

# **From Stockroom to Classroom: Impact of Meal Stocks on Attendance in a Kenyan School Feeding Program**

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## **Abstract**

School Meal Programs (SMPs) have been shown to be effective in boosting enrollment, attendance, academic performance, and health outcomes of children. Leveraging unique daily administrative information on school feeding and attendance rates, this paper extends our understanding of how day-to-day SMP operations can impact student attendance decisions in a close community where information on the status of school meals for any given day are largely observable. We present evidence that attendance rates respond to a missed school-meal. More importantly, we find that parents and children are forward looking in their attendance decisions and preemptively reduce attendance rates when school stock levels are low enough to indicate the possibility of a missed school meal. Low meal stocks push students to attend another nearby school. Additionally, we find that school management also adapt the provision of school, in the form of the amount of food provided, in response to existing stock levels. Our findings suggest that for SMP implementors in developing countries communities, consideration needs to be given to policy and programs that can help schools smooth their stock levels to maintain attendance rate and provision of food for students.

## **Keywords:**

**School Meal, School Feeding, Attendance Rate**

## 1. Introduction and Literature Review:

Coming out of the COVID-19 pandemic in 2020, School Meal Programs (SMPs) have quickly become one of the most widespread social safety nets in the global south (WFP, 2022). As of 2022, 418 million children benefit from school meals worldwide with around 41% of children enrolled in primary school now having access to a free or subsidized school meal daily. The expansion of SMPs in recent years has gained traction with government agencies in low-income countries, which have increased their domestic funding for SMPs from 30% to 45% between 2020 and 2022 (WFP, 2022).

The growth of SMPs in Sub Saharan Africa (SSA), a region that has historically lagged in schooling outcomes, has received particular attention by researchers. Most studies of SMPs in SSA focus on direct impacts of SMPs on attendance and enrollment rates (Alderman *et al*, 2012; Desalegn *et al*, 2021; Nikiema 2019), educational performance of students (Azomahou 2019; Hulett *et al* 2014) and health and nutritional outcomes (Hochfeld 2016; Nkhoma 2013). Existing studies and literature reviews find that the provision of school meals positively impacts student enrollment, attendance and schooling outcomes (Wall *et al*, 2022; Vermeersch & Kremer, 2005); Furthermore, the benefits of school feeding programs extends to health, academic performance and cognition (Cohen *et al*, 2021; Jomaa *et al*, 2011; Kyere *et al*, 2020).

Leveraging a randomized controlled trial conducted in internal displacement camps in Northern Uganda Alderman *et al* (2012) finds that SMPs increase both enrollment and attendance. They find positive impacts of in-school meal programs on primary aged children that were not previously enrolled and significant increases to attendance from both the take-home and in-school programs. Desalegn's (2021) study in Southern Ethiopia further corroborates these findings, showing a reduction in dropout rates and absenteeism from SMP schools. Aurino *et al* (2023) examines a larger scale government-led school feeding program in Ghana led to increases in standardized math and literacy scores over a two year period.

Several past studies also emphasize the gender dimension in school meal impacts. Comparing impacts across gender, female students tend to disproportionately benefit from SMPs due to them starting from a relatively disadvantaged position. In Burkina Faso, Kazianga *et al*. (2012) finds an increased to enrollment and improved test scores, with larger effects for female students. Azomahou *et al*. (2019), finds that SMPs increase attendance and enrollment but also lead to a significant improvement in test scores, particularly for female students. In a 2019 study in Burkina Faso, Nikiema (2019) finds that a take-home meal program has a larger enrollment effect for girls as compared to boys. The finding that school feeding has a larger effect on female enrollment has also been corroborated in several other studies (Afridi, 2010; Ahmad and del Ninno, 2002). Nikiema (2019) focuses on the varied impacts of different SMP implementations in Burkina Faso. Their study highlights that schools offering take-home rations, especially in rural areas with low girls' enrollment, experience a more significant increase in attendance and enrollment rates, emphasizing the importance of tailored approaches to SMPs in different contexts.

Cost effectiveness studies in the context of school feeding are relatively sparse (Lawson, 2012). In a study from Cambodia, Cheung and Berlin (2015) examine how different types of SMP regimes affect Their study finds that combinations of on-site school feeding, take-home meals for poor

girls, and de-worming programs lead to the most significant improvements in school enrollment; Schools receiving all three treatments saw the highest level of cost-effectiveness.

There is already a substantial volume of robust research on SMPs and their effect on enrollment, attendance, academic achievement, and the health of children are well established. However, most studies focus exclusively on comparing the existence of school meals to a counterfactual in which no school meals are provided, or compare several different SMP formats (e.g., in-school-feeding vs. take-home rations). From a practical and implementers perspective, simply knowing that SMPs improve student outcomes is not enough, and more relevant research into SMP implementation is critical in designing and improving existing programs. Given the scale and complexity of SMP operations, there is surprisingly little research on how the design, implementation and operation of SMP programs can affect student engagement and subsequent outcomes.

Leveraging a unique high-frequency dataset of a group of schools in Northern Kenya, we provide key insights into how daily attendance decisions of primary and lower secondary students are not only driven by irregular school meals but also expectations of missed meals due to school food stocks running low. We also find evidence that missed school meals in one school push students to attend a neighboring school, with this effect being larger for younger cohorts. Our contributions are two-fold, first these findings are highly relevant to policy makers and implementors seeking to design future SMPs, secondly, we reveal a key mechanism that affects daily attendance in SMP schools, namely the expectations of students and their families.

The remainder of this paper is organized as follows, a background and data section provide an overview and summary statistics describing the research setting and our dataset. The methodology section describes the modeling and estimation procedure and an in-depth discussion of the results. We additionally examine the dynamic effects of a missed meal and school stocks on daily attendance rates using an impulse response function approach to highlight the persistent nature of how expectations on whether a school will provide meals on a given day can effect on attendance over time. Finally, we summarize our findings and provide relevant and actionable policy recommendations as well as suggestions for future research topics on SMP design.

## **1. Background and Data Summary**

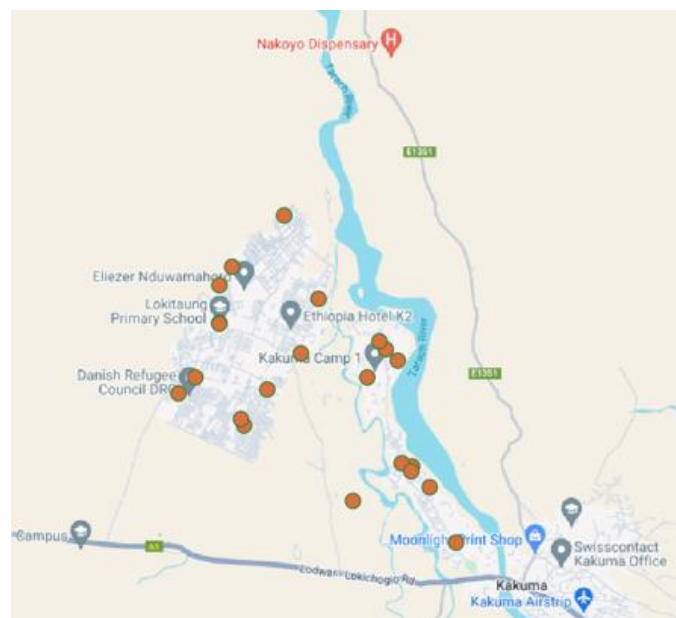
Our data set comes from the World Food Programme (WFP) School Connect project which has the objective to digitize school registries and extract related key performance indicators on school meal programs. School Connect is an application that allows for schools to digitally manage stocks, attendance, enrollment, and consumption information. The system also works for different modalities, including on-site feeding, school purchases or cash-to-schools, take-home rations and incorporate homegrown school feeding components.

School Connect is currently operational in 17 countries and across all levels of programmatic maturity and stages of transition to national government ownership of programmes. The countries using the tool include Benin, Burundi, Cameroon, Chad, Central African Republic, Ethiopia, Guinea, Guinea-Bissau, Haiti, Honduras, Mali, Niger, Kenya, Ukraine, Lebanon, the DRC, and the Gambia.

The features and functionalities of School Connect strengthen monitoring approaches with the provision of near real-time data and greater management oversight of the implementation of school meals programmes. The school-level data from School Connect also generates key descriptive analyses and trends in school meal implementation. The data logged in School Connect has served as the input for this study.

In this study, we zoom in on the data collected from May 2023 to November 2023 from 22 schools located within Kakuma and Kalobeyei Integrated Refugee Settlement. In total, excluding school breaks and weekends, we observe administrative information schools across approximately 130 school days in 2023. Figure 1 below maps the geographical location of the schools within Kakuma and Kalobeyei Integrated Refugee Settlement.

*Figure 1. Location of Schools in Kakuma/Kalobeyei Settlement*



The settlement hosts a varied group of refugee nationalities and has a total population of 275,953 (UNHCR, 2024), of which over half (162,770 individuals) are South-Sudanese nationals. The second largest cohort are Somali (37,864 individuals). The gender distribution for Kakuma camp skews towards more male refugees, with 46.9% being female and 53.1% male. In terms of geographical dispersion, ethnic groups tend to cluster together, resulting in schools usually serving a majority ethnic group. The ethnic diversity contributes to a wide range of food preferences, local staff report that even food insecure children sometimes decide not to eat certain meals based on preference. Additionally, members of the teachers, staff and board for these schools are mostly refugees themselves and the school itself is integrated in the community cluster. Such an arrangement is quite common in developing regions where most of the labor is local, and immigration is not particularly common and of a small scale.

One implication of this type of arrangement is that a lot of information about the schools' day-to-day operation is known by the community. For example, should a school not receive their replenishment food delivery from WFP in a timely fashion and are facing a stock shortage, that

information would likely make its way around in the community by word of mouth. In addition to direct observation on the volume of stocks in storage, school management is generally comprised of members from the community and students participate on the school board. Close geographical location also means that meal preparations in the mornings, or the day before, are likely directly visible as well.<sup>1</sup>

Additionally, attendance is taken in the morning and schools are largely closed off, meaning students are not able to freely enter and exit the school at any time they wish during school hours. This means that there is little room for a student to go to a school, then subsequently decide to leave because they realize no meals will be provided on that given day.<sup>2</sup> Our data set covers nursery, primary and lower secondary students. Not all schools in our sample service all grades. For our analysis we use the relevant sample of schools accordingly based on the grade level of interest. We mainly disaggregate our dataset into a primary school and nursery school sample. Table 1 below summarizes enrollment and attendance rates, by gender, by grade.

*Table 1. Enrollment and Attendance*

[Table 1 here]

The average size of a school's enrollment is around 2900 students, of which 1274 are female and 1687 male. While attendance rates at each grade level are quite similar between male and female students, the enrollment rate is noticeably lower for females, which seems to be exacerbated at higher grade levels. The number of female students enrolled lags male students with the gap increasing with the grade level, the lower enrollment rate for female students indicates the existence of a gender bias in the distribution of educational resources within these settlements. For each school in our sample, Table 2 below summarizes some key statistics on student enrollment size as well as meal provision characteristics.

*Table 2. Disaggregated Summary of Schools*

[Table 2 here]

Not all schools have both primary and nursery school; furthermore, some schools only cater to students of a particular gender. There is also a large variation in the size of schools and average (across all existing grade and gender) attendance rates. The WFP on-site school meal program provides five types of in-kind food items to schools, Maize, Rice, Split-peas, oils, and salt. All schools receive a similar mix of goods, based on the number of students enrolled. Of the approximately 130 days in which schools are in operation, staples of maize and rice were provided on 68 and 39 days on average, respectively. Split peas and oils were provided nearly every day that food was distributed at 103 days each. Stock breaks, which are days in which the staple food stock physically ran out, are approximately 12 days on average. Removing one outlier school, that number is closer to 10.

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<sup>1</sup> For example, observing smokestacks that indicate a school is preparing a meal in the morning.

<sup>2</sup> Though not impossible, the fencing of the school can be circumvented.

### 3. Methodology

#### 3.1 Impact of Missed Meals and Staple Stock on Attendance

Before diving into our econometric estimation strategy, it is important to highlight one key limitation of our study beforehand. The data we have is at the school-day level and lacks any information for individual students. The implication for our findings is that we are unable to say anything regarding the identity of the students. We are unable to distinguish between a situation in which inconsistent/missing school meals reduces attendance for all students enrolled, or if a selective group of opportunistic students only choose to go to school based on knowledge of the school's meal provision. Despite this limitation, we proceed with our analysis on the basis that regardless of what the mechanism driving attendance differences is, there is a benefit to incentivizing students to consistently stay in school.

The two primary research questions of interest are as follows: *i.) Does a missed meal in the past day(s) negatively affect attendance rates today? ii.) Does school attendance respond to depleted stock levels of schools? And iii.) Are there heterogeneous impacts across student grade and gender?*

Several challenges to estimation exist in our dataset. First, attendance rates are unlikely to be independent across time for the same school. A school with low attendance rates today is likely to experience low attendance the next day. To address this, we adopt an Arellano-Bond dynamic panel estimator that instruments attendance rates in the previous day with further lags of the dependent variable. Second, a schools' choice on whether to provide meals on a given day is likely endogenous to the situation on a given day, leading to biased estimates. This is further corroborated by our data that finds X% of the instances in which a school meal is missed was due to school management deciding that attendance was too low. An instrumental variables approach is taken in this case, where plausibly exogenous reasons for the lack of school meal provision (e.g., the cook did not show up, lack of firewood etc.) is used as an instrument for instances in which a school meal was not provided. Finally, autocorrelation in attendance rates leads to systematic underestimates of the standard errors leading to over rejection of our estimates. To correct for this, we correct the standard errors using Driscoll-Kraay standard errors.

The model specification is as follows:

$$Attend_{i,t} = \beta_0 + \theta \cdot Attend_{i,t-1} + \beta_1 \cdot MissedMeal_{i,t-1} + \beta_2 \cdot LowStock_{i,t} + \beta_3 \cdot PostBreak_{i,t} + \gamma_i + \sum_{\forall t} \alpha_t \cdot Month_t + \sum_{\forall j} \rho_j \cdot DayofWeek_j + \varepsilon_{i,t}$$

Where  $Attend_{i,t}$  is the attendance rate of students, defined as the number in attendance divided by the number enrolled, for school  $i$  in time  $t$ . An Arellano-Bond dynamic panel approach is used to include the lagged attendance rate of schools in the model, using past  $t-2$  lags as instrumental variables (Anderson and Hsiao, 1981). The two key variables of interest are  $MissedMeal_{i,t-1}$  and  $LowStock_{i,t}$ , which are binary variables indicating a missed meal in the previous day and whether a school's staple stocks have fallen below what is required to supply at least five more days of

school meals, respectively<sup>3</sup>. We additionally control for attendance dips that may happen due to extended breaks between semesters with a binary variable indicating that it is the first 3 days of a new semester (right after a break),  $PostBreak_{i,t}$ . School fixed effects are added to the model through  $\gamma_i$ , and the model additionally controls for a series of dummy variables for the month of the year and the day of the week (Monday-Friday).

As previously discussed, one potential source of endogeneity for the estimate of  $\beta_1$  is the fact that the lack of school meals is endogenous as it can be triggered by low attendance rates or both school meals and attendance can be simultaneously affected by a third factor, such as heavy rains.<sup>4</sup> To address this issue, we use the list of reported reasons a school meal was not provided and construct an instrument using plausibly exogenous reasons that should only affect attendance through the provision of school meals.<sup>5,6</sup> Serial correlation in the error terms can lead to biased standard errors, which we address by using Driscoll-Kraay standard errors with four periods of lag.<sup>7</sup> Table 3 below tabulates the estimated coefficients, disaggregated by gender.

*Table 3. Estimated Impacts on Attendance Rates*

[Table 3 here]

Across all our models, we observed a strong autocorrelation component from the lagged dependent variable, which was in turn instrumented with a lag. The time persistence of past attendance on current attendance is strong and seems to be reducing as cohorts age. In other words, attendance rates today are less strongly correlated with attendance rates yesterday for the primary 5 to 8 cohort than the primary 1 to 4 cohort.

Our estimate of the marginal impact of a missed school meal event on attendance the following day is only significant for the primary school sample, we find no significant effect of school meals on attendance for the nursery school group. We estimate that a missed school meal reduces attendance rates by 4-5% for the primary 1 to primary 8 cohort. Surprisingly, the effect of missed school meals on nursery grade students is small and insignificant. At face value, this is a puzzling result. Parents, who are assumed to be the decision makers for nursery students' attendance, are not reducing attendance of their nursery aged children immediately after a missed school meal.

However, one possibility is that refugee households don't only respond to missed meals, but rather form expectations regarding the likelihood of a school meal (or lack thereof) on any given day. To

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<sup>3</sup> i.e., the variable  $LowStock_{i,t}$  takes the value of 1 when the remaining staple stock is insufficient to provide 5 more days of food to students, assuming an average attendance rate.

<sup>4</sup> School masters were required to report on the reason as to why a school meal was missed, of which there are multiple instances where school meals were withheld due to reported low attendance rates.

<sup>5</sup> Common reasons are: The Chef did not show up, no firewood, no water. Instances of withholding school meals due to low stocks was not eligible for the instrument.

<sup>6</sup> First stage tests results strongly reject the null hypothesis of weak instruments in both first stage equations (Arellano Bond and No Meal equations).

<sup>7</sup> 4 was selected using the  $T^{0.25} + 1$  rule of thumb. We test the robustness by increase the lag number up to 8, the results are largely unchanged. Driscoll-Kraay standard errors were combined with clustered standard errors at the school level together with fixed effects.

examine this hypothesis, we include a binary variable indicating if a school's staple stocks have fallen below the threshold (specific to that school's average provisions) necessary to provide 5 more days of food. Interestingly, we find a strong negative effect on attendance when schools enter low stock status for children in nursery school and primary grades 1 to 4. However, students in primary 5 to 8 do not seem to reduce attendance in response to the schools' staple stock status. The effect of a school entering critically low stock levels is higher for younger cohorts and smaller and insignificant for grades 5-8.

Taking these results together, our interpretation is that children and family have information on school stocks and the likelihood of a school being unable to provide food on a given day, nursery school and younger primary children (or, more likely, their parents) preemptively pull back on attendance to avoid missing a meal. However, older students in grades 5 to 8 are a more selective group that have been in school for several years now (thus likely value education more) and only start reducing attendance when the school is physically unable to provide meals.

An alternative hypothesis is that there exists a group of children in the younger cohorts (nursery and primary 1 to 4) that are opportunistic and select which school they attend based on their knowledge of which nearby schools are low on stock and thus unlikely to be able to provide a school meal. This alternative hypothesis also implies that those students are less likely to make it to higher grade levels. The lack of student level data prevents us from distinguishing between these two hypotheses.

Regardless, our dynamic panel model finds evidence that a missed school meal does indeed reduce attendance the following school day, but only for upper year students. Instead, for younger students, attendance rates fall when they (or their parents) anticipate the school failing to provide a meal due to the school having critically low stocks.

### **3.2 Proximity Effects of Missed Meals in Neighboring School**

Given the relatively close geographical proximity of the schools, we can alternatively test our hypothesis between a missed school meal in a neighboring school and attendance in the current one. To do this, we simply create a new binary variable indicating whether the nearest other school did not provide a meal on a given day. We include this variable into our main estimation model as an additional variable of interest. Results of this regression are shown in Table 4 below.

[Table 4 here]

The results are striking in how significantly a missed meal in neighboring schools predicts an increase to attendance on a given day. The effect sizes are larger for nursery schools, with a missed school meal event in the neighboring school increasing attendance by 6 percentage points; that number is 4 percentage points for primary school grades 1-8.

### **3.4 Staple Provision by Schools**

In addition to looking at the behavior of students, a set of exploratory regressions explore how schools may adjust their provision of food items in response to stock levels. Table 5 below

tabulates the conditional correlations between the total kilograms of staples (maize and rice) a school provides in each day as a function of attendance, staple stock, and time of semester. No identification strategy is possible here and the results should be interpreted as conditional correlations.<sup>8</sup>

*Table 5. Volume of Staples Dispensed.*

[Table 5 here]

We find that each additional attendee increases provision of staples by 112 grams (0.112 kg), while schools who have just received a staple delivery provide an additional 22kgs of total staples in the following day, on average.<sup>9</sup> Schools who have fallen low on stocks reduce their provision of staples by 17.5 kgs, indicating that not only do students/households respond to stock levels, but schools dynamically adjust their provision of staples as well. An additional 29 kgs of staples are provided to students in the first three days after a long break on average. It's possible that headmasters and school management are keenly aware of the difficulty in getting students back in attendance post break and thus provide more food as an incentive. Alternatively, this could be a strategy by the school management to shed food that is close to spoiling, though this explanation is less likely given that reported spoilage levels are quite low.

Results from the model predicting school staple provision seem to further indicate that students and parents are not the only forward-looking agents. School management also dynamically adjust how much food they provide to students on any given day in response to lowered stock levels.

### **3.3 Dynamic Effect of School Meal and Stock on Attendance.**

Given the temporal nature of our data, we further investigate how instances of missed meals and low stock events impact attendance rates over a longer period. The negative impact from reduced attendance is exacerbated when the effect persists over the period of days or weeks, leading to higher losses in aggregate attendance.

To explore this temporal effect, we adopt a Panel Vector Autoregressive Model (pVAR) and show the estimated results using Impulse Response Functions (IRF) with 95% confidence intervals.<sup>10</sup> Figure 2 below shows the IRF for the likelihood of a no meal situation in response to the school entering a critical stock event.

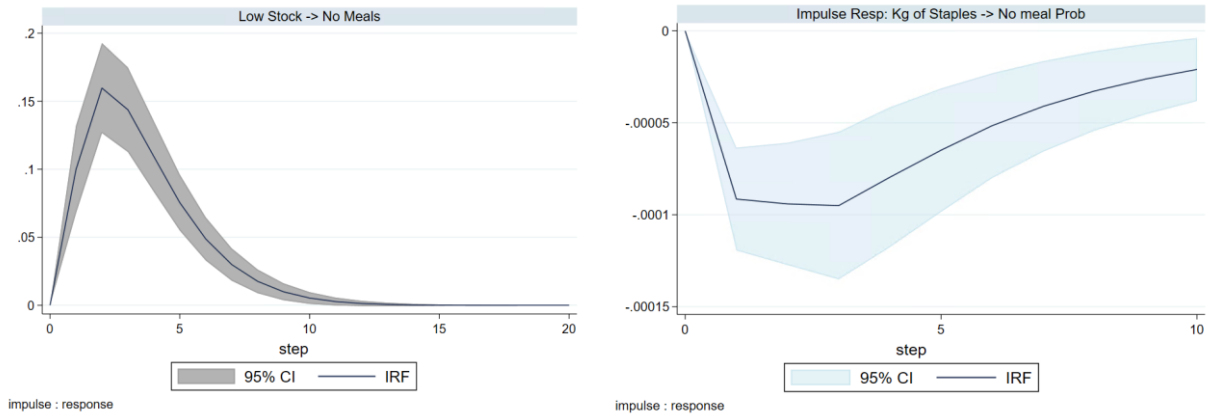
*Figure 2. No Meal likelihood in Response to Low Stocks and Stock Level*

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<sup>8</sup> We maintain Driscoll-Kraay and clustered standard errors to address autocorrelation issues.

<sup>9</sup> This is despite schools being instructed to carefully ration their food.

<sup>10</sup> Selection of the optimal number of lags was performed using the pvarsoc command in STATA. 1000 Monte Carlo iterations used to construct CIs.



Once a school enters critical stock status the probability of a no meal event rises dramatically and peaks by the second or third day by 15%, which then gradually reduces, with a significant effect on no meal risk being detected as far as 8-9 days later. While timely delivery of WFP food stocks is likely bringing down the risk, the fact that the chances of a no meal event are still elevated past 5 days indicates imperfect delivery. Furthermore, the probability of a no meal event peaking by the 2<sup>nd</sup> or 3<sup>rd</sup> day likely signifies that school management may choose to stop the provision of a meal when stocks are yet to be fully depleted to preserve staple stock levels. Using the stock level instead of a critical stock indicator provides additional evidence that no meal risks are persistent over time. Each 1Kg increase in stock levels translates to a 0.005% reduction in the chance of a no meal event. Considering that schools often hold hundreds of Kgs of staples, the impact is not insignificant.

Figure 3-1. Impulse Response Function, Female attendance rates (P1-8)

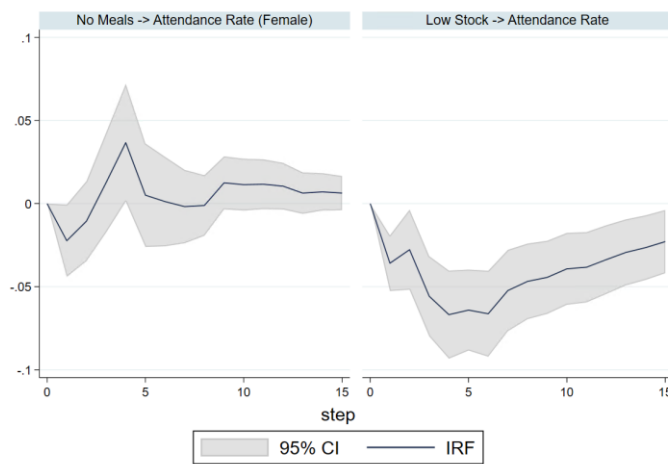
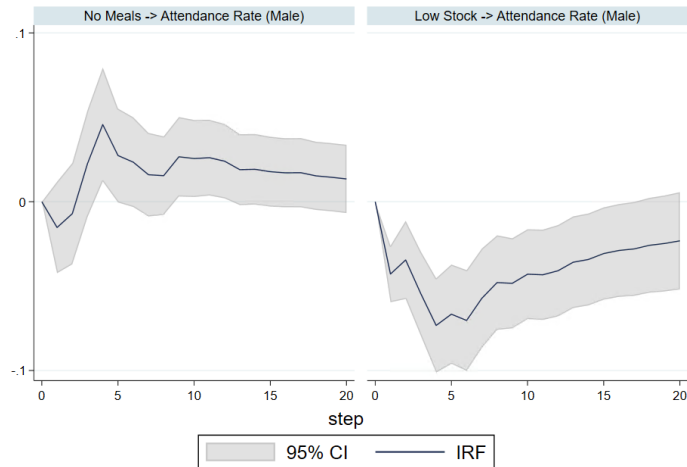


Figure 3-2. Impulse Response Function, Male attendance rates (P1-8)



To extend our analysis of how no meal events and stocks play a role in influencing school attendance rates, we utilize three time series of data, the attendance rate, instances of no meals and critical stock events in a VAR model and show the IRFs in Figure 3-1 and 3-2 above. Once the critical stock event is controlled for, the impact of no meal events on attendance is small and largely insignificant in the immediate day after. However, the impact of a school entering low stock levels is immediate and persistent. The IRFs results support our finding that the risk of a missed school meal is heightened once a school starts to run low on stocks and that attendance rates in these schools respond pre-emptively to an increased risk in no meal events happening.

#### 4. Conclusion:

In summary, this study leverages a unique school level data set to study the relationship between attendance rates, missed school meal events and instances of when a school enters critical levels of staple stock. We find that a missed school meal event has significant impact on attendance rates in the following days, however attendance response in anticipation to the possibility of a missed school meal. Furthermore, the impact of missed school meals events is quite small in magnitude when we control for schools entering critical stock levels, showing that the risk of a no meal event preemptively reduces attendance rates. This effect is primarily concentrated on younger students (grade 4 and below).

Our findings are highly relevant to implementors, and organizations seeking to design SMPs. In many developing regions, local schools are likely well integrated with the community and hire locally, facilitating the dissemination of information on the school’s situation. In such a scenario, policies that help facilitate a smooth stock level at schools can have added effect in promoting attendance rates of students. While implementing on-time delivery and better logistics plans can help, simple and more cost-effective methods could help alleviate the issue. For example, providing the school with a small emergency fund that allows them to purchase food stocks in local markets should SMP deliveries be delayed.

Tables

Table 1

**Table 1. Summary Statistics on Attendance and Enrollment**

Grade	Attendance Rate		Enrollment	
	Female	Male	Female	Male
Nursery 1	69.3%	68.9%	143	160
Nursery 2	67.4%	65.1%	155	173
Primary 1	70.0%	76.6%	115	116
Primary 2	64.3%	68.4%	129	151
Primary 3	62.7%	67.6%	123	178
Primary 4	62.0%	62.0%	137	200
Primary 5	62.5%	63.1%	123	183
Primary 6	70.4%	69.9%	104	154
Primary 7	64.0%	65.0%	94	122
Primary 8	70.0%	70.3%	150	251
<b>Total</b>	<b>66.3%</b>	<b>67.7%</b>	<b>1274</b>	<b>1687</b>

Table 2

Table 2. Summary Statistics by School

School ID	Enrollment			Average Attendance	Days food provided...				Days with Stock Break in Staples
	Female	Male	Total		Maize	Rice	Peas	Oils	
1	898	1277	2175	58.2%	70	42	110	110	15
2	237	0	237	59.5%	72	12	86	81	1
3	1163	0	1163	68.9%	82	36	114	117	16
4	805	1089	1894	58.9%	71	47	115	115	0
5	1377	2037	3414	60.9%	64	42	104	103	8
6	222	777	999	67.2%	70	64	132	120	0
7	1151	1582	2734	70.8%	62	54	115	114	5
8	1772	2519	4291	66.8%	67	45	109	110	13
9	1132	1905	3037	58.4%	72	40	107	107	0
10	1454	1492	2946	57.5%	66	50	112	109	15
11	0	1075	1075	59.1%	78	35	105	109	1
12	954	1281	2235	80.8%	76	44	119	111	24
13	1485	1850	3335	64.5%	69	23	91	92	10
14	695	1002	1697	64.4%	63	34	96	96	0
15	1641	2040	3681	68.5%	68	50	118	118	11
16	821	1583	2404	56.2%	65	39	103	103	11
17	201	236	437	77.4%	37	34	66	66	74
18	1571	2002	3573	42.5%	63	22	82	83	0
19	1843	3027	4870	80.6%	68	55	114	119	16
20	1564	1584	3148	67.5%	60	48	105	106	3
21	814	1073	1887	68.0%	70	41	94	105	36
22	654	960	1614	51.6%	79	9	84	78	0
Average	1021	1381	2402	64.0%	67.8	39.4	103.7	103.3	11.8





Table 5

Table 5. Kg Staples Consumed Per Day

<b>No Meal</b>	<b>Beta</b>	-110.1***
	<b>SE</b>	-9.93
<b>Number of Attendees</b>	<b>Beta</b>	0.112***
	<b>SE</b>	-0.005
<b>Staple Delivery previous school day</b>	<b>Beta</b>	22.38***
	<b>SE</b>	-5.99
<b>School Staple stock low (&lt;5 days)</b>	<b>Beta</b>	-17.5***
	<b>SE</b>	-4.65
<b>Recent Long Break (3 days)</b>	<b>Beta</b>	28.94***
	<b>SE</b>	-8.17
<b>Monday</b>	<b>Beta</b>	7.12
	<b>SE</b>	-5.56
<b>Tuesday</b>	<b>Beta</b>	-1.29
	<b>SE</b>	-5.41
<b>Wednesday</b>	<b>Beta</b>	-4.55
	<b>SE</b>	-5.46
<b>Thursday</b>	<b>Beta</b>	-7.12
	<b>SE</b>	-5.2
<b>Friday (omitted)</b>	<b>Beta</b>	-
	<b>SE</b>	-
<b>Monthly Dummies</b>		YES
<b>N*T</b>		2,663

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## **Declaration of interests**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: