School Feeding or General Food Distribution? Quasi-Experimental Evidence on the Educational Impacts of Emergency Food Assistance during Conflict in Mali

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Abstract

We rely on a unique precrisis baseline and five-year follow-up to investigate the effects of emergency school feeding and general food distribution (GFD) on children's schooling during conflict in Mali. We estimate programme impact on child enrolment, absenteeism and attainment by combining difference in differences with propensity score matching. School feeding led to increases in enrolment by 11 percentage points and to about an additional half-year of completed schooling. Attendance among boys residing in households receiving GFD, however, declined by about 20 per cent over the comparison group. Disaggregating by conflict intensity showed that receipt of any programme led to rises in enrolment mostly in high-intensity conflict areas and that the negative effects of GFD on attendance were also concentrated in the most affected areas. Conversely, school feeding mostly raised attainment among children residing in areas not in the immediate vicinity of the conflict. Programme receipt triggered adjustments in child labour. Thus, school feeding led to lower participation and time spent in work among girls, while GFD raised children's labour, particularly among boys. The educational implications of food assistance should be considered in planning humanitarian responses to bridge the gap between emergency assistance and development by promoting children's education.

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Author contributions

All authors contributed to the study design and draft. Elisabetta Aurino conducted data analysis and led in writing the article.

1. Introduction

In 2016, at least 357 million children (one in six globally) were living in areas affected by conflict, and the number had been steadily rising since the 2000s (Bahgat et al., 2017). Conflicts and related exposure to violence can have devastating effects on children's education, health, and overall well-being. These effects have detrimental repercussions on children's life course outcomes, as well as on the next generation (Akbulut-Yuksel, 2014; Akresh et al., 2017; Blattman and Miguel, 2010; Justino, Leone, and Salardi, 2014; Shemyakina, 2011).

Social protection, including cash transfers, vouchers, general food distribution, and school feeding, is increasingly seen as a sustainable tool to build human capital and reduce poverty during conflict and other crises, thus potentially bridging the gap between humanitarian responses and long-term development (FAO, 2017). Food assistance has been a key element of humanitarian aid. In the past decade, school feeding has been scaled up in emergencies as a rapidly deployable safety net, while generalized food distribution (GFD) is the largest component of humanitarian assistance globally (Harvey et al., 2010; WFP, 2013).

Despite the critical role of social protection in conflict and emergencies, evidence on the impacts, particularly food-based programmes, on child education is remarkably thin (Buvinić, Das Gupta, and Shemyakina, 2014; Doocy and Tappis, 2016). Additional knowledge gaps relate to whether the educational effects of social protection programmes in conflict vary by type of programme, child gender and degree of conflict intensity.

This lack of evidence constitutes a critical hindrance in the design of context- and child-sensitive responses that can promote the accumulation of human capital, particularly in situations of protracted fragility. This knowledge gap translates into a significant funding mismatch. Thus, the education sector receives only 2 per cent of total humanitarian aid, despite the importance of education in humanitarian responses, together with food, health, and shelter (Justino, 2016).

In this paper, we attempt to shed light on these open questions by focusing specifically on the educational impacts of GFD and school feeding during the recent conflict in Mali. Since February 2012, the country has experienced a series of political, economic and military crises, and it still faces a situation of protracted fragility. Strengthening the educational impacts of humanitarian response is particularly critical for Mali, where over half the 14.5 million inhabitants are under the age of 15 years. Primary completion and youth literacy

rates are among the lowest globally: one in two people aged 15–24 years cannot read a basic sentence.[1]

By relying on a unique precrisis baseline and longitudinal follow-up, we provide matched difference in differences estimates of the impact of food assistance on children's school enrolment, attendance and attainment in Mopti, central Mali. This paper contributes to two main literatures. It adds to the evidence base in the literature assessing the impact of social protection on child education in conflict situations, which is mostly focused on assessing the impacts of cash-based approaches (Doocy and Tappis, 2016; UNCHR, 2017; Wald and Bozzoli, 2011). We contribute in three main ways. First, we provide evidence on the impacts of food-based social protection programmes, specifically the differential impacts of GFD and school feeding. Second, we investigate heterogeneity in programme impacts by gender and by the extent of exposure to conflict. Third, we examine changes in child labour participation and duration as a potential mechanism for impact. The paper also contributes to the broader literature on school feeding by adding rigorous evidence on effectiveness in conflict situations (see section 2).

The remainder of this paper is organized as follows. Section 2 describes how food-based social protection may affect child schooling. Section 3 provides background on the study setting, the conflict and the humanitarian response. Sections 4 and 5 present the data and the identification strategy, respectively. Section 6 reports the results, and section 7 concludes.

2. Food-based social protection and schooling during conflict

Social protection, including social safety nets, are currently estimated to reach 1.9 billion children and adults globally(Alderman, Gentilini, and Yemtsov, 2018). We focus on two forms of food-based social protection, or food assistance, including school feeding and GFD. In this section, we discuss potential pathways through which such programmes can affect child schooling, with an emphasis on conflict and emergency settings.

School feeding programmes offer a free meal, snack, or take-home ration to children attending school with the aim of promoting child education and health. In conflict and other humanitarian crises, school feeding programmes may serve additional objectives linked to

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[1] WDI (World Development Indicators) (database), World Bank, Washington, DC (accessed 12 July 2017), http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators.

child safety, protection, dignity, integrity, and normalcy, which may sometimes override the more general goals of promoting schooling and health (WFP, 2007). In post-conflict and transitional contexts, school feeding is also used to assist in the restoration of education systems, to encourage the return of internally displaced persons and refugees, and to promote social cohesion among children (Harvey et al., 2010). A thematic evaluation of the World Food Programme's (WFP) school feeding operations in emergencies identified a range of context-specific challenges related to implementation, including security, limited accessibility, and weak in-country technical capacity (WFP, 2007). Moreover, school feeding may not always represent a viable solution in high-intensity conflict areas where schools are closed or other operational constraints impede effective implementation. The choice of the appropriate transfer modality, such as the provisions of snacks, cooked meals, or take-home rations, relative to infrastructure constraints constitutes another challenge. As noted by the evaluation (WFP, 2007: p. vii), "there is no definitive line between school feeding as implemented in emergency or development contexts; both contexts may have many similar challenges", though also recognizing that, in addition to specific humanitarian-related challenges, the constraints associated with development will likely be exacerbated during emergencies.

Among rural and food insecure households, investments in child schooling are part of decisions related to the time allocation of different household members, poverty and other constraints, perceived returns to education, and social norms. In this context, school feeding may directly benefit children's schooling through two main pathways (Adelman et al., 2008; Lesley Drake et al., 2018). The first involves increased enrolment and attendance through an income transfer (equivalent to the size of the meal or ration) to households. The transfer is conditional on school attendance and aims to reduce the overall opportunity cost of schooling. By subsidizing this cost, school feeding can decrease the overall time children spend in productive activities within or outside the household and promote shifts in time use to activities that are more compatible with school attendance. The net effect of school feeding on attendance depends on the ratio between the value of the transfer and the expected differences between the cost and benefits of attending school on a given day (Adelman et al., 2008; Kazianga, de Walque, and Alderman, 2012).

The second pathway relates to improved nutritional status and decreased morbidity, which may lead to an expansion in attendance and learning ability (for example, through enhanced cognition). More generally, the overall effects of school feeding on child schooling during conflict may depend on the intensity of the conflict and the repercussions of the conflict on the availability of educational inputs – schools may often be closed because of the destruction of infrastructure or the flight of teachers – and on programme

implementation. In non-humanitarian contexts, the effectiveness of school feeding will also depend on demand-side factors such as household poverty and household food insecurity or the level of community engagement. Fear and insecurity constitute additional barriers to children's education in conflict situations, and this may exacerbate gender inequalities in education if perceptions of insecurity become aligned with social norms related to the view that girls are more likely to be targets of violence (Justino, 2016).

While the positive effects of school feeding on enrolment and attendance are supported by a well-established evidence base in non-humanitarian settings, the evidence on the effectiveness of school feeding in emergencies is limited.[2] A field experiment assessed the impact of a WFP initiative involving school feeding and take-home rations on school participation in camps for internally displaced persons in northern Uganda (Alderman, Gilligan, and Lehrer, 2012). The experiment showed that school feeding had a positive impact on school enrolment and on morning and afternoon attendance. School feeding programmes likewise seem to promote enrolment and attendance during wars and other emergencies (UNICEF, 2012; WFP, 2007).

GFD generally involves the provision of a food ration, including cereals, oil and other basic foods, to vulnerable households. As a social protection tool, GFD is aimed at preventing households from adopting detrimental coping strategies in the face of food insecurity and other shocks. In the case of education, potential coping mechanisms may entail school dropout or larger absenteeism because of the increasing resort to child labour. However, the literature on GFD and education is strikingly limited.[3] On the one hand, the receipt of food aid may positively influence household educational decisions by freeing up labour and financial resources that would otherwise be employed in food production and consumption. For instance, in Ethiopia, GFD promoted schooling among younger boys after a drought (Broussard, Poppe, and Tekleselassie, 2016). However, families receiving food aid may use savings from food purchases to invest in productive activities in which children participate, thus reducing school attendance. Similarly, variation in food production or local prices following GFD may lead to the increased participation of children in agriculture or other work directly or indirectly related to GFD (such as queuing at collection points, reselling food rations, or performing farm or care work in place of other household members

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[2] By contrast, the evidence base on issues relating to learning and cognition is mixed; see Drake et al. (2017) for additional detail and a review.

[3] The literature has so far focused on the effects of food aid on the occurrence and length of violence and the effects of food aid on food production and prices in non-humanitarian settings (see, for example, Barrett, 2006; Nunn and Qian, 2014). While the latter strand of literature has highlighted a series of unintended positive outcomes (such as freeing up resources for investment) and negative outcomes (such as the distress sale of productive assets), the overall effect of aid on household welfare is not known a priori and even less so in conflict situations.

who are busy obtaining GFD). Most of the literature focuses on non-conflict settings. During conflict, the opportunity cost of schooling may rise even more because child labour is a common coping strategy in the face of conflict-related shocks – such as the loss of productive assets or household labour following armed violence, looting, or the recruitment of household members in the army – that add to the difficulties associated with already poorly functioning rural labour markets (Akresh and de Walque, 2008; Buvinić, Das Gupta, and Shemyakina, 2014; Shemyakina, 2011).

Compared with school feeding programmes, the links between GFD and household decisions regarding child schooling are less direct. The school attendance pathway embedded in the design of school feeding may not factor in GFD design decisions because these programmes do not generally include any explicit attendance conditionality. Decisions along the health pathway may also be more tenuous than in school feeding, depending on the way households allocate food among household members.[4]

The overall effects of both forms of food assistance on child schooling in conflict may vary between boys and girls. A large body of literature has documented that wars and violence have differential effects on children's schooling by gender, based on a number of contextual factors, such as the extent of child participation in education and labour, perceived returns to schooling, prevalence of child enlistment in the army, and social norms (Buvinić, Das Gupta, and Shemyakina, 2014). For instance, depending on gendered time use, child labour patterns and related gender differentials in the opportunity cost of schooling, food-based social protection may lead to differential impacts on the schooling of boys and girls.

The educational effects of school feeding and GFD may vary with conflict intensity, too. The literature on the educational impacts of conflict highlights that children experiencing greater conflict intensity tend to exhibit lower educational outcomes (Akbulut-Yuksel, 2014; Brück, Di Maio, and Miaari, 2014; Wald and Bozzoli, 2011). Conflict intensity may mediate the overall educational effects of emergency food-based social protection in forms that are not known a priori. The overall effect will depend on the way emergency responses are targeted (for example, towards areas that are more or less affected by the conflict events, or if some form of conditionality is present such as the distribution of take-home rations only among specific groups) and implemented (for instance, in occupied villages where schools are closed, school feeding may not be possible). Moreover, additional demand-side factors may affect the receipt by households of food assistance according to the intensity of conflict (Wald and Bozzoli, 2011). For instance, if households anticipate that schools will be

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[4] This issue arises in the case of take-home rations as well; see Adelman et al. (2008).

targeted by violence because they receive food, they may keep children at home, and school participation may increase less in higher conflict areas. Meanwhile, if households in areas of greater conflict suffer from larger economic hardships relative to households in areas of less conflict, the transfers may lead to increased schooling and, possibly, to additional time spent in school, leading to extra attainment. These factors may also vary by child gender. For instance, in the case of school feeding, even if communities are exposed to the same level of conflict intensity, there may be reasons that vary systematically between boys and girls that can hamper programme participation; thus, fear of sexual violence or abduction in the army may, respectively, be more relevant to girls and boys.

Using data on northern Mali before the political crisis, Dillon (2012) documented that households adjusted child labour in response to production shocks, leading to increases in the probability of withdrawal from school by 11 per cent and participation in farm work by 24 per cent.[5] Both school feeding and GFD may protect children from the adverse effects of productive shocks on schooling and labour participation following conflict.

The educational effects of food programmes in conflict situations are far from defined a priori also because of the lack of literature. We hypothesize that school feeding, conditional on school attendance, may, relative to GFD, be more protective of child schooling in situations of conflict. However, the net effect of both sorts of programmes will depend on a number of factors, including programme implementation issues, conflict intensity, gender patterns of schooling and work, and the extent to which the transfers can buffer households and the members within from the detrimental effects of conflict.

3. Background

Mali is a country in West Africa. It is classified as a low-income, food-deficit country by the Food and Agriculture Organisation of the United Nations. In 2016, Mali ranked 175th in 188 countries on the United Nations Development Programme human development index. The average life expectancy at birth is 58 years. The average schooling is two years per person. The annual per capita gross national product (GDP) is US$853. The WFP (2016) estimates that 24 per cent of the population is chronically food insecure. An observational study in central and northern Mali prior to the conflict of 2012 reported primary school enrolment rates of around 40 per cent among both boys and girls, well below regional and global averages (Gelli et al., 2014). The same study found that schooling outcomes were

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[5] Dillon does not disaggregate by gender to investigate whether the shocks affected girls and boys differently.

associated with a broad range of factors, including child's age and nutrition status, household consumption, on-farm labour, teacher availability, and village remoteness.

3.1 The 2012–2013 crisis in central Mali

This paper focuses on the Mopti Region in central Mali. Before 2012, Mopti was exposed to much lower conflict intensity than the country's northern regions (ICG 2016). During the 2012 crisis, however, parts of the Mopti Region were occupied by the Mouvement National pour la Libération de l'Azawad and Islamist groups, and the region experienced a peak of violence between 2012 and 2013 (figure 1). As a result, existing Government services and development programmes were interrupted, and Government staff fled the region, which was already characterized by high levels of economic and political fragility[6]. The conflict caused large-scale internal displacement and the closure of public infrastructure, including schools and health centres. The emergency aggravated the impacts of the drought affecting the country. When Government forces returned in 2013, the return of the state did not increase security nor improve the relations between state representatives and local populations, resulting in military, social and political tensions (ICG 2016). Armed groups are still active, and an international military operation is ongoing.

Figure 1. Timeline of conflict events and food-based social protection
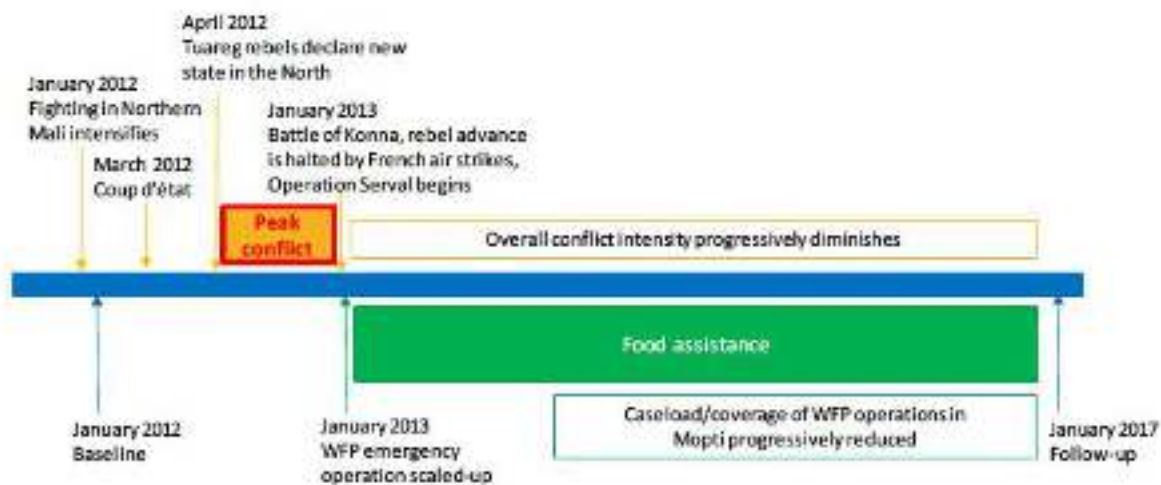
3.2 Food assistance provision during 2014–2015

Following the liberation of occupied zones and a relative return to normalcy, the

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[6] See Dowd and Tranchant 2018 for a detailed description of conflict events.

Government and its partners, including the WFP, implemented several humanitarian interventions. The WFP intervention in northern and central Mali included two main operations. The first, focused on drought relief, was launched in late January 2013 and ended in 2014. A subsequent programme was implemented to continue to provide assistance during 2015 and 2016, though on a considerably smaller scale. The programme included GFD, consisting of a household ration of cereals, pulses, vegetable oil and salt, along with fortified super cereal to increase micronutrient intake.

School feeding was implemented by the Government, WFP and other development partners (WFP, 2015). According to the national school feeding strategy, school feeding was initially targeted geographically to reach primary school children in the 166 communes (third level administrative units) in which food insecurity or the prevalence of acute malnutrition were highest (MEALN, 2012). Areas were also targeted on the basis of low enrolment rates, particularly among girls, and where distances to school were greatest. During the emergency response, WFP and other partners relied on the Government's geographical targeting, which rendered feasible the delivery and implementation of school feeding. Daily hot lunches of cereals, pulses, and vegetable oil, complemented by local condiments, were provided throughout the school year as an incentive for parents to enrol and keep their children in school.

Additional WFP humanitarian programme activities included nutrition interventions for pregnant and lactating women and young children and food-for-work or assets programmes (see appendix A, table A1). These aimed to ensure complementarity with the country programme implemented in southern Mali. The timeline of the conflict events and subsequent food assistance is provided in figure 1. For additional secondary data analysis on the coverage of WFP food assistance in Mopti, please refer to appendix A.

4. Data

4.1 Sample

This study employs longitudinal household and village data. The baseline, conducted in January 2012, was undertaken as part of a cluster-randomized trial of school feeding in Mali that was interrupted because of the onset of conflict a month later (Masset and Gelli, 2013). Seventy villages were randomly sampled among the most food-insecure communes in Mopti, with the idea of sampling two villages within each sample commune. In each village, 25 households were randomly sampled for the survey interviews. The baseline survey collected

detailed information on household food security, economic activities, and sociodemographics. A follow-up survey was undertaken in January 2017. The study involved minimal risks for participants, who were free to withdraw any time. Informed consent based on a standardized form was requested of household heads, parents and village chiefs. Ethical clearance was obtained from ethics boards at the Mali National Institute of Public Health and International Food Policy Research Institute.

Qualitative research was also conducted at endline. In Bamako, the capital, we interviewed key humanitarian stakeholders, including the individuals linked to the Government, the WFP, and international non-governmental organizations. In Mopti, commune stakeholders (such as mayors and health workers) were interviewed, and, in selected communities, same-sex focus groups were undertaken. The qualitative survey aimed at reconstructing a timeline of conflict and humanitarian aid events. It also covered a free list of responses to specific questions about individual exposure and reaction to the conflict and the presence or absence of humanitarian aid. educational issues were only mentioned marginally by some of the participants. Whenever this information was available, we reported it.

At endline, new modules were added to investigate conflict and aid through both household and village surveys. The endline successfully resurveyed 66 of the baseline villages located in 34 communes in the Mopti Region.[7] Four villages and 91 related baseline households could not be reached because of ongoing conflict. At endline, 210 households were lost to attrition, leading to an overall attrition rate of 22 per cent over the five-year study period (including the four villages that could not be reached at endline) or 15 per cent (excluding those villages). Considering the relatively long follow-up and the large internal displacements occurring during the conflict, these levels of attrition were, to a certain extent, to be expected. Appendix B1 presents descriptive statistics on households in the panel by attrition status. Generally, households that were successfully tracked were larger, with a higher dependency ratio and more school-age children, and belonged to the main ethnic group in the region. Households in villages that could not be resurveyed because of ongoing conflict had more animals (and slightly less land), lived in more remote villages, with less educational infrastructure and less chances to host a past development project. However, villages were perceived as safer by their inhabitants at baseline, and households were more likely to belong to the highest expenditures quartiles.

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[7] In two villages, the village survey could not be completed at endline for logistical reasons. However, because the household data were collected, data from these villages were included in the final sample (N = 148, about 5 per cent of the sample).

Appendix B2 presents baseline household and village predictors of household tracking among households that were resurveyed and for all baseline households. There were a few characteristics that predicted tracking (such as household size, main ethnic group, and school infrastructure), which, however, were mostly common between the two sets of households.

4.2 Measurement of conflict

We measured conflict intensity by using village data, rather than household data, to limit potential endogeneity in the likelihood of a household reporting conflict-related violence and food assistance receipt. The endline village questionnaire included questions about the presence of armed groups in the village and in the commune between 2012 and 2017. We generated a categorical variable that assumed the value of 0 if no armed groups were present in either the village or the commune, 1 if the armed groups were present in the commune surrounding the village, and 2 if the armed groups were present in the village. For descriptive statistics, please refer to appendix C.

4.3 Measurement of food assistance and descriptive statistics

Village and household respondents were asked in the endline survey about their experience with food assistance programmes. To characterize the receipt of food assistance by households, we created the following variables: 'any aid', to measure whether a household received any food assistance (including school feeding, GFD, targeted supplementary feeding, and food-for-work); 'receipt of school feeding' and 'receipt of GFD'. Given the low coverage of supplementary feeding and food-for-work, we did not estimate the impact of these programmes separately.

In the villages, GFD was the most common programme; 51 of 63 village respondents declared GFD was implemented during 2012–2017. School feeding and targeted supplementary feeding were implemented in 26 and 24 villages, respectively. With the exception of three villages, both interventions were implemented where GFD was also present. In two villages, food-for-work was offered alongside GFD. In the household sample, in the two years preceding the endline (2014–2016), 65 per cent of households did not receive any type of aid; 23 per cent of households received GFD; 16 per cent received school feeding; 6 per cent reported that preschool children or pregnant women received targeted supplementary feeding, and 6 per cent of households participated in food-for-work. There was limited overlap among different modalities across households: only 7 per cent of

households received two forms of food assistance or more. If overlap existed, it overwhelmingly involved GFD and school feeding. However, this proportion was small overall; only 61 households (corresponding to less than 5 per cent of the sample) reported contemporaneous receipt of school feeding and GFD. Respectively, 2 per cent and 3 per cent of households reported receipt of GFD and food-for-work, and GFD and supplementary feeding. Given these limited proportions, we did not investigate the issue of complementarity in the effects of receiving two forms of aid as part of the main analyses.

Figure 2 describes the extent to which food assistance programmes reached households by levels of conflict intensity. Households in villages without the presence of armed groups were generally more likely to gain access to any type of food assistance relative to households in areas in which armed groups were present in the commune or in the village. In villages occupied by armed groups, GFD was more common than school feeding; this may have been caused by school closures in those areas (see appendix C).

Figure 2. Mean household access to food programmes, by presence of armed groups
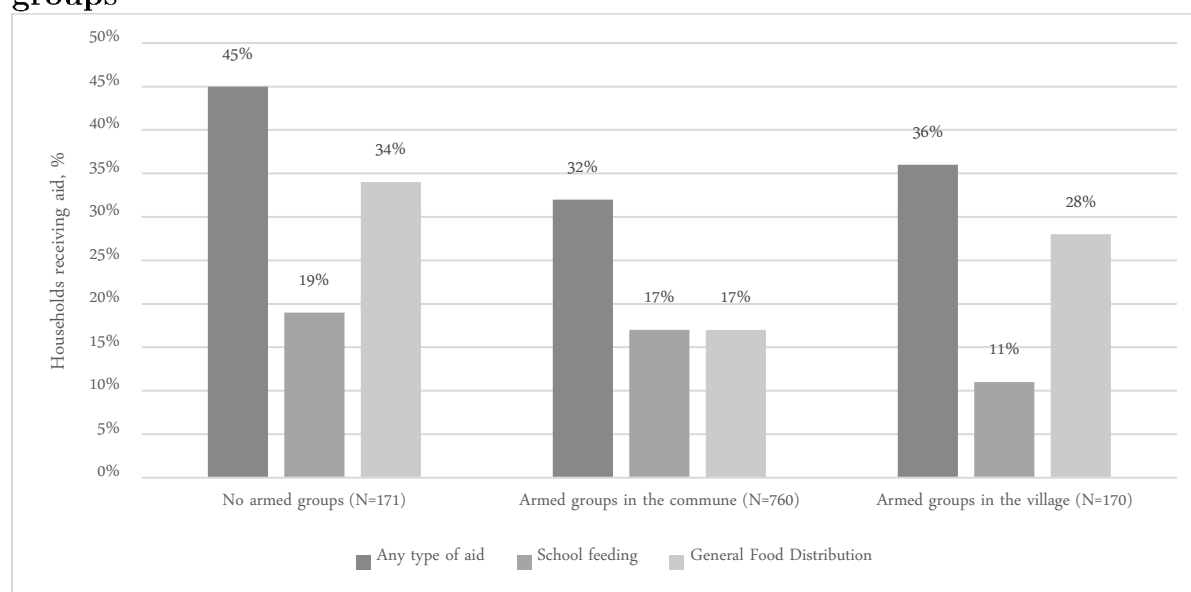
Table 1 presents baseline household and village predictors of the receipt of food assistance at endline. Among households, only belonging to the main ethnic group was negatively associated with GFD. For school feeding, only land was weakly associated with receipt. Among villages, the presence in the past of developmental projects was associated with the receipt of all types of aid, while a lack of safety at baseline was associated with a lower likelihood of receiving GFD. This result suggests that targeting may have been implemented

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based on the viability of delivering aid. This finding seems corroborated by discussions with WFP staff and by regionwide aid distribution statistics on Mopti Region (see appendix A).

[[TABLE 1 ABOUT HERE]]

4.4 Measurement of child education and descriptive statistics

We focus on the following outcomes among children of compulsory school age (7–16 years) at both rounds: school enrolment; attendance, as measured by number of days in which the child has been absent from school in the previous five-day school week (conditional on enrolment); and grade attainment, as measured by the number of years of formal education the child has completed. Information on all these indicators was collected through questions directed to all children in households.

Table 2 presents descriptive statistics on educational outcomes among the sample of children of compulsory school age at both rounds. Overall, school enrolment was 48 per cent at baseline, and decreased to 40 per cent at endline; the largest reductions were among boys (from 48 to 36 per cent). This rate is well below the national average of 57 per cent in 2015 (World Bank, 2017). The proportion of school days missed in the week previous to the survey doubled from baseline to endline; boys showed the largest increases in absenteeism. Grade attainment increased slightly at follow-up, though the overall levels remained extremely low, the average child in both surveys had not completed two years of education.[8] No marked differences between boys and girls emerged. In both rounds, the most common reasons mentioned for being out-of-school included labour (baseline: 28 per cent of respondents; endline: 12 per cent); child's young age (baseline: 8 per cent; endline: 5 per cent); lack of interest in education (baseline: 17 per cent; endline: 28 per cent), and parental refusal to send children to school (baseline: 11 per cent; endline: 23 per cent). Poor school quality or distance to school were not mentioned often (less than 1 per cent and 3 per cent, respectively, in both rounds). At follow-up, 11 per cent of children stated that they were not able to get back to school after the conflict events in 2012–2013. In both rounds, there were gender differences in the reasons for non-participation in school: agricultural labour and animal-rearing were mentioned more often by boys (at endline, 13.5 per cent among boys versus 10.0 per cent among girls), while early marriage and social norms keeping families from sending girls to school were mentioned only by girls. The most frequent incidence of parental refusal to allow children to attend school involved boys (25.0 per cent versus 20.5 per cent among girls). In focus groups, it emerged that the feeling of being

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[8] This is also partly related to the longitudinal design of the study. At baseline, the average age of a child of compulsory school age was 10.8 years (standard deviation = 2.78), while, at endline, the average age went up slightly, to 11.0 years (standard deviation = 2.76).

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abandoned by the state (especially prevalent in villages occupied by armed groups) led some of the boys to join rebel groups.

[TABLE 2 ABOUT HERE]

Figure 3 presents mean education outcomes among school-age children by conflict intensity and gender. As in previous research, children in areas characterized by greater conflict intensity were associated with the lowest educational indicators in the sample (see, for example, Wald and Bozzoli, 2011). Only 17 per cent of children in occupied villages were enrolled, compared with 44 per cent of children residing in villages where armed groups were present in the commune, and 37 per cent of children living in villages without armed groups. Grade attainment in occupied villages was also low; the average child had not even completed a year of education. However, children living in areas without the presence of armed groups had lower outcomes than their peers in areas in which rebels had occupied communes (p < .05 across all indicators). In separate qualitative analysis, households in those areas reported widespread school dropouts because of food shortages, which may help explain this finding. There were no marked differences between boys and girls in areas indirectly affected by conflict and in areas where rebels were present in the commune. The only exception was enrolment in occupied communes: only 40 per cent of boys against 49 per cent of girls were enrolled. In villages where armed groups were present, boys had completed an average of an additional year of schooling relative to girls, but they were also more likely than girls to be absent from school.

Figure 3. Mean educational outcomes at endline among school-age children (aged 7–16), by gender and conflict intensity

Enrolment

% of children currently enrolled

No armed groups: All children 37%, Girls 39%, Boys 35%
Armed groups in the commune: All children 44%, Girls 49%, Boys 40%
Armed groups in the village: All children 17%, Girls 16%, Boys 18%

Legend: All children, Girls, Boys

Absenteeism

Days of absence in the past school week

No armed groups: All children 0.83, Girls 0.8, Boys 0.87
Armed groups in the commune: All children 0.46, Girls 0.45, Boys 0.46
Armed groups in the village: All children 1.43, Girls 1.17, Boys 1.63

Legend: All children, Girls, Boys

Grade attained

Completed years of education

No armed groups: All children 1.63, Girls 1.65, Boys 1.61
Armed groups in the commune: All children 1.94, Girls 1.99, Boys 1.89
Armed groups in the village: All children 0.86, Girls 0.56, Boys 1.11

Legend: All children, Girls, Boys

Note: Enrolment is a binary indicator indicating whether the child was currently enrolled in school; absenteeism is measured as the number of days the child was absent in the five-day school week previous to the survey; grade attained is measured as the number of years of education completed. Conflict intensity is a categorical variable ranging from absence of armed groups to armed groups in the commune and to armed groups in the village. N = 3,556, but information on rebel groups at endline was only available for 3,009 children. N = 480: no armed groups. N = 2,081: armed groups in the commune. N = 448: armed groups in the village.

Figure 4 presents educational outcomes by household receipt of food assistance, including children with access to any type of aid. Children living in households receiving school feeding were more likely to be enrolled than children in other groups. They were also more likely to spend more years in school and to be absent from school less often than their peers not receiving school feeding. Girls in households receiving any type of food assistance were more likely to be enrolled than boys.

Figure 4. Mean educational outcomes at endline among school-age children (aged 7–16), by gender and type of food aid
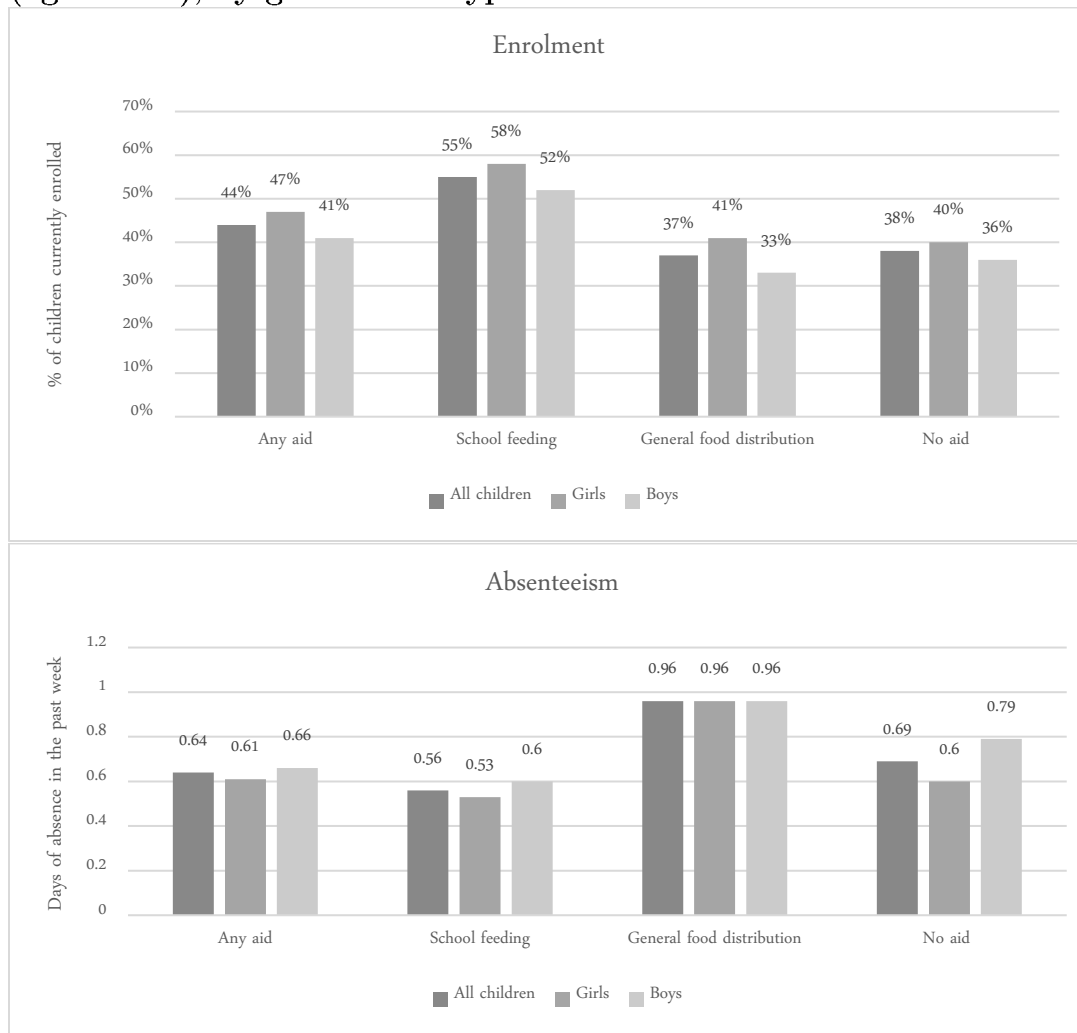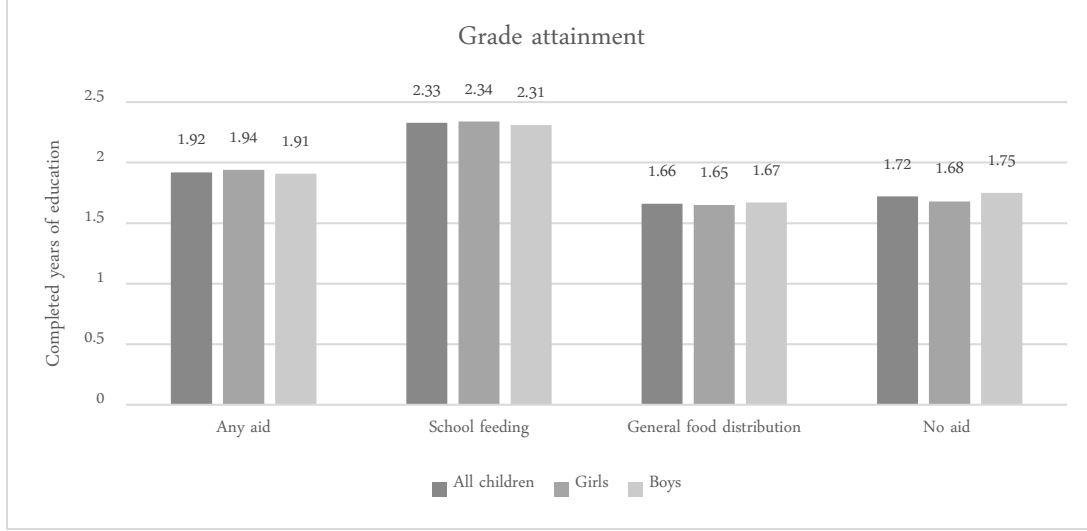
Grade attainment

Note: Enrolment is a binary indicator indicating whether the child was currently enrolled in school; absenteeism is measured as the number of days the child was absent in the five-day school week previous to the survey; grade attained is measured as the number of years of education completed. Any aid, school feeding and food aid are dichotomous variables related to the receipt of any food aid type; school feeding and food aid, respectively, in the 24 months previous to the survey.

5. Methods

5.1 Identification strategy

Because the scale-up of food assistance and exposure to conflict were not random, there are two main challenges in the identification of the impact of food assistance on children's education. First, there is no counterfactual to identify the causal effect of food assistance on education. Second, households may select into food assistance. This may lead to selection bias because household characteristics and the receipt of food assistance may be correlated. More formally, Y_{ih}^1 is the outcome of interest for child i, living in household h that received food assistance A, and Y_{ih}^0 is the outcome for child i from household h not receiving A. Household h either received food assistance or did not receive it so that only one outcome is observed: $Y_{ih=}Y_{ih}^1.P(A=1)+Y_{ih}^0.P(A=0)$, where P indicates the probability of receiving any type of food assistance. The effect of treatment on households, $Y_h^1 - Y_h^0$, therefore remains unknowable. To retrieve the educational effect of food assistance, we need to estimate the average treatment effect on the treated, ATT, which is defined as $E(Y^1 - Y^0)|A = 1$. ATT can be decomposed as follows:

$$ATT = E\left(Y_{i,h}^1 - Y_{i,h}^0\right)|A = 1$$
$$= E\left(Y_{i,h}^1|A = 1\right) - E\left(Y_{i,h}^0|A = 0\right) + \underbrace{E\left(Y_{i,h}^0|A = 1\right) - E\left(Y_{i,h}^0|A = 0\right)}_{\text{Selection bias}} \quad (1)$$

The second part of equation 1 refers to the selection bias that arises if the potential outcomes among treated subjects in the absence of the treatment differ from those among comparison subjects. The direction of the selection bias is not known a priori and depends on the way food assistance has been distributed. WFP project documents highlight the priority to deliver food assistance to the most vulnerable households so that the expected educational outcomes in the case of child i receiving treatment are less favourable than the expected outcomes in the case of a child not receiving food assistance so that $[E(Y_h^0|A = 1) < E(Y_h^0|A = 0)]$. Nonetheless, there may be plausible concerns that the delivery of food assistance may fail to reach the most vulnerable populations because of conflict intensity, remoteness, and financial and logistical challenges so that the educational outcomes in the case of a child receiving aid may potentially be more favourable than the outcomes among children excluded from the programmes, as follows: $[E(Y_h^0|A = 1) > E(Y_h^0|A = 0)]$.

We address these challenges by combining propensity score matching and difference in differences to estimate the ATT (Heckman, Ichimura, and Todd, 1998; Hirano, Imbens, and Ridder, 2003). Through propensity score matching, we estimate the probability that a household receives aid *P(A)*, conditional on a range of baseline household and village characteristics (X) that may be related to both the selection into treatment and child educational outcomes *[X: P (X) = P (A = 1|X)]*. Rosenbaum and Rubin (1983) show that, if selection on observable characteristics is fully controlled for, the conditional outcomes are independent of treatment status, or $(Y_h^0, Y_h^1 \perp A|P(X)$, meaning that $E\left(Y_h^0|A = 1, P(x)\right) = E\left(Y_h^0|A = 0, P(x)\right)$, and ATT is identified (unconfoundness assumption). The weight, w_h, is calculated as $w_h = \frac{1}{\widehat{p_h}}$ for treatment subjects and as $w_h = \frac{1}{1-\widehat{p_h}}$ for control subjects, where $\widehat{p_h}$ is the estimated propensity score for household h. The use of the inverse probability weights adjusts for the systematic imbalances in observable covariates between treatment and comparison households so that the kernel propensity score difference in differences estimator provides an unbiased estimate of ATT under the unconfoundness assumption. To improve the quality of the match, we restrict our matching to the region of common support where the distributions of the density of the propensity score overlap among the treatment and comparison groups. The combination of propensity score matching and the difference in differences estimator is aimed at removing unobserved time-invariant household and

village characteristics that may be associated with child education, food assistance receipt and exposure to conflict. This partially addresses the issue that the unconfoundness assumption does not hold because of unobservable covariates.

Another threat to identification is the possibility that food assistance may exacerbate the conflict and extend its duration (Nunn and Qian, 2014). To disentangle the relation between exposure to conflict and receipt of food assistance, we focused only on conflict events occurring in the aftermath of the coup, when civil unrest was at its peak (2012–2014), while we evaluated the impact of food assistance only in the following period (2014–2016). Thus, we estimated the probability that a household received food assistance during 2014–2016 based on 2012 household and village characteristics and exposure to conflict (in communes and villages) during 2012–2014.

5.2 Econometric analysis

We first estimated treatment effects on the full longitudinal household sample on the underlying hypothesis that households living in communes or villages not directly occupied by armed groups may nonetheless be affected by the conflict. The probability of receiving food assistance A was estimated with a probit estimator by restricting the longitudinal sample to the villages that were successfully resurveyed at endline. The probability of receiving food assistance was modelled through a wide set of baseline household and village characteristics, including the age of the household head, whether the household belongs to the main ethnic group, household consumption expenditure quartile, household size, dependency ratio, number of school-age children, household dietary diversity (number of food groups consumed in the previous week), share of food expenditures in total expenditure, whether the household was polygamous, household head identified as a waged worker, amount of cultivated land, and number of livestock. Village characteristics included presence of a secondary school and of a market within five kilometres, whether a development project was present, whether the village was unsafe, and village conflict exposure during 2012–2014. To address the hypothesis that the implementation of social protection was related to supply-side education indicators (such as school feeding or food aid implemented in communities with better or worse school provision), we also included two scores that measured school infrastructure and school governance through the first component of two separate principal component analyses. For school infrastructure, these included the share of classes with blackboards, whether the school has sufficient classes to avoid obliging pupils to attend outside the school, the availability of sanitation facilities, soap in sanitation facilities, and whether the school has an in situ water source. For school governance, the indicators included the presence of a parent-teacher association, whether the school had

registers, and whether the school had been inspected during the year previous to the study.[9] Baseline tests of balance comparing average outcomes (both weighted and unweighted) across treatment groups were undertaken (Austin, 2009).

Equation 2 presents the regression-equivalent of the difference in differences with covariates and weighting based on the estimated propensity score:

$$Y_{iht,a} = \beta_0 + \beta_1 D2017_h + \beta_2 A_{h,a} + \beta_3\left(D2017_h * A_{h,a}\right) + \gamma_{iht} + \varepsilon_{iht}, \quad (2)$$

where $Y_{iht,a}$ relates to the vector of outcomes of child i living in household h at time t, who receives food assistance type a. $D2017_h$ is the time trend; it is equal to 1 for the endline, zero otherwise. $A_{h,a}$ is an indicator variable for the household receipt of food assistance type a. The parameter of interest is β_3, the treatment effect for food assistance a at endline. γ_{iht} is a vector of additional child-level controls (age, male, an indicator variable for oldest child in the household, and an interaction between status as the oldest child and a male) to increase the precision of the difference in differences estimates. These variables were chosen because they may all influence schooling and labour (Edmonds, 2007). ε_{iht} is a vector of bootstrapped standard errors.

We then estimated the treatment effects by gender and conflict intensity. The propensity score was estimated separately for each subgroup, and the balance of matched covariates was checked.

As robustness checks, we reran the estimates by including the full set of baseline villages in the estimation of the propensity score. Furthermore, we dealt with the hypothesis that the overlap between the receipt of school feeding and general food assistance for a subset of the sample may affect our results. We addressed this issue by including the receipt of school feeding as one of the covariates in the regressions for the propensity score in the estimates related to the impact of GFD, and, vice versa, we included the receipt of GFD as a covariate in the propensity score for the impact estimates related to school feeding. Finally, we restricted the sample to the longitudinal sample of children aged 7–10 years at baseline, which, at endline, were still of compulsory school age, to investigate whether this affected the results.

6. Treatment effects

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[9] The inclusion of these as separate indicators did not change our main results (available upon request).

6.1 Main results

In the full sample, the estimated densities of propensity scores between treatment and comparison groups displayed a high degree of overlap across all food assistance modalities (appendix D, figures D1-D3). Table D1 reports the baseline characteristics between treated and untreated households at baseline in the original unmatched samples. Treated and untreated households were different in a number of household and village characteristics. Table D2 presents the comparison of baseline characteristics between treated and untreated households in the matched sample. After applying the propensity score weights in the matching, all the standardized differences in the baseline covariates were below 10 per cent, which is the usual threshold for potentially problematic imbalances in the distribution of baseline characteristics (Austin, 2009). We conclude that the propensity score matching was fairly effective in eliminating observable sources of selection bias. We also conducted separate balance analyses for the subsamples of boys and girls, and, in both cases, found no differences above the threshold for unbalanced covariates (available upon request).

The impact estimates for child education are reported in table 3. Panels A, B and C report treatment effects for enrolment, absenteeism and grade attainment, respectively. School feeding had a positive impact on children's enrolment; there was an increase of about 11 percentage points in the probability of enrolment for treatment children relative to children in the comparison group. This is a large increase, particularly in light of the low enrolment rates in Mali, and was equivalent to one fifth the standard deviation in the endline enrolment rate. No gender differences in the effect of school feeding on enrolment were evident. School feeding also positively affected grade attainment; treated children achieved an average of more than an additional half-year of education compared with comparison peers. The school feeding effect was slightly larger among girls, who achieved an additional 0.6 years relative to boys. There was no significant effect of school feeding on absenteeism.

By contrast, the receipt of GFD did not change enrolment and had a negative, but not significant effect on the grade attained. The receipt of GFD increased absenteeism by more than a half schoolday per week among both boys and girls. This result was driven by boys: those living in households receiving GFD were absent an average of an additional day per week (an increase of 20 per cent over boys in the control group), while, among girls, the point estimate was positive, but not statistically different from zero. A similar increase in absenteeism associated with receiving take-home rations was documented in rural Burkina Faso by Kazianga, de Walque, and Alderman (2012), .

Overall, these findings highlight that the two programmes had diverging impacts in

terms of children's schooling and that school feeding had a large effect on enrolment rates and attainment, while GFD appeared to increase absenteeism. The impacts of both programmes on education also varied by child gender. Robustness checks are reported in appendix E.

[TABLE 3 ABOUT HERE]

6.2 Heterogeneity by conflict exposure

The propensity score estimation and balance tests were repeated separately in the three conflict intensity subgroups (available upon request). All weighted baseline covariates among the different forms of food assistance were balanced in the subgroup of villages indirectly affected by the conflict and in villages where armed groups were only present in the communes.[10] However, there were numerous unbalanced covariates in the subgroup of villages occupied by armed groups, most likely because of the small number of observations involved. This subgroup was therefore excluded from the estimations. To avoid losing this information, we merged the two conflict-affected subgroups into a single group along with villages in which rebels were present either in communes or villages, for which the balance of matched covariates was satisfying. Subgroup analysis by degree of conflict exposure and gender was not possible because of the small sample sizes and the additional imbalances in matched covariates.

Table 4 presents treatment effects by conflict intensity. Table 3, panels A, B and C report treatment effects in enrolment, absenteeism and grade attainment, respectively, for each of three groups of conflict intensity (that is, no armed groups, armed groups in communes, and armed groups in communes or villages). Overall, any type of aid received had a positive effect on enrolment only in the case of households residing in occupied communes, which showed a 12 percentage point increase in the probability of being enrolled. There was no impact of school feeding on enrolment in any of the three groups. School feeding had no statistically significant effects on absenteeism in conflict-affected subgroups, but it increased grade attainment in villages indirectly affected by conflict events; the average increase was about 0.6 additional school years.

[TABLE 4 ABOUT HERE]

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[10] One exception was the index of school governance in the case of communities indirectly affected by conflict, according to which the difference in the case of any aid and the case of food aid was 0.12. This was only marginally higher than the critical threshold of 0.1; we therefore do not view this as evidence of strong imbalances in the matched samples.

The negative effect of food aid on school attendance observed in the full sample was mostly driven by the villages most directly affected by conflict. While GFD had no effect on child absenteeism in villages where no armed groups were present, the receipt of GFD led to increases of 0.4 and about 0.8 additional absentee days in villages where armed groups were present in the communes and in villages where armed groups were present in the communes or villages, respectively.

6.3 Exploring pathways of impact: child labour

Child labour is an important response strategy in the face of shocks such as conflict, potentially leading to increased absenteeism and dropouts (see section 2). In this subsection, we test whether changes in child labour by type of food assistance may explain the differential effects of school feeding and GFD on schooling, as well as the observed gender differences in attendance induced by GFD. The household surveys collected information on the labour of all household members who had been above 5 years of age during the previous calendar year. Three dichotomous indicators of participation in labour among children of mandatory school age were developed: participation in any work (including farm work, housework and waged or business work), participation in farm work (including agriculture and animal-rearing activities) and participation in housework (household chores and care). Participation in waged or business work was not included as a separate outcome because its prevalence was extremely low (about 2 per cent in both survey rounds). The household survey included follow-up questions on the number of months in which children were involved in any specific activity, which enabled the generation of three additional indicators on the duration (in months) of participation in any work activity. For the category related to the duration of any type of work, we summed the months spent in all activity types for each child, for a maximum of 12 months. The descriptive statistics presented in appendix F1 show that, consistent with the expectations of increased participation following the multiple shocks of conflict and drought and the noted decreases in school participation, involvement in child labour activities rose markedly between survey rounds. Also, they highlight a gendered pattern of participation in labour: boys were more involved in farm-related activities, and girls were more likely to work within the household.

Table 5 illustrates the treatment effects of food assistance on participation in labour (panels A1–C1) and the duration of work (panels A2–C2) among school-age children. We report three main findings. First, consistent with the educational results, the receipt of GFD led to marked increases in the probability of participating in any type of activity by about 12 percentage points for the full sample. This translated to about an additional month of work in any activity in the previous year (panel A2). Though the coefficients for the

treatment effects for school feeding were suggestive of a protective effect (that is, a decline in participation and time spent in labour), the impacts were not statistically significant across the full sample.

[TABLE 5 about here]

Second, important gender heterogeneities were present. Although GFD increased the probability of any work involvement in the full sample, these effects appear to have been driven by boys (panel A1). Boys showed a 20 percentage point increase relative to comparison peers (significant at 1 per cent) in the likelihood of involvement in any work activities. The treatment effect among girls in GFD was also positive, but the point estimate was smaller among girls than among boys and only significant at 10 per cent. In terms of average time spent in labour, receiving GFD translated to about 1.5 additional months spent by boys in all work activities considered (panel A2). By contrast, school feeding decreased the participation of girls in any labour activities by about 10 percentage points, which accounted for a reduction in work time of about one month per year.

The indicators on participation in farm-related labour and housework shifted in opposite directions among boys and girls. In the case of girls, school feeding led to a decrease in the time spent on farming and animal-rearing by nearly one month, while no significant changes in housework were evident. By contrast, among boys, the probability of participating in farm work increased across all food assistance types and for GFD by about 13 percentage points. Also, boys receiving GFD showed a 9 percentage point greater likelihood of working at household chores and care, leading to a rise of about one additional month spent in these activities relative to comparison peers.

We disaggregated the estimates by exposure to conflict intensity to test whether the shifts in child work were larger in areas that were most affected by conflict events. The results reported in appendix table F2 show that this seemed to be the case, especially for any work and farm activities. This is coherent with the fact that child labour may increase especially where the conflict-related shocks were larger, as documented in appendix C.

Overall, these results corroborate the gendered division of work observed in the descriptive statistics and related gender differences in the opportunity costs of schooling, which may also explain the differences in attendance between boys and girls. Among girls, school feeding led to a shift away from farm work because these activities may be less compatible with schooling. A similar finding was reported by Kazianga, de Walque, and Alderman (2012). However, among boys, the receipt of any programme, but particularly

GFD, led to increases in any type of work. We can speculate that, if the opportunity cost of schooling had been higher among boys (for example, because of the greater involvement of boys in farm work and animal-rearing activities), particularly in areas characterized by higher conflict intensity, the income effect stemming from the receipt of either food programme was not sufficient to shield boys from the increased demand for their labour following the multiple shocks generated by the conflict and drought. The largest increases in the participation of boys in work were among children in the GFD group. This may provide a plausible mechanism for the documented increases in school absenteeism among boys living in households receiving this type of food assistance.

7. Discussion and Conclusions

In this paper, we examine the educational impacts of two emergency food-based social protection programmes during the recent political crisis in Mopti, Mali. School feeding had a positive impact on school enrolment and grade attainment. Children in households receiving school meals were 10 percentage points more likely to be enrolled in school, and they had completed an average of nearly an additional half-year of education relative to children in the comparison group. GFD, by contrast, had no significant effects on enrolment and attainment and led to reductions in school attendance (about an additional half-day of absence per week). Important gender differences were also found. School feeding led to slightly larger gains in attainment among girls, while boys in households receiving GFD drove the decreases in attendance by missing about an additional day of school per week relative to comparison boys.

These remarkable results can be explained by how the programmes were able to offset the opportunity costs of education relative to participation in child labour. These costs were already high in a setting characterized by structural food insecurity and protracted fragility, such as in Mopti, and were compounded by conflict. Treatment effects on child labour by aid type mirrored the findings on education: school feeding in the case of girls led to marked declines in participation and time spent in any work activity, especially farm labour. Decreases in farm labour among girls may be more compatible with school attendance, the key condition for receiving the free meals. GFD does not appear, however, to have offset the benefits of child labour among boys, for whom the opportunity cost of schooling can be higher because of their greater involvement in farm-related activities. Boys expanded their participation in any work, particularly in high-intensity conflict areas and among those living in GFD households. These results highlight that labour constraints are important in making between schooling and productive activities among various household members.

In a complementary analysis, we find that food assistance had important protective effects on household food security (Tranchant et al., 2018). Though both GFD and school feeding were beneficial, the effect sizes differed by type of food assistance, and GFD had larger effects on food expenditures. The combined findings of the studies suggest there are important trade-offs to consider in examining the potential for providing food assistance during conflict. These trade-offs not only depend on the costs and feasibility of providing assistance in conflict-affected areas, as highlighted in Tranchant et al. (2018), but also on the multidimensional risks that vulnerable households and their individual members face during conflict. Overall, these results highlight that the joint programming of school feeding and GFD activities in conflict areas (which is currently not generally undertaken by WFP) may help account for and take advantage of these trade-offs and complementarities within and across programmes through a more coherent approach to designing and delivering emergency food assistance. However, joint programming may also have implications in terms of lowering beneficiary coverage, which is another important trade-off in humanitarian assistance.

This study has limitations. First, we do not have data that facilitate a study of the impacts of food assistance on learning, which is the ultimate goal of any educational system and the priority in the educational agenda of the Sustainable Development Goals. However, in the absence of complimentary supply-side interventions and given the low quality of the Mali educational system (particularly during the crisis), we would expect little or no effects. Nonetheless, incentivizing school participation, attendance, and attainment can contribute to other important dimensions of child development in conflict, such as feelings of normalcy and safety, and may delay child marriage especially among girls and lead to positive outcomes among girls and their children. This is particularly relevant in Mali, where recent estimates have documented that about one woman aged 18–22 in two had a child before age 18, and 13 per cent had a child before age 15 (Malé and Wodon, 2016). In contrast to other countries, the share of early childbirth has been expanding, particularly among rural and uneducated girls. Accordingly, by keeping girls in school longer, school feeding may also contribute to this additional goal.

Attrition among households and villages is an additional concern. Specifically, at follow-up, four villages were lost to attrition because of the extreme levels of insecurity and, for this reason, the sample is not representative of the broader population in Mopti, nor perhaps of groups that are most vulnerable to the detrimental effects of conflict. However, the inclusion of all baseline households in the estimation of the propensity score did not

affect our results. Moreover, households that were lost to follow-up were less likely to be economically vulnerable than the households included in the longitudinal sample, a finding that is consistent with feedback from in-depth interviews during the formative stages of this study, where respondents highlighted that more well off households were the first to leave when conflicts began. Attrition rates were, however, similar among both treatment and comparison groups for all forms of aid. Attrition is, in this case more, thus likely to threaten external validity than internal validity.

Important questions remain on the provision of humanitarian aid during conflict. For instance, as with cash transfers, it may that variations in the size and duration of the transfers may influence the impact of both programmes, but particularly GFD, in different ways. This also has implications in terms of the costs of both programmes, as well as for the different modalities of the same programme (such as cooked meals versus snacks). Also, how should one go about optimizing food assistance to balance the trade-offs between education goals and food security goals? This remains an important area for further research. A related question is whether the positive effects of school feeding may arise only while the programme is being implemented or can improvements in attendance and school completion be sustained over the long term. Additional research might also investigate whether complementary interventions, including other forms of social protection or supply-side educational investments, may enhance the effects of these programmes.

In a world in which conflicts and other humanitarian crises are the sad daily reality among millions of children and their families, the promise of social protection for all included in Sustainable Development Goal 1 cannot be realized without sound evidence on what works and why in different contexts. This research highlights the potential for interventions to protect vulnerable children and the important trade-offs involved in the design of policies and programmes focusing on these populations, as well as the important evidence gaps that still remain.

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indicators.

Table 1. Predictors of aid receipt at endline

	Any aid	School feeding	Food aid
Household size	0.005	0.006	−0.001
	(0.007)	(0.005)	(0.006)
Dependency ratio	0.014	0.021	0.016
	(0.027)	(0.019)	(0.027)
Second expenditure quartile	0.005	−0.048	0.021
	(0.053)	(0.046)	(0.043)
Third expenditure quartile	−0.013	−0.059	0.057
	(0.064)	(0.053)	(0.050)
Fourth expenditure quartile	0.028	−0.014	0.072
	(0.064)	(0.057)	(0.052)
Number of school-age children	0.002	−0.018	−0.001
	(0.017)	(0.013)	(0.014)
Main ethnic group	−0.142*	0.006	−0.162**
	(0.074)	(0.049)	(0.073)
Age of household head	−0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)
Share of food on total expenditure	0.064	−0.127	0.165
	(0.145)	(0.115)	(0.123)
Household dietary diversity	−0.018	−0.013	−0.007
	(0.015)	(0.011)	(0.015)
Household is polygamous	−0.015	−0.016	−0.006
	(0.042)	(0.033)	(0.039)
Household head is worker	0.109	−0.001	0.143
	(0.102)	(0.057)	(0.114)
Land size	0.000	0.008*	−0.006
	(0.005)	(0.004)	(0.004)
Secondary school less than 5km	0.038	−0.027	0.048
	(0.078)	(0.054)	(0.075)
Market less than 5km	−0.123	−0.005	−0.112
	(0.087)	(0.059)	(0.075)
Village had past development projects	0.158**	0.093**	0.099*
	(0.063)	(0.045)	(0.055)
Village is very unsafe	−0.205*	0.022	−0.221***
	(0.109)	(0.113)	(0.064)
Number of cattle owned by household	−0.002	0.000	0.000
	(0.006)	(0.004)	(0.005)

School infrastructure index	0.012	0.003	0.019
	(0.033)	(0.024)	(0.035)
School governance index	0.022	0.001	0.031
	(0.034)	(0.026)	(0.024)
Constant	0.445**	0.239	0.252
	(0.220)	(0.153)	(0.216)
Observations	870	870	870
R-squared	0.056	0.041	0.069

Note: OLS regressions with standard errors (in parentheses) clustered among villages.

* $p < .1$ ** $p < .05$ *** $p < .01$

Table 2. Descriptive statistics of child enrolment, grade attainment and absenteeism, by survey round and child gender

	Baseline	*Endline*	*Difference*
	Enrolment		
Full sample	0.49	0.40	0.09*** (7.39)
	(0.50)	(0.49)	
	[3373]	[3556]	
Girls	0.50	0.43	0.07*** (4.11)
	(0.50)	(0.50)	
	[1577]	[1702]	
Boys	0.48	0.36	0.11*** (6.38)
	(0.50)	(0.48)	
	[1800]	[1854]	
	Absenteeism		
Full sample	0.39	0.67	-0.27*** (-5.62)
	(1.21)	(1.38)	
	[1453]	[1430]	
Girls	0.35	0.61	-0.26*** (-4.07)
	(1.13)	(1.32)	
	[709]	[733]	
Boys	0.42	0.67	-0.29*** (-3.95)
	(1.28)	(1.43)	
	[744]	[697]	
	Grade attainment		
Full sample	1.46	1.79	−0.30*** (−5.65)
	(2.02)	(2.37)	
	[3373]	[3546]	
Girls	1.41	1.78	−0.355*** (−4.75)
	(1.98)	(2.26)	

	[1577]	[1701]	
Boys	1.51	1.71	−0.253*** (−3.34)
	(2.06)	(2.40)	
	[1800]	[1845]	

Note: The table shows difference in differences estimates with propensity scores on children aged 7–16 years. Enrolment is a binary indicator showing whether the child was currently enrolled in school. Absenteeism is measured as the number of days in the five-day school week previous to the survey in which the child was absent (conditional on enrolment). Grade attained is measured as the number of years of education completed. Means and standard deviation are shown in parentheses; observations are in squared brackets. Differences in means and t-statistics are also shown in parentheses.

* p < .1 ** p < .05 *** p < .01

Table 3. Impact of food assistance on child education, full sample and stratified by gender

	Any aid	School feeding	General food distribution
	Enrolment		
Full sample	0.051	0.101**	0.031
	(0.035)	(0.040)	(0.044)
	[4,296]	[4,219]	[4,267]
Girls	0.033	0.112*	−0.000
	(0.048)	(0.066)	(0.063)
	[1,885]	[1,827]	[1,869]
Boys	0.086*	0.113**	0.029
	(0.049)	(0.052)	(0.052)
	[2,104]	[2,101]	[2,063]
	Absenteeism		
Full sample	−0.071	−0.089	0.529***
	(0.169)	(0.157)	(0.190)
	[1,403]	[1,293]	[1,321]
Girls	−0.101	−0.117	0.430
	(0.197)	(0.251)	(0.273)
	[667]	[654]	[613]
Boys	0.066	0.359	0.982***
	(0.238)	(0.226)	(0.303)
	[649]	[636]	[628]
	Grade attainment		
Full sample	0.040	0.551***	−0.222
	(0.126)	(0.176)	(0.142)
	[4,283]	[4,194]	[4,261]
Girls	0.067	0.628***	−0.229
	(0.201)	(0.232)	(0.249)
	[1,884]	[1,825]	[1,867]
Boys	0.124	0.523**	−0.272
	(0.193)	(0.215)	(0.290)
	[2,098]	[2,093]	[2,057]

Note: The table shows difference in differences estimates with propensity scores. Estimates include child age, gender, a dichotomous variable for the first-born child and whether the first-born was male. Bootstrapped standard errors are shown in in parentheses. Enrolment is a binary indicator showing whether the child was currently enrolled in school (conditional on enrolment). Absenteeism is measured as the number of days in the

five-day school week previous to the survey in which the child was absent. Grade attained is measured as the number of years of education completed.

* p < .1 ** p < .05 *** p < .01

Table 4. Impact of food assistance on child education, by intensity of exposure to conflict

	Any aid	School feeding	General food distribution
Panel A. Enrolment			
No armed groups	0.016	0.037	−0.087
	(0.043)	(0.070)	(0.080)
	[1,765]	[1,754]	[1,560]
Armed groups in the commune	0.118**	0.110	0.098
	(0.048)	(0.070)	(0.060)
	[2,056]	[1,924]	[1,797]
Armed groups in the commune or in the village	0.083	0.091	0.012
	(0.055)	(0.063)	(0.055)
	[2,519]	[2,219]	[2,553]
Panel B. Absenteeism			
No armed groups	−0.032	0.492	−0.043
	(0.254)	(0.299)	(0.309)
	[589]	[521]	[486]
Armed groups in the commune	0.276	−0.148	0.419**
	(0.211)	(0.245)	(0.199)
	[773]	[621]	[591]
Armed groups in the commune or in the village	0.200	0.100	0.773***
	(0.194)	(0.221)	(0.249)
	[856]	[745]	[790]
Panel C. Grade attainment			
No armed groups	0.050	0.609***	−0.125
	(0.242)	(0.210)	(0.351)
	[1,756]	[1,746]	[1,551]
Armed groups in the commune	0.079	0.339	−0.124
	(0.216)	(0.293)	(0.232)
	[2,056]	[1,918]	[1,793]
Armed groups in the commune or in the village	0.040	0.365	−0.262
	(0.171)	(0.305)	(0.225)
	[2,517]	[2,217]	[2,545]

Note: The table shows difference in differences estimates with propensity scores. Estimates include child age, gender, a dichotomous variable for the first-born child and whether the first-born child was male. The number of observations is indicated in square brackets. Enrolment is a binary indicator showing whether the child was currently enrolled in school. Absenteeism is measured as the number of days in the five-day school week previous to the survey in which the child was absent (conditional on enrolment). Grade attained is measured as the number of years of education completed. Conflict intensity is defined by three dichotomous indicators: households residing where no armed groups were present in the local village or commune; households residing where armed groups were present in the local commune only; and households residing where armed groups

where present in either the local commune or the local village. It was not possible to estimate the effect of aid in villages directly occupied by armed groups because there were insufficient observations to ensure balance in the propensity scores between treatment and comparison groups.

* p < .1 ** p < .05 *** p < .01

Table 5. Impact of food assistance on child labour, full sample and stratified by gender

	Any aid	School feeding	General food distribution	Any aid	School feeding	General food distribution
	A1. Participation in any work			**A2. Months spent in any work**		
Full sample	0.078**	-0.023	0.123***	0.538	-0.553	0.976**
	(0.032)	(0.037)	(0.030)	(0.358)	(0.456)	(0.407)
	[4,084]	[4,024]	[4,043]	[4,083]	[4,017]	[4,053]
Girls	0.004	-0.098*	0.081*	0.256	-1.039*	0.893
	(0.056)	(0.059)	(0.045)	(0.552)	(0.552)	(0.622)
	[1,793]	[1,717]	[1,773]	[1,794]	[1,717]	[1,774]
Boys	0.142***	0.070	0.200***	0.878*	0.414	1.537***
	(0.047)	(0.050)	(0.055)	(0.510)	(0.580)	(0.541)
	[2,036]	[2,032]	[1,990]	[2,036]	[2,032]	[1,990]
	B1. Participation in farm labour			**B2. Months spent in farm labour**		
Full sample	0.029	-0.035	0.047	-0.166	-0.889***	-0.243
	(0.026)	(0.036)	(0.037)	(0.245)	(0.270)	(0.261)
	[4,078]	[4,023]	[4,052]	[4,080]	[4,026]	[4,049]
Girls	-0.052	-0.102	-0.039	-0.511	-0.975*	-0.658
	(0.053)	(0.064)	(0.060)	(0.335)	(0.510)	(0.415)
	[1,793]	[1,716]	[1,773]	[1,794]	[1,716]	[1,774]
Boys	0.130***	0.078	0.133***	0.105	-0.445	-0.119
	(0.044)	(0.063)	(0.046)	(0.499)	(0.543)	(0.534)
	[2,036]	[2,030]	[1,994]	[2,036]	[2,032]	[1,994]
	C1. Participation in housework			**C2. Months spent in housework**		
Full sample	0.049	0.028	0.048	0.348	-0.099	0.512
	(0.031)	(0.037)	(0.039)	(0.366)	(0.482)	(0.418)
	[4,079]	[4,019]	[4,048]	[4,074]	[4,027]	[4,044]
Girls	0.044	-0.022	0.089	0.237	-0.807	0.775
	(0.052)	(0.058)	(0.061)	(0.555)	(0.698)	(0.538)
	[1,794]	[1,716]	[1,773]	[1,794]	[1,716]	[1,774]

Boys	0.053	0.072	0.083*	0.493	0.643	0.964*
	(0.039)	(0.051)	(0.046)	(0.459)	(0.607)	(0.572)
	[2,036]	[2,034]	[1,994]	[2,036]	[2,030]	[1,994]

Note: The table shows difference in differences estimates with propensity scores. Estimates include child age, gender, a dichotomous variable for first-born child and whether the first-born is male. Bootstrapped standard errors are in parentheses. Panels A1–C1 are binary indicators equal to 1 if the child reported being involved in any type of work (including farm, housework and waged or business work), farm work and housework, respectively. Panels A2–C2 report estimates on outcomes related to months spent in any work, farm work and housework in the past 12 months.

* p < .1 ** p < .05 *** p < .01

Supplementary materials

Appendix A. WFP food assistance and coverage in Mopti

Table A1 presents WFP humanitarian activities in Mopti. Data on WFP beneficiaries were obtained for 2014 and 2015. In Mopti, WFP supported 228,649 beneficiaries in 2014 and 135,456 beneficiaries in 2015 after it scaled down its operations. The breakdown of beneficiaries and coverage by cercle (second-level administrative unit after region) is summarized in figure 2. WFP activities covered approximately 10 per cent of the Mopti population in 2014 and 6 per cent of the population in 2015. Average coverage between 2014 and 2015 appeared to be heterogeneous across the Mopti Region, peaking at 22 per cent of households in Bandiagara cercle, and was lowest in the cercles of Djenné and Koro (less than 1 per cent coverage). Overlaying the study villages in the maps on coverage suggested that the study population was exposed to varying degrees of humanitarian assistance (figure A1). The exact targeting mechanism of cercles and households is unclear. Some variation in coverage may be attributed to delays or the impossibility of delivering assistance because armed groups blocked the access to roads in certain areas. To a lesser extent, there was some temporal variability in the mean coverage of WFP activities across regions (figure A2).

Table A1. Interventions included in WFP food assistance activities, since January 2013

Intervention	Targets	Objectives	Activities
Generalized food aid	Food-insecure or internally displaced populations. Woman-headed households, households that have lost income or assets, and households with elderly or disabled people	Assist all accessible moderately and severely food-insecure households and non-displaced persons, displaced persons, and host communities	Provide 2,100 kilocalories per person per day, consisting of cereals, pulses, vegetable oil and salt, with super cereal to increase micronutrient intake
School feeding	Primary school children in areas with high food insecurity	Prevent hunger and provide incentives to arrive on time and attend school until lunchtime; school attendance also reduces the exposure of children to other risks.	Two daily meals will be provided: a morning porridge of super cereal and a midday meal consisting of cereal, pulses, vegetable oil and salt.
Blanket supplementary feeding	Children aged 6–59 months; pregnant and lactating women	Blanket supplementary feeding to help prevent an increase in acute malnutrition	Provide children a half-sachet of Plumpy'Sup per day. Provide super cereal and vegetable oil to pregnant and lactating women. Nutrition and hygiene messages for mothers.
Targeted supplementary feeding	Children aged 6–59 months with moderate acute malnutrition; malnourished pregnant and lactating women	Treat moderate and acute malnutrition among children 6–59 months and malnourished pregnant and lactating women	Targeted supplementary feeding, providing 92 grams of Plumpy'Sup per day. Rely on partners and community health worker screening and referral capacities, as well as functioning health centres
Food-for-work	Vulnerable and food insecure rural households	Empower people to meet their own needs by using food as an incentive	Communities identify projects that are able to improve their livelihoods and food security. The food incentive is distributed

			to localities according to the level of labour provided

Figure A1: Number of beneficiaries and estimated mean coverage of food assistance activities by WFP, Mopti Region, 2014–2015
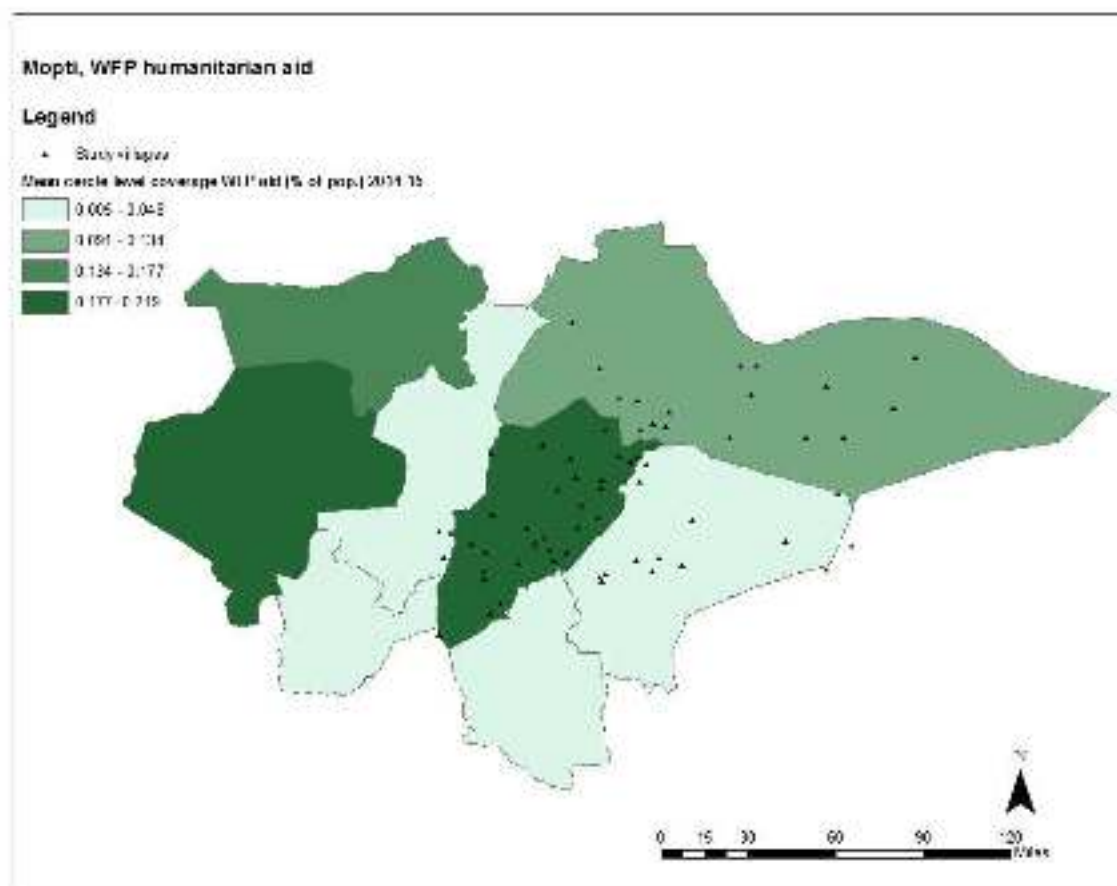
Note: Elaboration based on WFP data.

Figure A2. Beneficiaries and estimated mean coverage of food assistance activities by WFP, Mopti Region, by cercle, 2014–2015
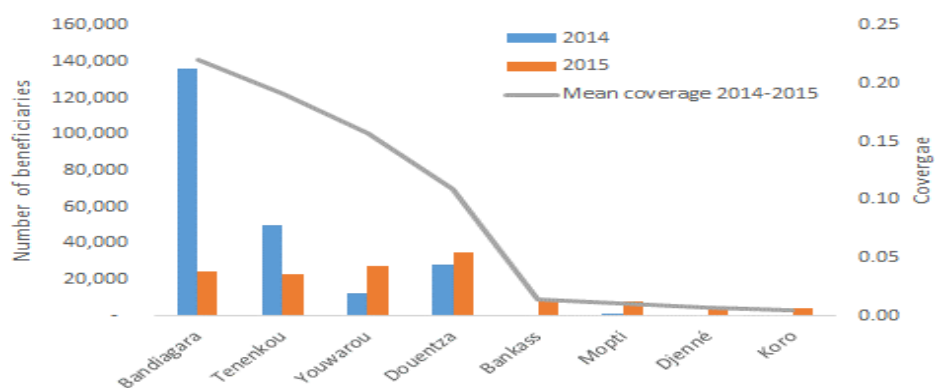
Source: Elaboration on WFP data.
Note: 2016 data were not available.

Appendix B. Attrition

Table B1. Household and village characteristics at baseline

	Panel households in the 66 villages that were resurveyed at endline	Households lost to follow-up in villages resurveyed at endline	Difference panel versus households lost to follow-up in villages resurveyed at endline[a]	Households in villages that could not be reached at endline	Difference all households in villages that were resurveyed at endline and villages that could not be reached[a]
Dependency ratio	1.72	1.38	***	1.62	
	(0.85)	(0.87)		(0.79)	
Household size	9.65	6.20	***	6.36	***
	(3.43)	(2.49)		(2.25)	
Second expenditure quartile	0.25	0.20		0.16	
	(0.43)	(0.40)		(0.37)	
Third expenditure quartile	0.25	0.24		0.41	***
	(0.43)	(0.43)		(0.49)	
Fourth expenditure quartile	0.25	0.38	***	0.43	**
	(0.44)	(0.49)		(0.50)	
Number of school-age children	2.64	1.98	***	2.23	*
	(1.45)	(1.22)		(1.13)	
Main ethnic group	0.84	0.73	***	0.52	***
	(0.37)	(0.44)		(0.50)	
Age of household head	49.63	51.50	*	46.63	*
	(12.32)	(13.90)		(11.91)	
Share of food on total expenditure	0.74	0.77	**	0.74	
	(0.14)	(0.13)		(0.10)	
Household dietary diversity	6.79	6.60	*	6.77	
	(1.31)	(1.36)		(1.15)	
Household is polygamous	0.34	0.21	***	0.16	**
	(0.47)	(0.41)		(0.37)	
Household head is worker	0.04	0.08	*	0.08	
	(0.20)	(0.27)		(0.27)	
Land size	3.72	3.50		3.22	
	(4.11)	(3.77)		(2.67)	
Number of cattle owned by household	3.09	2.96		4.34	***
	(2.90)	(2.78)		(3.04)	
Secondary school less than 5km	0.36	0.34		0.00	***
	(0.48)	(0.47)		(0.00)	
Market less than 5km	0.27	0.25		0.00	***
	(0.44)	(0.43)		(0.00)	
Village had past development projects	0.60	0.57		0.46	*

	(0.49)	(0.50)		(0.50)	
Village is very unsafe	0.07	0.07		0.00	*
	(0.25)	(0.26)		(0.00)	
School infrastructure index	0.02	0.07		-0.56	***
	(0.99)	(1.02)		(0.75)	
School governance index	0.00	-0.03		0.15	
	(1.01)	(0.95)		(0.85)	
Observations	1264	210		91	

Note: Means and standard deviations in parentheses.

a. Reports the level of statistical significance of the difference between the means of the groups.

* p < .1 ** p < .05 *** p < .01.

Table B2. Baseline household and village predictors of five-year tracking of households, villages on which there was complete information at follow-up and all baseline villages

	Household in all villages at follow-up, N = 66	All villages at baseline, N = 70
Household size	0.039***	0.049***
	(0.005)	(0.007)
Dependency ratio	−0.006	−0.010
	(0.016)	(0.016)
Second expenditure quartile	−0.010	−0.037
	(0.032)	(0.036)
Third expenditure quartile	−0.010	−0.067
	(0.028)	(0.049)
Fourth expenditure quartile	−0.047	−0.096*
	(0.031)	(0.050)
Number of school-age children	−0.012	−0.024**
	(0.008)	(0.010)
Main ethnic group	0.105**	0.165*
	(0.047)	(0.085)
Age of household head	−0.000	0.001
	(0.001)	(0.001)
Share of food on total expenditure	−0.065	−0.035
	(0.086)	(0.092)
Household dietary diversity	0.011	0.015
	(0.007)	(0.010)
Household is polygamous	−0.051*	−0.050
	(0.026)	(0.034)
Household head is worker	−0.105	−0.102
	(0.065)	(0.070)
Land size	−0.001	−0.001
	(0.003)	(0.003)
Number of cattle owned by household	−0.005	−0.011**
	(0.003)	(0.005)
Secondary school less than 5km	−0.021	0.023
	(0.026)	(0.041)
Market less than 5km	0.012	0.055
	(0.027)	(0.033)
Village had past development projects	0.028	0.043
	(0.023)	(0.049)
Village is very unsafe	0.026	0.095
	(0.041)	(0.078)
School infrastructure index	−0.025***	−0.013
	(0.009)	(0.028)
School governance index	−0.005	−0.019
	(0.010)	(0.022)
Constant	0.456***	0.240*

	(0.118)	(0.140)
Observations	1,037	1,124
R-squared	0.148	0.219

Note: OLS regressions with standard errors clustered on villages.

* p < .1 ** p < .05 *** p < .01

Appendix C. Intensity of conflict exposure

The presence of armed groups during 2012–2017 was reported in 10 of 64 villages. This presence was quite stable: 70 per cent of these villages reported the presence of armed groups at follow-up. Most village leaders (85 per cent; N = 48) reported the presence of armed groups in the communes.

The presence of armed groups was detrimental for the local population: 9 out of 10 local leaders in villages where armed groups were present reported episodes of violence against civilians. Armed groups were perceived as a threat to livelihoods and safety. Village data highlighted that the armed groups did not act to substitute for the state, that is, no village leader reported that armed groups raised taxes, provided services, or administered local justice. While no infrastructural damage was reported among schools and health centres, there were frequent reports of closure because of the flight of Government personnel. Thus, 14 primary schools stopped functioning because of the lack of teachers. Of these, half were closed in the aftermath of the 2012 coup, and the remaining ones stopped functioning between 2013 and early 2014. The closed schools were not all located in the villages where the rebel groups were present. Three schools were in areas where armed groups were absent (constituting 14 per cent of total schools in these areas); seven schools were in areas where rebels were present only in the local communes (21 per cent of total schools), and three schools were closed in villages where armed groups were present (representing 43 per cent of total schools). Separate qualitative analysis highlights that there was variation in the length of school closures based on the presence of armed groups, ranging from three months in unoccupied areas to the full period of occupation in the villages where armed groups were present.

The presence of the armed groups in the communes and in the villages was reflected among households in the strong likelihood of reporting any episode of violence and of restrictions on movement within and outside the villages. Table C1 highlights that households in villages where armed groups were present were much more likely to have experienced violence (including banditry, terrorism and armed attacks, political violence, destruction of infrastructure, kidnapping, and lynching) relative to households in communes where armed groups were present and to households in villages and communes without armed groups. Also, households in villages in which armed groups were present were more likely to report movement restrictions. About 40 per cent of households in villages with armed groups present reported reduced travel to school for children, compared with 18 per cent of households in communes where armed groups were present and 12 per cent of households in villages or communes without armed groups.

The experiences of households exposed to varying conflict intensity tended to be rather similar. The fact that even households not living in areas occupied by the armed

groups reported a range of negative consequences underscores that the demarcation lines between different degrees of conflict intensity, as measured by the absence or presence of armed groups, were not always unambiguous. We thus consider that the entire sample was negatively affected, to different degrees, by the conflict.

Table C1. Household reports of violence and behavioural responses to conflict-related events at endline, means and probability from Pearson chi squared

	No armed groups (N=171)	Armed groups in the commune (N=760)	Armed group in the village (N=170)	Total (N= 1,101)	Pr. Pearson Chi Square
Number of episodes of violence reported by the household	0.18	0.23	0.82	0.32	0.000
Household reporting any episode of violence	15%	15%	49%	21%	0.000
Fear travelling outside the village	46%	51%	79%	55%	0.000
Reduced travelling to health centres	28%	22%	56%	29%	0.000
Reduced travelling to aid centres	23%	21%	47%	26%	0.000
Reduced children travelling to school	12%	18%	39%	21%	0.000
Damage to property	0%	6%	6%	5%	0.332
Loss of property	48%	39%	48%	44%	0.500
Physical arm	0%	0%	4%	1%	0.108
Reduced mental health	18%	17%	10%	15%	0.483
Loss of revenue	33%	31%	24%	29%	0.587
Damage of common goods	0%	1%	0%	1%	0.581
Fear	0%	5%	8%	5%	0.260

Appendix D. Propensity score matching diagnostics

Figure D1. Kernel density of propensity score, by treatment groups (any aid) (N=4351)
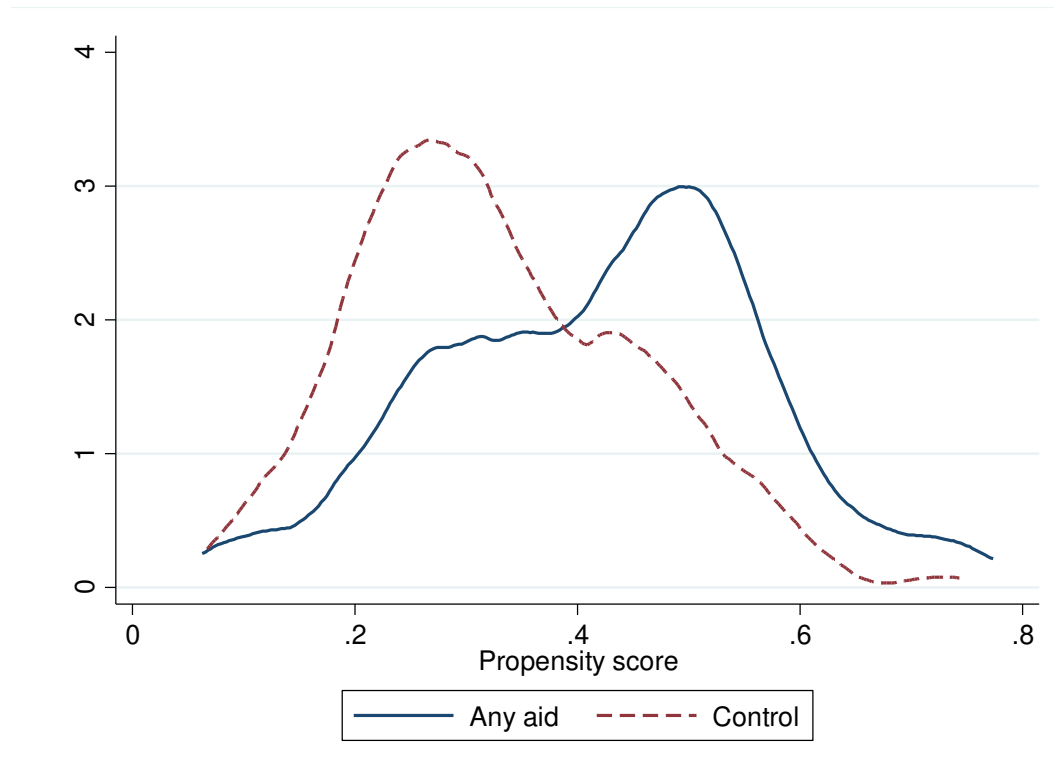
Note: Kernel density is estimated on the full longitudinal sample of villages.

Figure D2. Kernel density of propensity score, by treatment groups (school feeding) (N=3094)
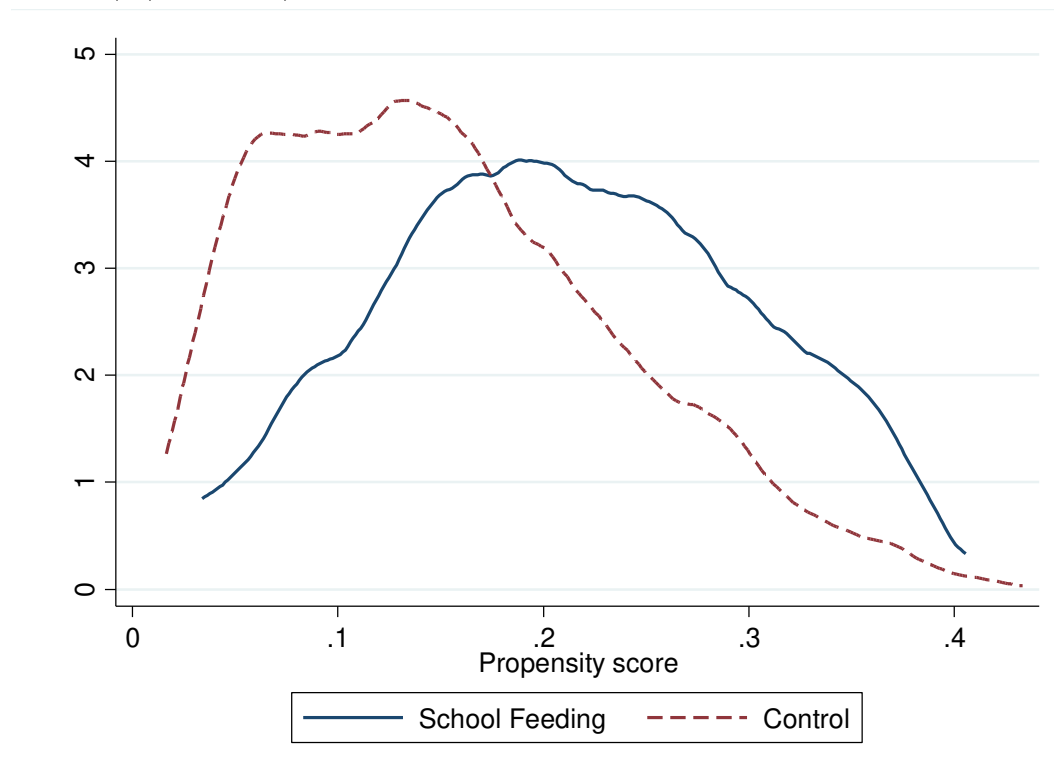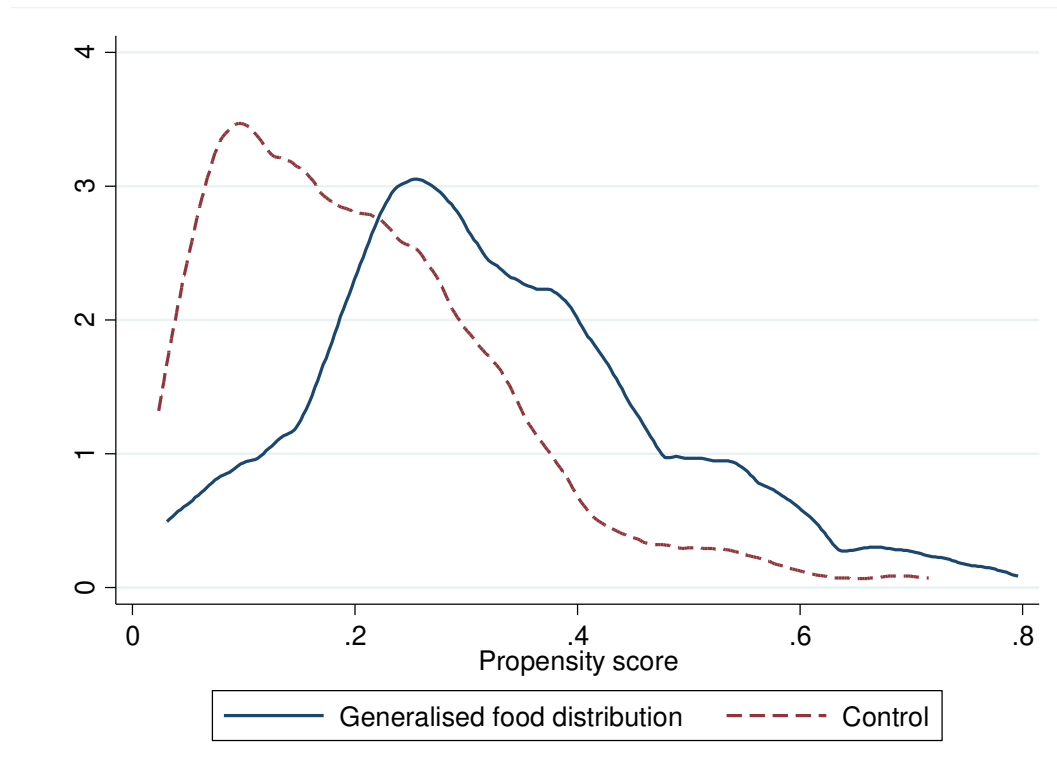

Note: Kernel density is estimated on the full longitudinal sample of villages.

Figure D3. Kernel density of propensity score, by treatment groups (food aid) (N=3122)

Note: Kernel density is estimated on the full longitudinal sample of villages.

Table D1. Comparison of mean baseline characteristics between treated and untreated households, by type of food assistance programme

	Any aid				School Feeding				Food aid			
	Control (N=733)	Treated (N=399)	Difference	Pr(T>t)	Control (N=949)	Treated (N=183)	Difference	Pr(T>t)	Control (N=875)	Treated (N=257)	Difference	Pr(T>t)
Household size	9.565	9.771	0.206	0.3353	9.55	10.093	0.543	0.0498**	9.689	9.465	−0.224	0.3574
Dependency ratio	1.711	1.768	0.057	0.2817	1.712	1.827	0.115	0.0935*	1.724	1.754	0.03	0.6194
N of school-age children in the household	2.641	2.641	0	0.9975	2.636	2.667	0.031	0.7923	2.674	2.527	−0.147	0.153
Household is of main ethnic group	0.86	0.814	−0.046	0.0429**	0.841	0.857	0.016	0.5845	0.862	0.781	−0.081	0.0018***
Age of the household	49.788	49.456	−0.332	0.6653	49.844	48.773	−1.07	0.283	49.65	49.741	0.091	0.9171
1st expenditure quartile	0.253	0.251	−0.002	0.9459	0.243	0.301	0.057	0.1018	0.261	0.223	−0.039	0.2123
2nd expenditure quartile	0.246	0.244	−0.002	0.9259	0.246	0.24	−0.006	0.8666	0.252	0.223	−0.029	0.3378
3rd expenditure quartile	0.256	0.226	−0.03	0.2685	0.256	0.191	−0.065	0.0633*	0.242	0.258	0.016	0.5979
4th expenditure quartile	0.245	0.279	0.034	0.2117	0.255	0.268	0.013	0.7133	0.245	0.297	0.052	0.0959*
Proportion of budget for food	0.743	0.741	−0.001	0.8767	0.745	0.729	−0.016	0.1654	0.741	0.746	0.004	0.6518
Number of food groups	6.8	6.771	−0.029	0.7198	6.797	6.753	−0.044	0.6781	6.789	6.793	0.004	0.9656
Household is polygamous	0.35	0.327	−0.023	0.4328	0.346	0.32	−0.025	0.5114	0.348	0.322	−0.026	0.442
Household head is a worker	0.029	0.063	0.034	0.0056***	0.041	0.039	−0.003	0.8614	0.029	0.082	0.053	0.0001***
Land size	3.762	3.723	−0.039	0.8781	3.657	4.217	0.56	0.0928*	3.86	3.369	−0.491	0.0941*
Household owns cattle	3.104	3.141	0.036	0.8426	3.124	3.083	−0.041	0.8618	3.07	3.278	0.208	0.3176
Armed groups in village	0.098	0.102	0.004	0.8563	0.111	0.041	−0.07	0.0054***	0.087	0.145	0.058	0.0102**
Armed groups In region	0.677	0.597	−0.08	0.0093***	0.662	0.58	−0.083	0.0393**	0.667	0.59	−0.077	0.0290**
Secondary school within 5km	0.345	0.384	0.039	0.1907	0.352	0.393	0.041	0.2905	0.354	0.375	0.021	0.547
Market within 5km	0.285	0.241	−0.044	0.1158	0.273	0.251	−0.021	0.5497	0.281	0.23	−0.05	0.1109
Past development project in village	0.563	0.663	0.101	0.0010***	0.572	0.732	0.16	0.0001***	0.589	0.629	0.04	0.2549
Village very unsafe	0.075	0.049	−0.026	0.0978*	0.062	0.087	0.025	0.2216	0.076	0.029	−0.047	0.0098***
School infrastructure index	−0.04	0.119	0.159	0.0150**	−0.015	0.178	0.193	0.0220**	−0.017	0.13	0.147	0.0473**
School governance index	−0.04	0.093	0.133	0.0458**	−0.003	0.074	0.077	0.3701	−0.035	0.145	0.18	0.0155**

Table D2. Comparison of baseline characteristics between treated and untreated households in the propensity-score matched sample

	Any aid			School Feeding			Food aid		
	Mean Treated (N=399)	Mean Untreated (N=733)	Standardized diff.	Mean Treated (N=183)	Mean Untreated (N=949)	Standardized diff.	Mean Treated (N=257)	Mean Untreated (N=875)	Standardized diff.
Household size	9.57	9.37	0.057	9.87	9.85	0.006	9.26	9.12	0.042
Dependency ratio	1.74	1.76	−0.029	1.8	1.78	0.026	1.7	1.7	0.007
Number of school-age children in the household	2.59	2.58	0.013	2.58	2.58	0.002	2.49	2.45	0.026
Household is of main ethnic group	0.83	0.82	0.002	0.87	0.89	−0.046	0.79	0.79	0
Age of the household	49.92	49.97	−0.005	49.61	49.38	0.019	49.94	49.97	−0.002
First expenditure quartile	0.32	0.31	0.037	0.41	0.41	0.009	0.26	0.25	0.034
Second expenditure quartile	0.23	0.23	−0.001	0.2	0.21	−0.018	0.22	0.21	0.016
Third expenditure quartile	0.21	0.21	−0.005	0.17	0.16	0.004	0.24	0.24	−0.002
Fourth expenditure quartile	0.24	0.25	−0.035	0.22	0.22	0.004	0.27	0.3	−0.051
Proportion of budget for food	0.74	0.74	−0.006	0.72	0.72	0.038	0.75	0.76	−0.039
Number of food groups	6.71	6.75	−0.031	6.62	6.65	−0.025	6.79	6.83	−0.029
Household is polygamous	0.34	0.33	0.022	0.35	0.35	0.005	0.31	0.29	0.034
Household head is a worker	0.06	0.05	0.011	0.03	0.04	−0.033	0.08	0.07	0.059
Land size	3.65	3.58	0.021	4.22	4	0.067	3.26	3.19	0.024
Household owns cattle	3.18	3.2	−0.008	3.34	3.32	0.005	3.22	3.23	−0.004
Armed groups in village	0.11	0.1	0.055	0.04	0.04	−0.006	0.15	0.13	0.055
Armed groups in region	0.61	0.58	0.055	0.54	0.56	−0.024	0.63	0.63	0.005
Secondary school within 5km	0.33	0.3	0.052	0.3	0.3	−0.004	0.33	0.33	−0.006
Market within 5km	0.15	0.16	−0.028	0.17	0.2	−0.076	0.13	0.14	−0.038
Past development project in village	0.68	0.68	−0.004	0.74	0.73	0.011	0.67	0.66	0.01
Village very unsafe	0.06	0.06	0.028	0.12	0.11	0.037	0.04	0.04	−0.015
School infrastructure index	−0.03	0	−0.028	−0.03	−0.01	−0.028	0	0.07	−0.065
School governance index	−0.01	0.01	−0.022	−0.07	−0.07	0.002	0.06	0.09	−0.025

*** p < .01 ** p < .05 * p < 0.1

Appendix E. Robustness checks

We ran robustness checks (see subsection 5.2). In all of them, we controlled for the balance of the covariates and common support (available upon request). First, we included all baseline villages in the estimation of the propensity score and reran all estimates. Table E1 reports that there were no substantial changes to our main results. Second, we investigated whether bias from overlap from the receipt of different forms of aid changed our results. The findings are presented in table E2. The inclusion of school feeding receipt in the propensity score led to slightly larger treatment effects for GFD in the case of absenteeism. Also, the coefficient related to grade attained became statistically significant at 10 per cent. In the case of school feeding, the inclusion of GFD receipt in the estimation of the propensity score did not affect the results. Finally, we restricted the sample to the longitudinal sample of children aged 7–10 years at baseline, which, at endline, were still of compulsory school age. Again, treatment effects estimates on this restricted sample were qualitative, the same as in the cross-section of children aged 7–16 at both survey rounds (available upon request).

Table E1. Treatment effects on education outcomes, including all baseline households in the estimation of the propensity score

	Any aid	School feeding	General food distribution
	Enrolment		
Treatment effect	0.052	0.101***	0.029
	(0.036)	(0.037)	(0.033)
N	[4,294]	[4,199]	[4,267]
	Absenteeism		
Treatment effect	−0.037	0.068	0.590***
	(0.152)	(0.167)	(0.179)
N	[1,393]	[1,326]	[1,297]
	Grade attainment		
Treatment effect	0.029	0.537***	−0.221
	(0.149)	(0.166)	(0.136)
N	[4,287]	[4,197]	[4,258]

Note: The table shows difference in differences estimates with propensity scores. Estimates include child age, gender, a dichotomous variable for first-born child and whether the first-born was male. Bootstrapped standard

errors are in parentheses. Enrolment is a binary indicator showing whether the child was currently enrolled in school. Absenteeism is measured as the number of days in the five-day school week previous to the survey in which the child was absent. Grade attained is measured as the number of years of education completed.

* p < .1 ** p < .05 *** p < .01

Table E2. Robustness check: treatment effects, including receipts of the alternative programme in the propensity scores

	Enrolment		Absenteeism		Grade attainment	
	School feeding	General food Distribution	School feeding	General food Distribution	School feeding	General food Distribution
Treatment effect	0.090**	0.011	0.098	0.710***	0.562***	−0.319*
	(0.042)	(0.041)	(0.174)	(0.209)	(0.178)	(0.178)
	[4,191]	[4,282]	[1,285]	[1,330]	[4,198]	[4,280]

Note: The table shows difference in differences estimates with propensity scores. The propensity score includes the receipt of general food distribution in the case of school feeding and the receipt of school feeding in the case of general food distribution. Estimates include child age, gender, a dichotomous variable for first-born child and whether the first-born was male. Bootstrapped standard errors are in parentheses. Enrolment is a binary indicator showing whether the child was currently enrolled in school. Absenteeism is measured as the number of days in the five-day school week previous to the survey in which the child was absent. Grade attained is measured as the number of years of education completed.

* $p < .1$ ** $p < .05$ *** $p < .01$

Appendix F. Child Labour

Table F1. Descriptive statistics of occurrence of child labour, by gender

	Baseline			Endline		
	All children (N=3,409)	Girls (N=1,592)	Boys (N=1,817)	All children (N=3,556)	Girls (N=1,702)	Boys (N=1,854)
Participation in child labour	0.40	0.40	0.41	0.81	0.81	0.80
	(0.49)	(0.49)	(0.49)	(0.40)	(0.39)	(0.40)
Participation in farm work	0.29	0.22	0.35	0.65	0.53	0.76
	(0.45)	(0.41)	(0.48)	(0.48)	(0.50)	(0.43)
Participation in housework	0.20	0.28	0.13	0.49	0.70	0.30
	(0.40)	(0.45)	(0.33)	(0.50)	(0.46)	(0.46)
Months spent in any work	3.39	3.73	3.10	7.64	8.41	6.95
	(4.94)	(5.22)	(4.65)	(5.06)	(5.02)	(5.00)
Months spent in farm work	1.33	0.81	1.79	4.53	3.09	5.79
	(2.71)	(1.78)	(3.25)	(4.64)	(3.92)	(4.85)
Months spent in housework	2.23	3.12	1.46	5.21	7.64	3.07
	(4.60)	(5.15)	(3.89)	(5.74)	(5.52)	(5.04)

Note: Means and standard deviations are in parentheses. The outcomes are binary indicators equal to 1 if the child reported involvement in any type of work, farm work, and housework, respectively, in the 12 months previous to the survey. The indicators of participation in work are dichotomous variables assuming the value of 1 if the child reported involvement in any type of work (including farm, housework, and waged or business work), farm work, and housework, respectively. The remaining indicators relate to months spent in any work, farm work, and housework.

Table F2. Impact of food assistance on occurrence of child labour by intensity of exposure to conflict

	Any aid	School feeding	General food distribution	Any aid	School feeding	General food distribution
	A1. Participation in any work			**A2. Months spent in any work**		
No armed groups	0.037	−0.076	−0.001	0.220	−1.143*	0.062
	(0.059)	(0.063)	(0.072)	(0.605)	(0.686)	(0.892)
	[1,690]	[1,677]	[1,484]	[1,690]	[1,677]	[1,484]
Armed groups in the commune	0.088**	0.046	0.106*	0.535	−0.312	0.790
	(0.041)	(0.043)	(0.056)	(0.527)	(0.779)	(0.536)
	[1,938]	[1,764]	[1,693]	[1,934]	[1,764]	[1,693]
Armed groups in the commune or village	0.164***	0.095**	0.199***	1.113**	0.627	1.832***
	(0.039)	(0.045)	(0.042)	(0.470)	(0.700)	(0.480)
	[2,381]	[2,106]	[2,407]	[2,381]	[2,113]	[2,404]
	B1. Participation in farm labour			**B2. Months spent in farm labour**		
No armed groups	−0.008	−0.066	−0.022	−0.648	−1.424***	−0.399
	(0.057)	(0.071)	(0.063)	(0.443)	(0.488)	(0.586)
	[1,690]	[1,677]	[1,479]	[1,690]	[1,672]	[1,484]
Armed groups in the commune	0.047	0.041	0.047	−0.179	−0.406	−0.227
	(0.042)	(0.057)	(0.052)	(0.316)	(0.501)	(0.416)
	[1,938]	[1,764]	[1,693]	[1,938]	[1,774]	[1,693]
Armed groups in the commune or village	0.101**	0.084	0.100**	0.086	−0.036	0.265
	(0.044)	(0.054)	(0.044)	(0.322)	(0.357)	(0.365)
	[2,376]	[2,105]	[2,404]	[2,376]	[2,109]	[2,403]
	C1. Participation in housework			**C2. Months spent in housework**		
No armed groups	0.064	0.052	0.024	0.398	−0.362	−0.115
	(0.056)	(0.066)	(0.062)	(0.593)	(0.747)	(0.742)
	[1,685]	[1,677]	[1,484]	[1,690]	[1,677]	[1,479]
Armed groups in the commune	0.021	−0.015	0.037	0.259	−0.150	0.446
	(0.044)	(0.072)	(0.063)	(0.577)	(0.710)	(0.597)
	[1,938]	[1,767]	[1,693]	[1,934]	[1,767]	[1,693]
Armed groups in the commune or village	0.064	0.054	0.095*	0.398	−0.362	−0.082
	(0.041)	(0.052)	(0.050)	(0.620)	(0.724)	(0.672)
	[2,376]	[2,112]	[2,407]	[1,690]	[1,677]	[1,484]

Note: The table shows difference in differences estimates with propensity scores. Estimates include child age, gender, a dichotomous variable for first-born child and whether the first-born was male. The number of observations are in square brackets. Bootstrapped standard errors are in parentheses. Conflict intensity was defined by three dichotomous indicators: household residing where no armed groups were present in either the local village or commune, household residing where armed groups were present in the local commune only, and household residing where armed groups where present either in the local commune or village. It was not

possible to estimate the effect of aid in villages directly occupied by armed groups because there were not sufficient observations that ensured balance in the propensity score between treatment and comparison groups. The outcomes are binary indicators equal to 1 if the child reported involvement in any type of work, farm work, and housework, respectively, in the 12 months previous to the survey.

* p < .1 ** p < .05 *** p < .01