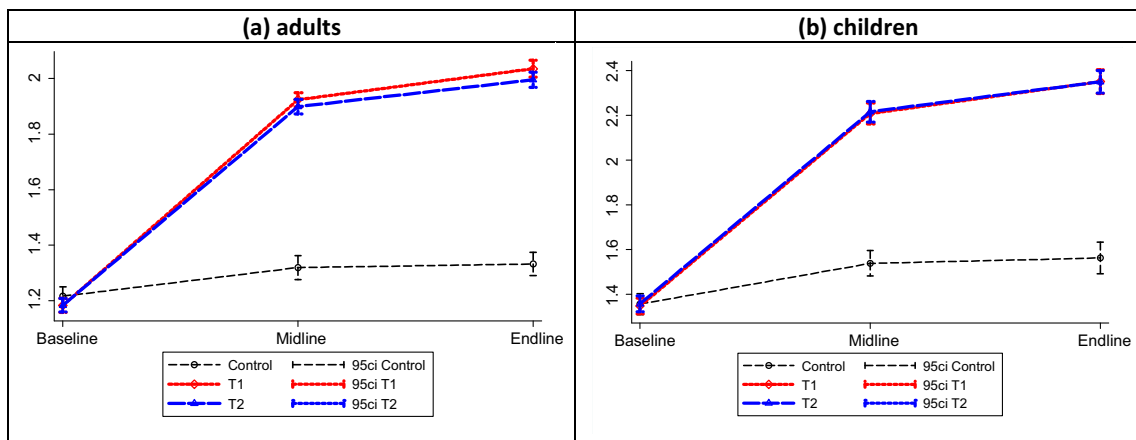


Fig. 3 Number of meals consumed per day, by household category, Burundi

Table 4 Treatment effect on the number of meals consumed by adults in a day, Burundi

	Baseline–Midline	Baseline–Endline	Midline–Endline
Cibitoke			
T1 vs C	0.656***	0.763***	0.108**
T2 vs C	0.627***	0.693***	0.065
sig. Test T1 vs T2	ns	ns	ns
Kirundo			
T1 vs C	0.618***	0.706***	0.088*
T2 vs C	0.599***	0.702***	0.102**
sig. Test T1 vs T2	ns	ns	ns
Total			
T1 vs C	0.637***	0.736***	0.098***
T2 vs C	0.614***	0.698***	0.084**
sig. Test T1 vs T2	ns	ns	ns

Source: Concern Worldwide data, Burundi

Note: Asterisks (*, **, ***) indicate statistical significance at 10%, 5% and 1% level respectively

The statistical significance of these trends is partially offset by similar trends, but on a smaller scale, among the control group. The proportion of control households cultivating vegetables first rose (from 39% to 41% to 63%) and then fell (to 56%) over the four survey rounds. This pattern was mirrored for control households growing fruit (up from 22% to 24% then 46%, then down to 30%). It seems likely that this can be explained as a ‘demonstration effect’, with non-participants observing how to make kitchen gardens and learning the

benefits of eating vegetables and fruit from beneficiaries, then adopting this practice for themselves.

Across all four categories, the proportion of households cultivating vegetables and fruit was higher 4 years after the Graduation Programme started than at baseline, implying that the changes were sustained for large numbers of households even after programme support ended. Establishing whether these changes were permanent, however, would require additional follow-up surveys several years later.

Table 5 Treatment effect on the number of meals consumed by children in a day, Burundi

	Baseline–Midline	Baseline–Endline	Midline–Endline
Cibitoke			
T1 vs C	0.713***	0.864***	0.151*
T2 vs C	0.735***	0.857***	0.122
sig. Test T1 vs T2	ns	ns	ns
Kirundo			
T1 vs C	0.645***	0.731***	0.087
T2 vs C	0.626***	0.722***	0.096
sig. Test T1 vs T2	ns	ns	ns
Total			
T1 vs C	0.679***	0.799***	0.119**
T2 vs C	0.680***	0.790***	0.111*
sig. Test T1 vs T2	ns	ns	ns

Source: Concern Worldwide data, Burundi

Note: Asterisks (*, **, ***) indicate statistical significance at 10%, 5% and 1% level respectively

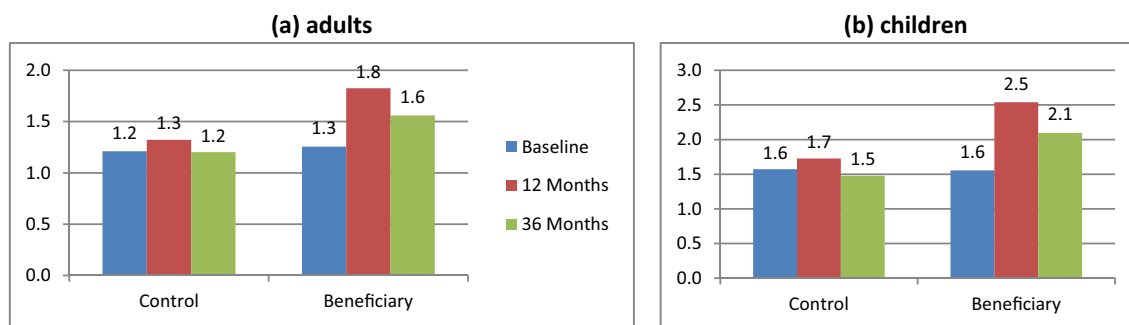


Fig. 4 Number of meals consumed per day, Rwanda

Table 6 Food expenditure, Rwanda (RwF/week)

	Baseline	12 months	36 months
Treatment	1476	2060***	1908***
Control	1545	1810*	1324

Source: Concern Worldwide data, Rwanda

Notes: Asterisks (*, **, ***) indicate statistical significance at 10%, 5% and 1% level respectively. Statistical comparisons are done between 12 months survey and baseline and between 36 month survey and baseline. Results from Rwanda use data from the second cohort of beneficiaries. Rwanda Francs (RwF) 620 = US\$ 1

4.3 Food security outcomes

Nutritional status is the most objective measure of food security outcomes. However, malnutrition (child stunting and wasting, adult body mass index (BMI)) was not assessed in either the Burundi or Rwanda impact evaluations. Collecting and analysing anthropometric data (weights, heights and ages) requires expertise and resources that were beyond the scope and budget of these surveys. Instead, a subjective indicator of malnutrition was collected in Rwanda – perceived

malnutrition. Respondents were asked for their perception of the prevalence of malnutrition in their households.

At baseline, more control group households reported perceived symptoms of malnutrition among their household members (42% vs 25%). After the first 12 months of programme implementation, perceived malnutrition halved in treatment households (from 25% to 12%) and fell by a smaller proportion among control group households (from 42% to 31%). This positive trend continued – at 36 months 2% of treatment households and 8% of control group respondents perceived any signs of malnutrition in their homes, and at 48 months the figures had fallen further, to just 1% and 7% respectively (Table 11).

According to this self-reported indicator, therefore, the prevalence of malnutrition fell from one in four treated households to close to zero, after respondents joined the Graduation Programme in Rwanda. This is a sustained and very positive outcome, but it is not an attributable impact of the programme, because a similar trend was recorded among control group households. There was no statistically significant difference in trends on perceived malnutrition between programme participants and non-participants. One possible explanation is that Rwanda has reformed and invested heavily in its health system,

Table 7 HDDI by survey round, Burundi and Rwanda

			Baseline	Midline	Endline	Follow-up
Burundi	Cibitoke	T1	2.65		5.64	
		T2	2.70		5.40	
		Control	2.77		3.16	
	Kirundo	T1	1.98		4.61	
		T2	1.90		4.34	
		Control	1.82		2.94	
	All	T1	2.31		5.18	
		T2	2.31		4.92	
		Control	2.30		3.07	
Rwanda	2nd cohort	Treatment	2.3	4.5		3.8
		Control	2.4	2.5		2.2

Source: Concern Worldwide data, Burundi and Rwanda

Notes: Asterisks (*, **, ***) indicate statistical significance at 10%, 5% and 1% level respectively. Statistical comparisons in Rwanda are done between 12 months (midline) survey and baseline and between 36 months (follow-up) survey and baseline. Results from Rwanda use data from the second cohort of beneficiaries

Fig. 5 Number of food groups consumed by treatment group adults, Burundi

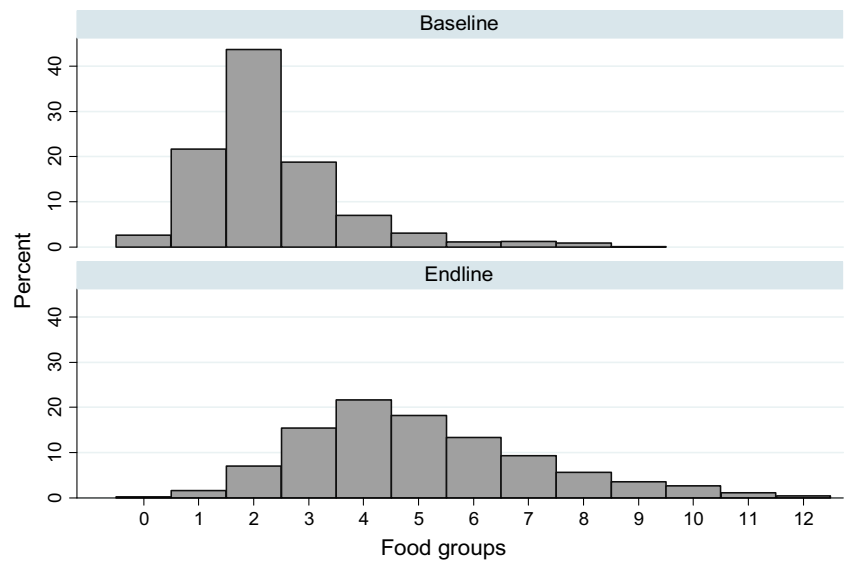


Table 8 Treatment effect on HDDI, Burundi

Cibitoke	Baseline–Endline
T1 vs C	2.601***
T2 vs C	2.308***
sig. Test T1 vs T2	**
Kirundo	Baseline–Endline
T1 vs C	1.500***
T2 vs C	1.304***
sig. Test T1 vs T2	*
Total	Baseline–Endline
T1 vs C	2.099***
T2 vs C	1.855***
sig. Test T1 vs T2	***

Source: Concern Worldwide data, Burundi

Note: Asterisks (*, **, ***) indicate statistical significance at 10%, 5% and 1% level respectively

including providing affordable health insurance (*mutuelle de santé*) that has significantly expanded access to better quality health care (ILO 2014), and improved health status has contributed to improved nutrition status among the general population.

5 Discussion and conclusions

The theoretical linkages between social protection and food security remain weakly conceptualised. Social protection programmes are typically evaluated against their poverty reduction impacts, with food security being of secondary interest, or a corollary benefit. Is enhanced household food security a legitimate and appropriate objective for social protection policies and programmes to pursue? Graduation programmes are more nutrition-sensitive than other forms of social protection, but for policy-makers focused on food security a key decision is whether to allocate public resources to supporting food production (agriculture) or food consumption (e.g. social protection). Further research is needed to understand the relative effectiveness of public investments in alternative hunger eradication initiatives.

Nonetheless, our research suggests that even though graduation programmes are focused on SDG 1 (end poverty), they also have great potential to contribute to SDG 2 (end hunger), because the various components of the graduation package address the multidimensional nature

Table 9 Households consuming meat and milk, Rwanda (%)

		Baseline (0 months)	Midline (12 months)	Endline (36 months)	Follow-up (48 months)
Meat (1+/month)	Treatment	8	41	39	21
	Control	18	5	24	3
Milk (1+/week)	Treatment	4	20	27	17
	Control	12	5	18	6

Source: Concern Worldwide data, Rwanda

Notes: Asterisks (*, **, ***) indicate statistical significance at 10%, 5% and 1% level respectively. Statistical comparisons in Rwanda were done between 12 months (midline) survey and baseline, between 36 months (endline) survey and baseline and between 48 months (follow-up) and baseline. Results from Rwanda used data from the first cohort of beneficiaries

Table 10 Households growing vegetables and fruit, Rwanda (%)

		Baseline (0 months)	Midline (12 months)	Endline (36 months)	Follow-up (48 months)
Vegetables	Treatment	29	74***	89***	80***
	Control	39	41	63***	56***
Fruit	Treatment	29	53***	71***	55***
	Control	22	24	46***	30*

Source: Concern Worldwide data, Rwanda

Notes: Asterisks (*, **, ***) indicate statistical significance at 10%, 5% and 1% level respectively. Statistical comparisons in Rwanda are done between 12 months (midline) survey and baseline, between 36 months (endline) survey and baseline and between 48 months (follow-up) and baseline. Results from Rwanda use data from the first cohort of beneficiaries

of food and nutrition insecurity. The programmes in Burundi and Rwanda significantly reduced chronic and seasonal food insecurity and improved the quality of diets in participating households, on all indicators monitored. The number of meals eaten daily increased, while months of hunger in the year decreased significantly. Dietary diversity increased, as did the proportion of households consuming meat or milk and those growing vegetables and fruit for home consumption.

Moreover, these findings suggest that the graduation model has greater potential to impact positively on food security in poor households than conventional forms of social protection. This is because the graduation package offers several pathways to food security. First, cash transfers and savings facilities boost purchasing power, and poor households spend significant proportions of any incremental income on food. Second, asset transfers plus livelihood training generate income streams that persist even after programme support ends. Third, when assets transferred are livestock they can also be sources of nutritious food (meat, milk or eggs). Fourth, much of the information delivered as behaviour change communication (BCC) relates directly to food and nutrition security, notably sessions that concern dietary diversity, breastfeeding and good hygiene practices. A fifth

component in the Burundi and Rwanda adaptations ensures direct access to nutritious foods, by promoting kitchen gardens for production of vegetables and fruit.

At the conceptual level, different components of the graduation model address different pathways to food and nutrition security, and enable synergies between income and non-income effects. Cash transfers and support to IGAs improve access to food by alleviating income constraints, but improvements in the quality of diets are also needed, and this is better achieved with BCC and kitchen gardens. Also, IGAs that involve rearing livestock increase consumption of meat and milk and eggs, because cash transfers are invested in purchasing livestock that generate both food and further income. Similarly, BCC sessions deliver information about nutritious diets, while cash transfers finance purchase of nutritious food.

The longitudinal research design of this evaluation also allows conclusions to be drawn about the sustainability of graduation programme impacts. The biggest impacts on food security in both Burundi and Rwanda were recorded between the baseline and midline surveys, during the cash transfers phase when households received the largest amount of material support. In the second year of the project cycle, households in both countries received productive assets and training, but no cash transfers. The income generated by project-supported livelihood activities in year 2 was generally worth less than the cash transferred in year 1, which explains the reduced (but still positive) impacts after year 1. In follow-up surveys conducted 3–4 years after households joined the Rwanda programme and 1–2 years after they exited the programme, some food security outcomes were sustained but others had declined, while remaining higher than baseline level.

An important factor in the sustainability of these impacts is the non-cash components of the programme: training in financial literacy, access to savings, coaching sessions on nutrition and food hygiene, and the establishment of kitchen gardens. These findings reinforce

Table 11 Trends in perceived malnutrition, Rwanda (%)

	Baseline (0 months)	Midline (12 months)	Endline (36 months)	Follow-up (48 months)
Treatment	25	12**	2***	1***
Control	42	31*	8***	7***

Source: Concern Worldwide data, Rwanda

Notes: Asterisks (*, **, ***) indicate statistical significance at 10%, 5% and 1% level respectively. Statistical comparisons in Rwanda are done between 12 months (midline) survey and baseline, between 36 months (endline) survey and baseline and between 48 months (follow-up) and baseline. Results from Rwanda use data from the first cohort of beneficiaries

evidence from other contexts that linking cash transfers to other services – so-called ‘cash plus’ initiatives – in particular to nutrition-related behaviour change communication (BCC), yields stronger and more sustained improvements in food security and nutrition outcomes than cash alone (Ahmed et al. 2016; Roelen et al. 2017). However, the evidence of falling impacts post-exit suggests that some forms of support need to be maintained or reinforced, for improvements in food and nutrition security to be sustained in the long run.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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