WFP EVALUATION

Pilot Impact Evaluation of the Home-Grown School Feeding Programme in Guatemala

Pilot impact evaluation report

Report number: OEV/2022/028
May 2025

World Food Programme

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Acknowledgements

The work described in this report is the result of a collaboration between the World Food Programme's (WFP) Office of Evaluation and the World Bank's Development Impact Evaluation (DIME) department.

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The study has been pre-registered in the American Economic Association Randomized Control Trials (AEA RCT) registry at: https://www.socialscienceregistry.org/trials/10267

We are grateful to all individuals who contributed to data collection and, in particular, the respondents for their time.

Suggested citation: De Gouvea Scot, T., Heirman, J., Horner-Ibler, D., Jeong, D., Khincha, R., Kondylis, F., La, M. P., Lombardini, S., & Subirana Bofill, A. (2024). *Pilot Impact Evaluation of the Home-grown School Feeding Programme in Guatemala*. Rome: World Food Programme.

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Key takeaways

- The Guatemala WFP country office, in partnership with the Ministry of Education and Ministry of Agriculture, has developed a smartphone app (the School Feeding Management Application or SFMA), which aims to connect schools and registered suppliers to facilitate the procurement process from local suppliers of the Guatemalan school meal programme. This pilot impact evaluation employed a lean impact evaluation approach, using a randomized controlled trial (RCT) design to assess whether the introduction of the app had any impacts on meals distributed by schools (such as quality, quantity, delivery and diversity of meals).
- Findings from this pilot impact evaluation indicate that overall, the usage of the app was low. Despite school training participation being high (99 percent of schools having representatives attend at least one training session) only 12 percent posted a purchase order and only 7 percent completed a purchase on the app. The main reasons given for not using the app were internet connectivity issues and functionality issues. Only 24 percent of the registered suppliers attended the SFMA training (which was a requirement to receive the login credentials to access the app). App usage was low even among the suppliers who attended the training: only 15 percent of the training participants attempted to use the app, and only 4 percent of the suppliers reported completing an offer on the app successfully.
- Consistent with the low adoption rate, there was little to no change in school procurement behaviours. The pilot did not identify changes in the number of unique suppliers, number of transactions or quantity and value of procurements as a result of introducing the app. The pilot found that the share of purchases from family farmers was almost the same between schools that had access to the app and those that did not.
- The pilot found some modest (though not statistically significant) evidence that app features assisted schools in making procurement decisions more efficiently by reducing the hours spent on planning. Moreover, the schools with access to the app were more likely to procure alternative food products when the specific ingredients specified in the official menus of the Ministry of Education were not easily available. The substitutions of the products did not compromise meal diversity.
- The pilot also informs the feasibility of a potential impact evaluation to assess the impact of home-grown school feeding programmes on farmers' income and agricultural practices before introducing the app nationwide to all schools. While the introduction and expansion of the app would allow a credible counterfactual to be identified, the take-up is currently too small to enable it to detect an impact. It is therefore advised that, until app usage increases among its intended users, the scale-up of the app and a larger-scale impact evaluation to assess the impact on farmers' income should be paused.

1. Introduction

1. School meals programmes are among the most widespread social safety net programmes in the world.[1] Rigorous evidence from several countries has shown that school feeding programmes enhance nutrition, enrolment, learning and cognitive abilities.[2] Through the recent focus on home-grown school feeding (HGSF) programmes, school meal programmes have led to an increased focus on how such programmes can promote the socioeconomic lives of local communities beyond schoolchildren. However, the innovative element of these programmes also means that there is limited evidence available for policymakers of their impacts on local economies and service delivery.

2. To respond to this demand for evidence, the World Food Programme's (WFP) Office of Evaluation and School-based Programmes, in partnership with the World Bank's Development Impact Evaluation (DIME) department, created the School-based Programme Impact Evaluation Window.[3] The window aims to contribute with a portfolio of rigorous impact evaluations to inform policy decisions on the trade-offs in the design of school-based programmes, support governments to design and scale up their programmes, and contribute to the global evidence base for school meals.

3. Guatemala has close to universal coverage of school feeding for primary schools. *The Ley de Alimentación Escolar* (LAE, or School Feeding Law) was introduced in 2017 to promote improved nutritional and health outcomes for students while also increasing the procurement of locally produced foods and beverages. The LAE requires that 70 percent of school meal purchases are procured through HGSF. However, market participation from family farmers is generally low. According to administrative data on school invoices, in 2022 only 26 percent of the 28,000 schools in Guatemala were able to procure 70 percent of their purchases from family farmers. To encourage market participation and facilitate market transactions, the Guatemala WFP country office, in partnership with the Ministry of Education and Ministry of Agriculture, has developed a smartphone app: the School Feeding Management Application (SFMA or 'the app'). The aim of this app is to connect schools and registered suppliers[4] (farmers) to facilitate a more efficient procurement process and optimize sourcing from local suppliers.

4. Before introducing the app nationwide to all schools, the WFP Guatemala country office initiated a pilot programme to assess its operational feasibility. Within it, a pilot impact evaluation was also set up to document the causal impacts of the app on procurement practices and inform the potential scale-up of the application. Pilot impact evaluations are recommended in cases where the time and scale of programming are limited, and aspects of the programme are yet untested. Based on WFP's impact evaluation standard process, a pilot is usually conducted during the preparatory phase of an impact evaluation to provide confidence in the feasibility of a future design for evaluating an intervention.

[1] WFP. 2022. *State of School Feeding Worldwide 2022*. Rome: World Food Programme.
[2] WFP. 2021. *School feeding programmes in low- and lower-middle-income countries. A focused review of recent evidence from impact evaluations*. Rome: World Food Programme.
[3] WFP. 2021. *School-based Programmes Impact Evaluation Window: Concept note*. Rome: World Food Programme.
[4] Registered suppliers are farmers registered with the Guatemalan Ministry of Agriculture and approved for provision of agricultural products.

5. The pilot impact evaluation employed a lean impact evaluation approach. Lean impact evaluations are conducted using an experimental design to test alternative implementation modalities. Rather than focusing on outcomes, lean impact evaluations focus on comparing output-level data and mainly rely on already existing monitoring systems for data collection. This has the advantage of minimizing data collection costs, while providing reliable evidence on implementation. Data on final outcomes collected during a pilot are not large enough to make any causal claim.
6. This lean impact evaluation used a randomized controlled trial (RCT) design to assess whether the introduction of SFMA had any impacts on meals distributed by schools (for example, quality, quantity, delivery and diversity of meals). First, the lean impact evaluation assessed the app's take-up by schools and suppliers. Second, it assessed whether the app impacted the number and/or value of purchases from local registered suppliers. Third, the lean impact evaluation attempted to determine whether the use of the app changed the efficiency of the procurement process. Finally, it informed the feasibility of a potential impact evaluation to assess the impact of HGSF on farmers' incomes and agricultural practices.
7. This report begins by describing the evaluation context and programme (section 2). It then describes the evaluation questions, design and data sources (section 3). Results are presented in section 4. Section 5 concludes and provides considerations for future programmes.

2. Context and programme description

2.1 Context

8. The Guatemalan *Ley de Alimentación Escolar* (LAE) was introduced in 2017 with the aims of promoting health and nutrition for students and improving and increasing procurement from local farmers. To implement the LAE, the Ministry of Education created the *Programma de Alimentación Escolar* (PAE) to ensure successful management of funds and procurement. According to the 2021 Ministry of Education report on PAE implementation, 2.6 million students in 26,469 schools in Guatemala are covered by the PAE.[5] This constitutes close to universal coverage of school feeding for pre-primary and primary schools (up to age 14).[6]
9. In more than 97 percent of schools in the country, the Ministry of Education has helped to establish parents' organizations, named Organizaciones de Padres de Familia (OPF), who are tasked with – among other responsibilities – the organization, procurement and distribution of school meals.[7]

[5] Congreso de la Republica [de Guatemala]. 2021. *Cobertura del programa de alimentación escolar llegaría a 3.6 millón de estudiantes*. Ciudad de Guatemala, Guatemala, Congreso de la Republica.
[6] Ministerio de Educación. 2021. *Estado de Aplicación de la Ley de Alimentación Escolar y su Reglamento*. Ciudad de Guatemala, Guatemala, Ministerio de Educación.
[7] Ministerio de Educación. 2021. *Estado de Aplicación de la Ley de Alimentación Escolar y su Reglamento*. Ciudad de Guatemala, Guatemala, Ministerio de Educación.

10. Article 15 of the LAE stipulates that, of the financial resources allocated to OPFs for school meal procurement, at least 70 percent (originally 50 percent in 2017–2022; updated to 70 percent in 2023) should be spent on products originating from family farmers, also known as HGSF. While the LAE has helped to ensure that students across Guatemala have access to government-recommended nutritional menus, even during the COVID-19 global pandemic,[8] the market participation from family farmers is generally low, making it challenging to meet the local-purchasing target. Administrative data on school purchases in 2022 suggest that only 26 percent of the schools complied with the LAE 2017 requirement.

2.2 Programme description

11. To encourage market participation from family farmers and to facilitate market transactions, the WFP Guatemala country office developed the School Feeding Management Application (SFMA or 'the app'), a smartphone application that connects schools and registered suppliers in the nearby area. Schools can easily submit purchase orders, and farmers can make digital offers.

12. SFMA originated as a partnership between WFP and the Guatemalan Ministry of Education in 2019, when the WFP Guatemala country office proposed a PAE tracking application. Preliminary steps were taken in the creation of the app; however, in 2020 – due to the onset of the COVID-19 global pandemic – an urgent need for real-time, school-level procurement data required an adaptation to the original app development plan. WFP and Ministry of Education collaborated in the creation of an application titled Mis Compras de PAE to ensure that the LAE and PAE were followed correctly during the pandemic. The Mis Compras app tracked school purchasing via the collection of procurement data from OPFs. The Mis Compras app ensured that data once collected in-person would continue to be collected remotely. However, suppliers were not connected to OPFs in this original application, nor was there extensive analysis of the data from the app. In support of the LAE and returning to the original, pre-COVID intent of the app, the revamped new app, SFMA, was developed to better serve both the Ministry of Education and OPFs, as well as incorporating the Ministry of Agriculture and suppliers into the PAE.

13. The objectives of this app are: to strengthen the school procurement process by increasing the supply of locally produced nutritious food; to increase procurement efficiency by reducing search and transaction costs; and to boost the local economy by supporting smallholder suppliers.

14. The country office piloted the application from August 2022 to June 2023 in six departments of Guatemala (Alta Verapaz, Chimaltenango, Chiquimula, El Progreso, Escuintla and San Marcos). Training was organized in schools with OPFs and suppliers to cover the importance of the LAE and compliance with the requirements of the law. The Ministry of Education and Ministry of Agriculture also provided additional detailed training on the new procurement app to promote the use of the app among OPFs and suppliers. The first procurement event using the app took place in March 2023 (as part of the second delivery: *entrega* 2). The second procurement event using the app took place in May 2023 (as part of the third delivery: *entrega* 3).

[8] IFAD. 2021. *Linking Families, Farmers and Schools in Guatemala*.

3. Questions and design

3.1 Pilot evaluation questions

15. The main questions addressed in this pilot impact evaluation were:

    EQ1. What is the take-up of the app among the schools and suppliers where a training session demonstrating the app was conducted?

    EQ2. Does the use of the app increase the number and/or value of purchases by schools from local registered suppliers?

    EQ3. Does the use of the app change procurement efficiency, and how it relates to the type of the food procured?

Additionally, the following secondary question was considered:

    EQ4. Are the conditions in place to roll out the app at the national level and conduct a large-scale impact evaluation to measure the impact of home-grown school feeding on farmers' production, sales, and revenues?

16. First, the pilot impact evaluation assessed the take-up of the procurement app by schools and producers in municipalities in which the app was introduced. The evaluation assessed how often schools and producers used the app to complete their procurement processes. The evaluation surveyed both schools and producers on their perceptions about the app and any issues they might be facing when using it.

17. Second, the randomization of schools allowed the evaluation to estimate how the procurement process itself is changing in schools that were offered to use the app. The main outcome of interest is whether the app increases the number/value of purchases from local registered suppliers, compared with schools with no access to the app. Compliance with the School Feeding Law regarding purchases from local suppliers is also a key outcome. The evaluation also considered other dimensions of the procurement process, including the total number of producers supplying to a school, the number of transactions and the volume of procurement.

18. Third, the evaluation assessed whether the use of the app changed the types of the food procured. Schools are expected to adhere to a menu suggested by the Ministry of Education, but some products may not be available in rural communities, making it challenging to adhere to the officially recommended menu items. The effect of the app on this is unknown a priori. The app may make it easier for schools to adhere to the menu, by automatically generating the number of products to be bought, when given a menu and the number of students to be served. On the other hand, the app has a built-in flexible feature that allows schools to substitute the default items with other approved products when the former are not available.

19. Finally, app usage and an increase in purchases from local producers are necessary components for an impact evaluation investigating the impact of HGSF on the livelihoods of these communities. The pilot impact evaluation assessed the feasibility of an impact evaluation, which would evaluate whether farmers in municipalities where the app is introduced see any changes in their input usage, productivity, and farming revenues and profits.

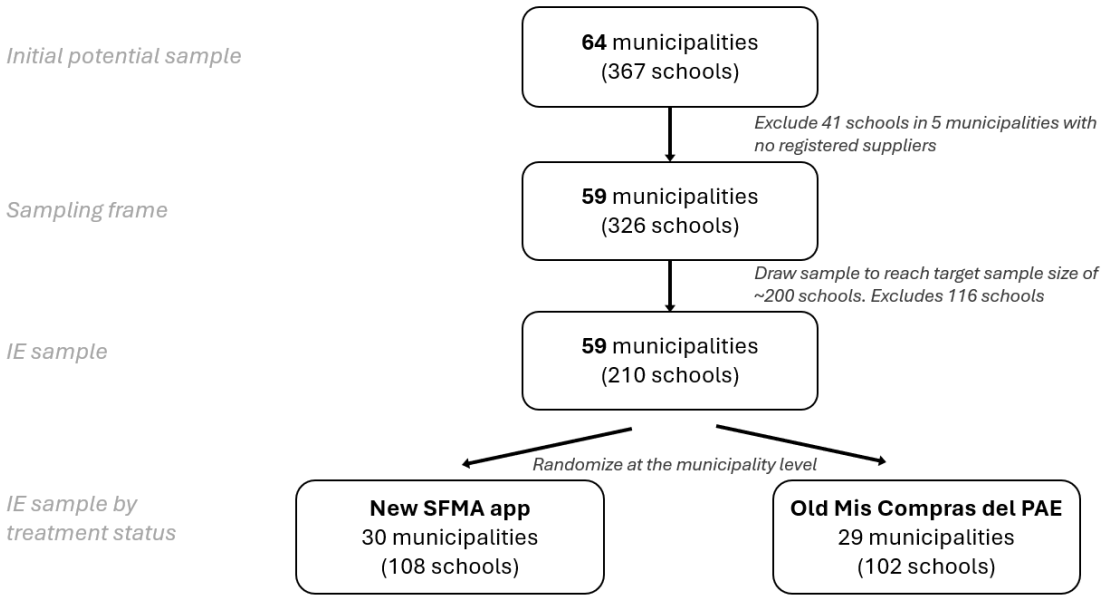
3.2 Evaluation design

20. The pilot impact evaluation employed a lean impact evaluation approach. It used an experimental design to compare food procurement and school meal distribution practices of schools exposed to the new app, SFMA, with the practices of schools using the old Mis Compras del PAE app (representing the status quo). Lean impact evaluations are conducted using experimental designs to test alternative implementation modalities. However, rather than focusing on outcomes, lean impact evaluations focus on comparing output-level data and mainly rely on pre-existing monitoring systems for data collection.

21. Figure 1 provides a visual representation of the school sample selection and the random assignment of municipalities. Based on a list of eligible schools and their basic characteristics, 367 schools in 64 municipalities[9] were initially identified for the implementation of a pilot programme using SFMA. Among these, five municipalities were excluded because they did not have any registered suppliers. Of the remaining 59 municipalities, 30 municipalities (108 schools) were randomly assigned to receive the app, while 29 municipalities (102 schools) served as a comparison group (Figure 2).

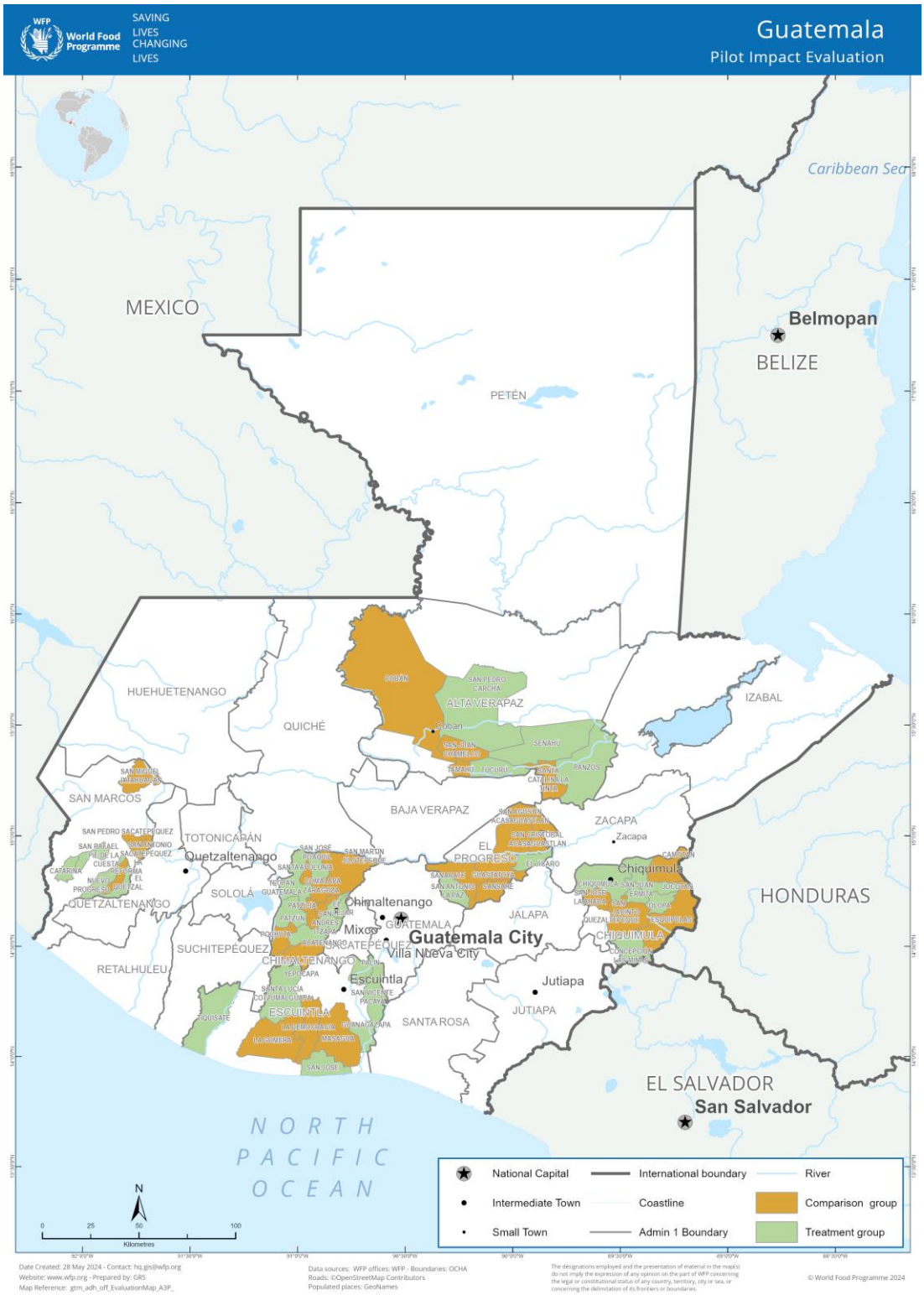
22. All schools and all eligible suppliers in the 59 selected municipalities received training on the general procurement process, the importance of the LAE and compliance with the law. Providing training to both groups ensures that any changes in outcomes is not due to the fact that one group received some training or had interactions with government officials. The only difference is that some schools and suppliers were also trained on the use of the new SFMA.

Figure 1: Sample selection and random assignment



[9] In the six departments of Alta Verapaz, Chimaltenango, Chiquimula, El Progreso, Escuintla and San Marcos.

Figure 2: A map of study municipalities



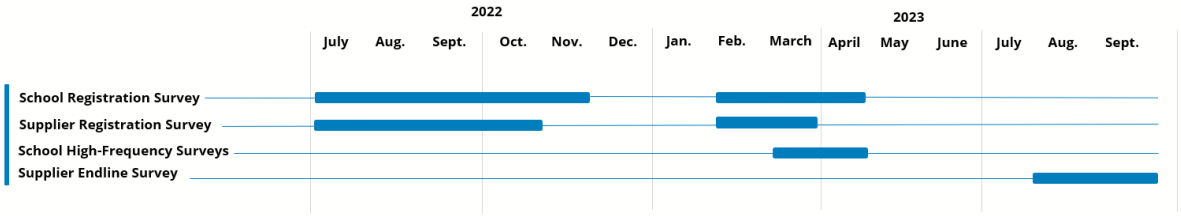
3.3 Data sources

23. All analyses in the results section relied on survey data, as procurement-related administrative data gathered through the app was not available. The impact evaluation team worked closely with the WFP Guatemala country office on the development of the following tools:

    - **School registration surveys:** Registration surveys were collected during all the training with OPFs between July and November 2022, with additional data collected between February and April 2023. These registration surveys were created to obtain basic characteristics of schools as well as participation records in training. From the 210 schools in the sample, 207 were surveyed (107 schools in status quo municipalities and 100 schools in municipalities where SFMA was introduced).
    - **School high-frequency surveys:** Two rounds of high-frequency phone surveys were collected to capture schools' food procurement and delivery behaviours a few weeks after the procurement event in March and April 2023. From the 210 schools in the sample, 204 participated in the first round of the high-frequency surveys (98 in status quo municipalities and 106 where SFMA was introduced) and 189 in the second round (91 and 98 respectively).
    - **Supplier registration surveys:** Registration surveys were collected during all training with suppliers between July and October 2022, with additional data collected between February and March 2023. These registration surveys were created to obtain basic characteristics of suppliers as well as participation records in training. Out of the 618 registered suppliers, 147 attended the training and were surveyed (64 in status quo municipalities and 83 in municipalities where SFMA was introduced).
    - **Supplier endline surveys:** A survey was conducted at the end of the pilot period (August and September 2023). The survey included modules on farm inputs, production and sales (specifically sales as part of the school feeding program), as well as the usage of the app. From the 618 registered suppliers, 180 were randomly selected and interviewed (84 in status quo municipalities and 96 in municipalities where SFMA was introduced).

24. With the exception of the supplier survey, all the surveys are part of the programme monitoring and evaluation. The WFP country office led the data collection in close collaboration with the impact evaluation team. Figure 3 provides a visual representation of the timeline for data collection activities.

Figure 3: Timeline of data collection



3.4 Schools' and farmers' characteristics

25. This subsection presents a few key characteristics of school respondents interviewed during the two rounds of high-frequency surveys. If a representative of the school was surveyed in both rounds, only the most recent information was considered (round 2). Table 1 shows that

42 percent of the respondents interviewed at the high-frequency surveys were OPF members who oversaw school meal procurement at the school level. A majority of the respondents were female (64 percent) and married (65 percent). The average age was 44.5 years, while 90 percent of them attended a technical school or university. Additionally, the schools had, on average, 305 students enrolled, with boys representing 51 percent of the students.

Table 1: Schools' profile

	N	Mean	Standard deviation
Respondent characteristics			
OPF member	204	0.42	0.49
Female	203	0.64	0.48
Civil status: married	201	0.65	0.48
Age	203	44.50	9.50
Educational level: technical school and above	192	0.90	0.30
School characteristics			
Total student enrolment	204	304.99	157.67
Percentage of boys enrolled	202	0.51	0.08

26. Table 2 shows a few key characteristics of respondents to the supplier survey. The vast majority of the sample – 90 percent of suppliers – had cultivated land during the last 12 months, with an average of 8.7 hectares cultivated; 88 percent of them producing products found on school menus. While almost all respondents (92 percent) were familiar with the LAE, only about two-thirds of them sold food products to schools in 2023 (68 percent). The sales came from a combination of their own production and aggregated crops, as 63 percent of them worked as intermediaries. Lastly, 43 percent of suppliers were part of a farmer's group in some form.

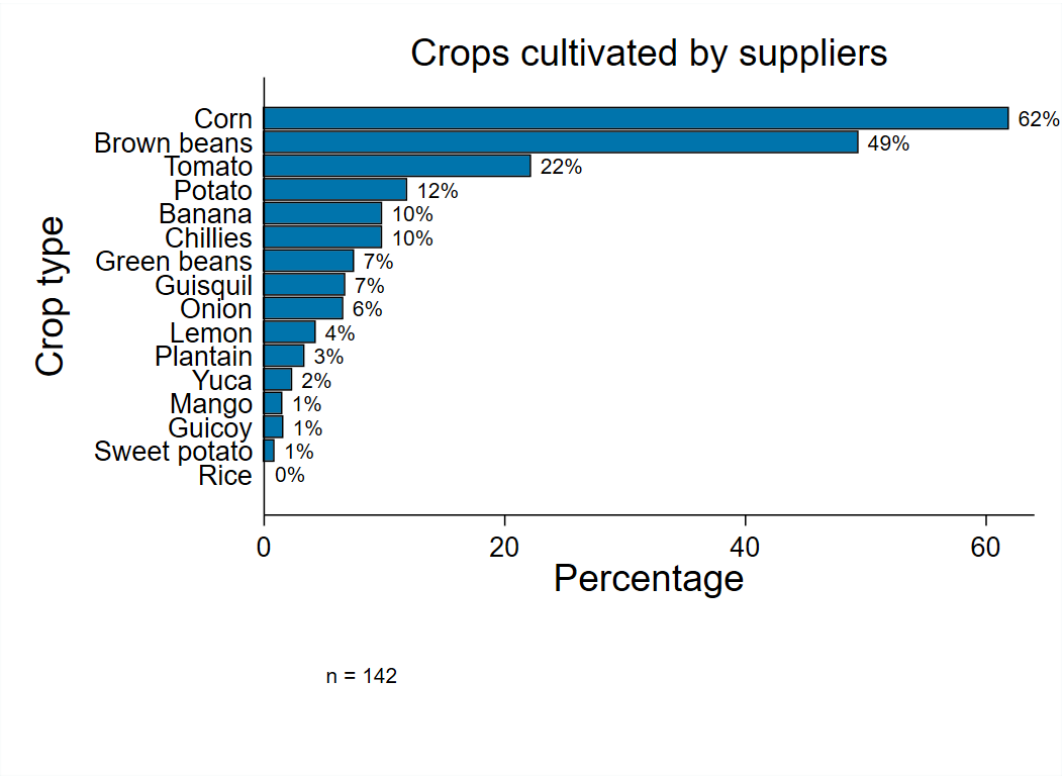
Table 2: Suppliers' profile

	N	Mean	Standard Deviation
Respondent characteristics			
Female	180	0.37	0.48
Civil status: married	179	0.65	0.48
Age	180	42.14	13.00

Educational level: technical school and above	180	0.47	0.50
Supplier characteristics			
HH cultivated land in the last 12 months	180	0.90	0.30
Area cultivated in hectares	162	8.70	2.34
Producing products found in school menu	180	0.88	0.32
Being familiar with the LAE	180	0.92	0.28
Sold food products to school 2023	180	0.68	0.47
Selling aggregated products not produced by themselves	180	0.63	0.48
Supplier is part of a co-op/association/group	180	0.43	0.50

27. While 88 percent of them produced at least one product found in the school menus, only one in five suppliers produced all the products purchased as part of the school menus (such as tomatoes, potatoes and bananas) (Figure 4).

Figure 4: Crops cultivated by suppliers



4. Results

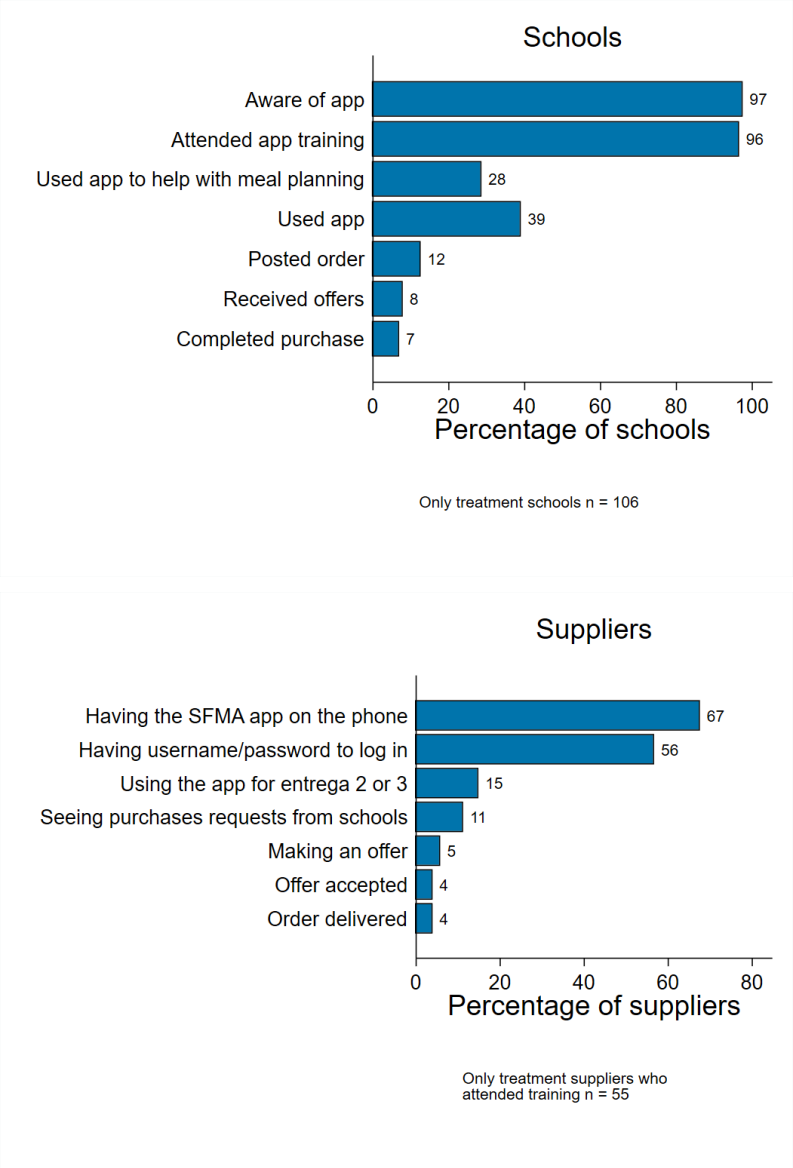
28. This section assesses the app's take-up, estimates its impacts on school procurement behaviours and procurement efficiency, and describes the users' challenges.
29. Since the use of the app is endogenous (that is, determined by schools' and suppliers' ability and preference to participate or not), comparing the schools and suppliers who used the app with those who did not use the app does not measure the causal impact of using the app. For example, schools that use an app may have better internet connection or have OPF members who are younger and more educated, both of which are directly correlated with procurement behaviour. Therefore, the analysis relies on the intention-to-treat to arrive at unbiased estimates of the programme impacts, which compares all schools and suppliers in municipalities who were randomly offered the app (regardless of whether they used the app) with all schools and suppliers in municipalities who were not randomly offered the app.

4.1 Take-up and use

Summary of findings: During the study duration, between August 2022 and June 2023, the awareness of the app was high among the schools (97 percent), while it was low among suppliers (40 percent). Despite the high awareness, almost no procurement transactions were completed on the app. Only 12 percent of the schools reported posting a purchase order on the app and 7 percent completed a purchase. On the supplier side, only 15 percent of the suppliers who attended the training attempted to use the app, while 5 percent submitted an offer on the app.

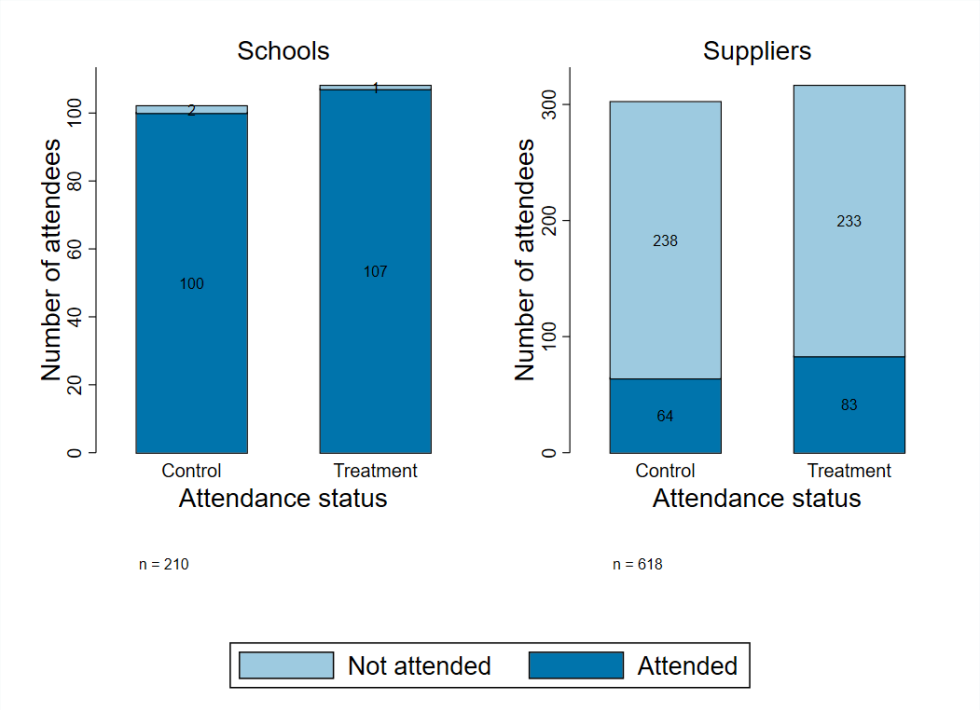
30. This section presents findings on awareness of SFMA and the participation of schools and suppliers in training. It assesses the take-up of the app using the school high-frequency surveys and the supplier surveys among the schools and suppliers in the municipalities where a training session was conducted. Training participation uses schools and suppliers registration survey data.
31. The awareness of the app was high among schools (97 percent) that participated in the training in municipalities where SFMA was introduced (Figure 5). This contrasts with the fact that only 39 percent of the schools attempted to use the app for procuring school meals, and only 12 percent of the schools were able to successfully post a purchase order. Only 8 percent of interviewed schools reported receiving an offer from suppliers and 7 percent completed purchases on the app.
32. Among a sample of suppliers who received training on the app in municipalities where SFMA was introduced, only 15 percent of them attempted to use the app at the time of the supplier survey. Approximately one-third of them did not have the app installed, and about half of the suppliers did not have login credentials to access the app. Overall, only 5 percent of them made an offer on the app.

Figure 5: Usage of SFMA



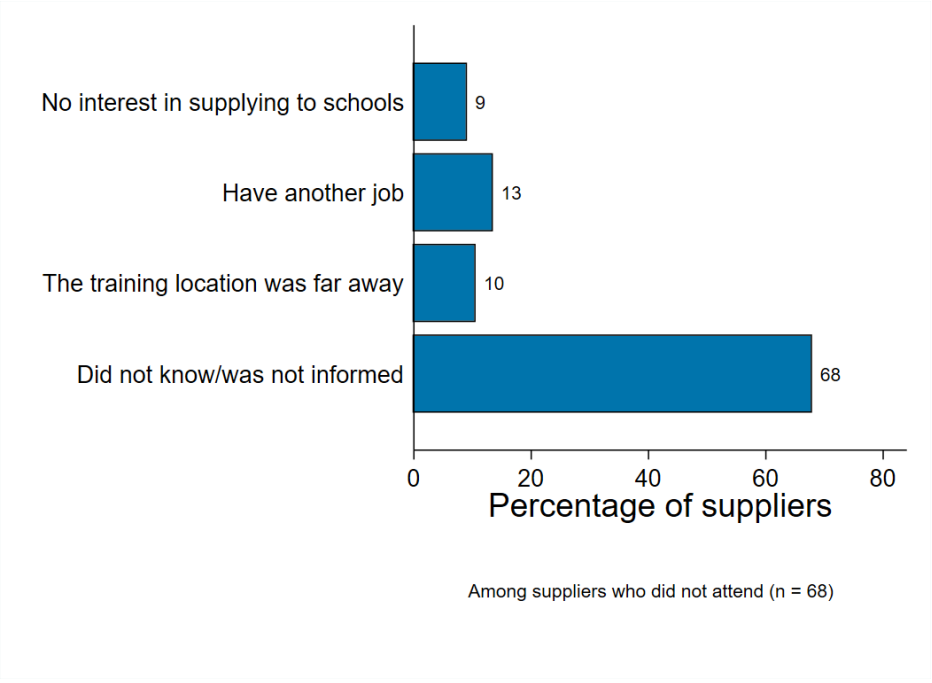
33. To better understand the reasons for low usage, the pilot examined the schools and suppliers registration survey data, which includes all 210 schools, and all 618 suppliers registered with the Ministry of Agriculture in the study municipalities. Figure 6 shows that almost all schools had representatives who attended at least one training session. On the suppliers' side, only 24 percent of the registered family farmers attended the training. This low supplier participation led to having no suppliers at all in many municipalities who were trained on how to use the app, which contributed to the very small number of offers from the suppliers.

Figure 6: Training participation



34. During the supplier survey, the suppliers who did not attend the training were asked about the reasons for their non-attendance (Figure 7). Many suppliers (68 percent) reported that they were not informed of any training, suggesting that outreach is a big problem in mobilizing family farmers to come to training. Beyond lack of awareness, suppliers also indicated that the opportunity cost of travelling to attend training is quite high, given that they have another job, and the training location is far away.

Figure 7: Reasons why suppliers did not attend the WFP training



4.2 Schools' procurement behaviours

Summary of findings: The share of schools satisfying the legal requirement of purchasing at least 70 percent of meals from family farmers did not change with the availability of the app. Consistent with the low usage of the app, there were no detectable changes in the procurement behaviours (i.e., number of transactions as well as the procurement quantity and value).

35. One of the main objectives of the app was to connect schools and registered suppliers, to facilitate sourcing from local suppliers and encourage suppliers to sell food to schools. This section assesses whether the use of the app increased the number and/or value of purchases by schools from local registered suppliers.
36. Figure 8 indicates that the share of purchases from family farmers was approximately 44 percent of the procurement value for both schools that had access to the app and schools that did not. The remaining purchases mainly came from traders (26 percent for schools with access to the app and 23 percent for the schools in the control group) and stores (14 percent and 19 percent respectively).
37. Figure 9 presents the percentage of schools that procured at least 50 percent of meals from registered smallholder farmers, as well as those that procured at least 70 percent. Among the schools that were offered the app, about 55 percent of schools met the requirement when using the 50 percent threshold, while only 25 percent of schools met the requirement when using the 70 percent minimum threshold. These shares do not meaningfully change between schools that were offered and those that were not offered the app.

Figure 8: Procurement from registered farmers

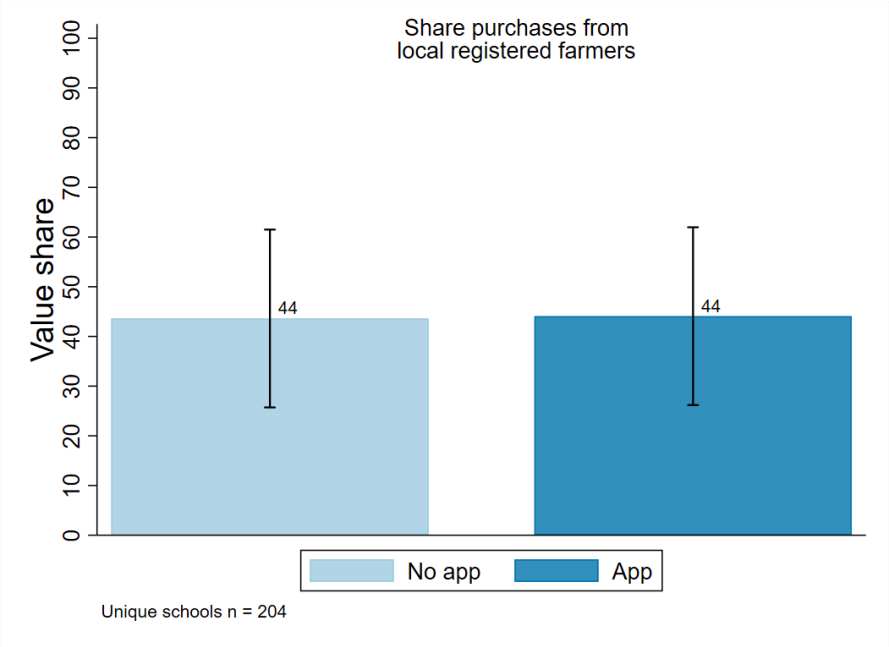
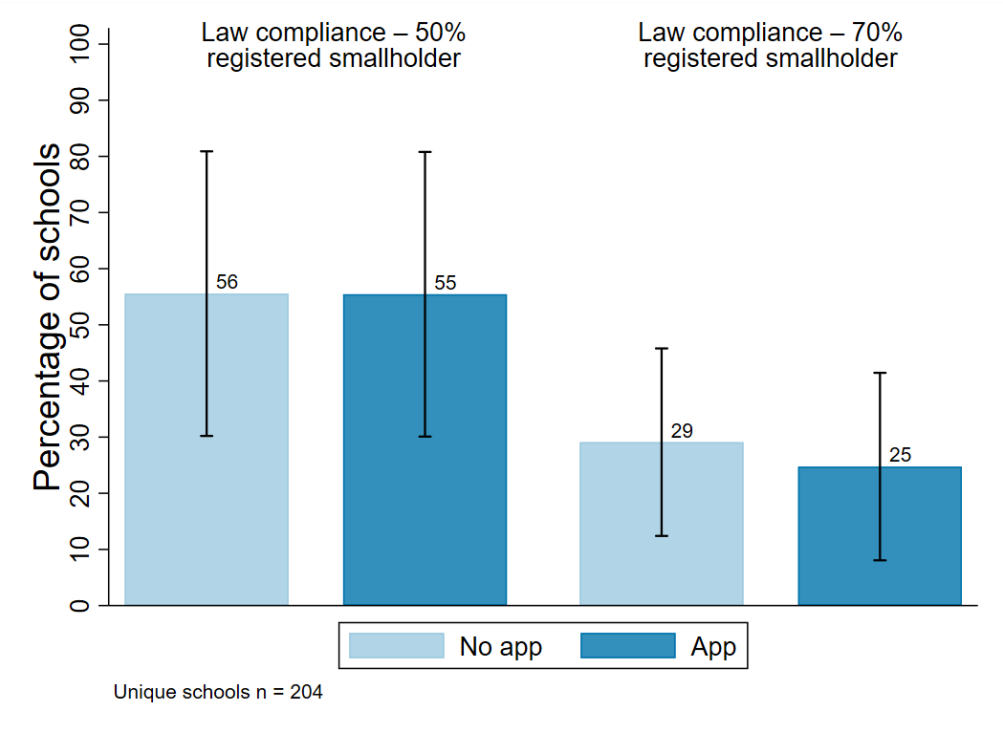
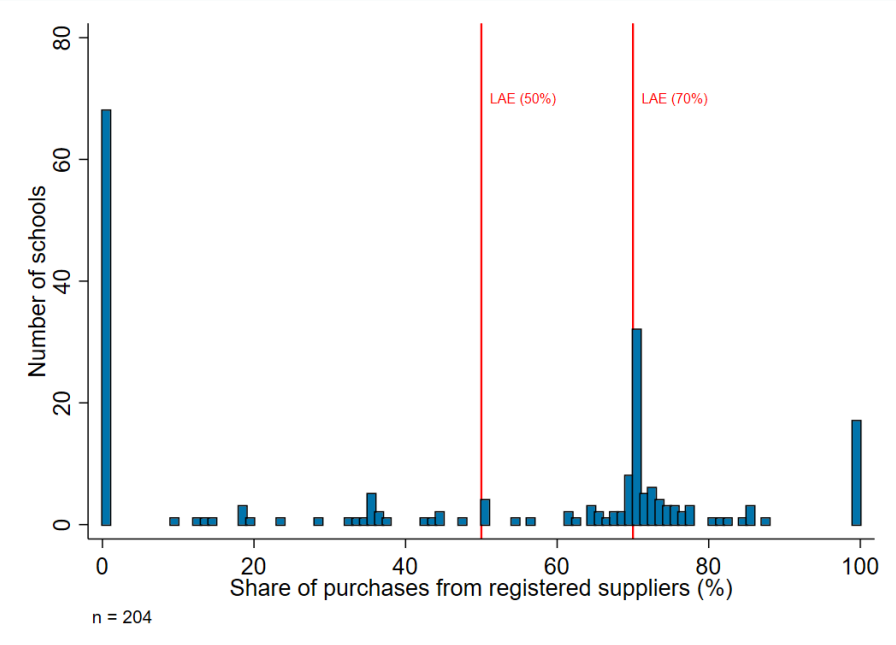


Figure 9: Compliance with procurement requirements



38. Figure 10 shows the distribution of shares from registered suppliers. It is estimated that 33 percent of the schools did not buy any product from registered suppliers, while 21 percent exceeded the 70 percent minimum threshold required by the LAE and 8 percent bought all products from registered suppliers.

Figure 10: Histogram of share of purchases from registered suppliers

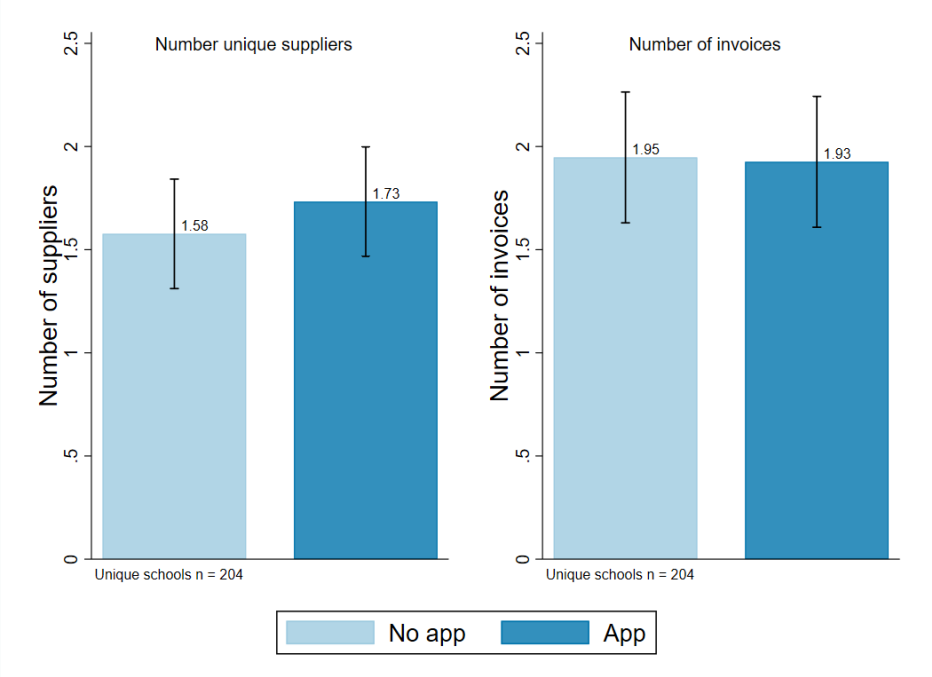


39. The pilot impact evaluation assessed whether the app had had an impact on the number of transactions and/or the total value of purchases by the schools. If the app helps schools to find suppliers easily, then schools may be able to procure from a greater number of suppliers. Similarly, if the app helps schools to find competitive prices, then the value of purchases may decrease due to the cost saving.

As shown in Figure

40. Figure 11, there were no significant detectable changes in the number of unique suppliers from whom schools bought meals or in the number of unique invoices, when comparing the schools that were offered the app and those that were not.

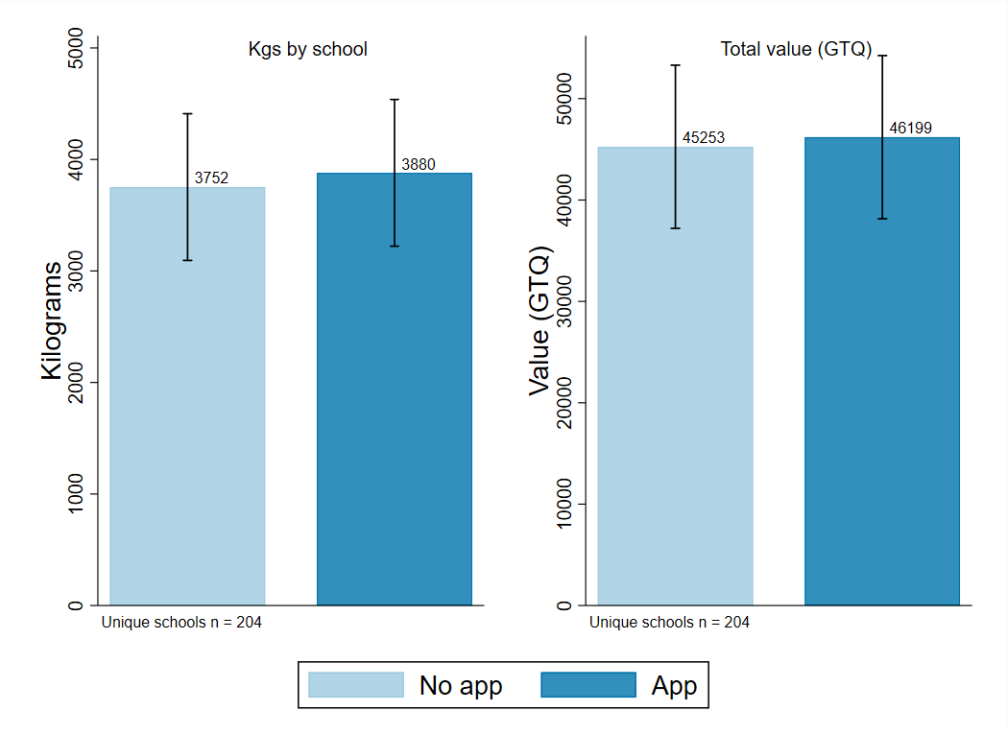
Figure 11: Changes in transactions with suppliers



Estimates in Figure

41. Figure 12 do not find a significant difference in the total quantity of procured meals (measured in kg) and the total value of purchases (measured in Quetzal) between the two groups of schools. Overall, the lack of changes in procurement behaviours is not surprising given the very low usage of the app and the low number of successful purchases on the app as noted in the section 4.1.

Figure 12: Procurement quantities and prices



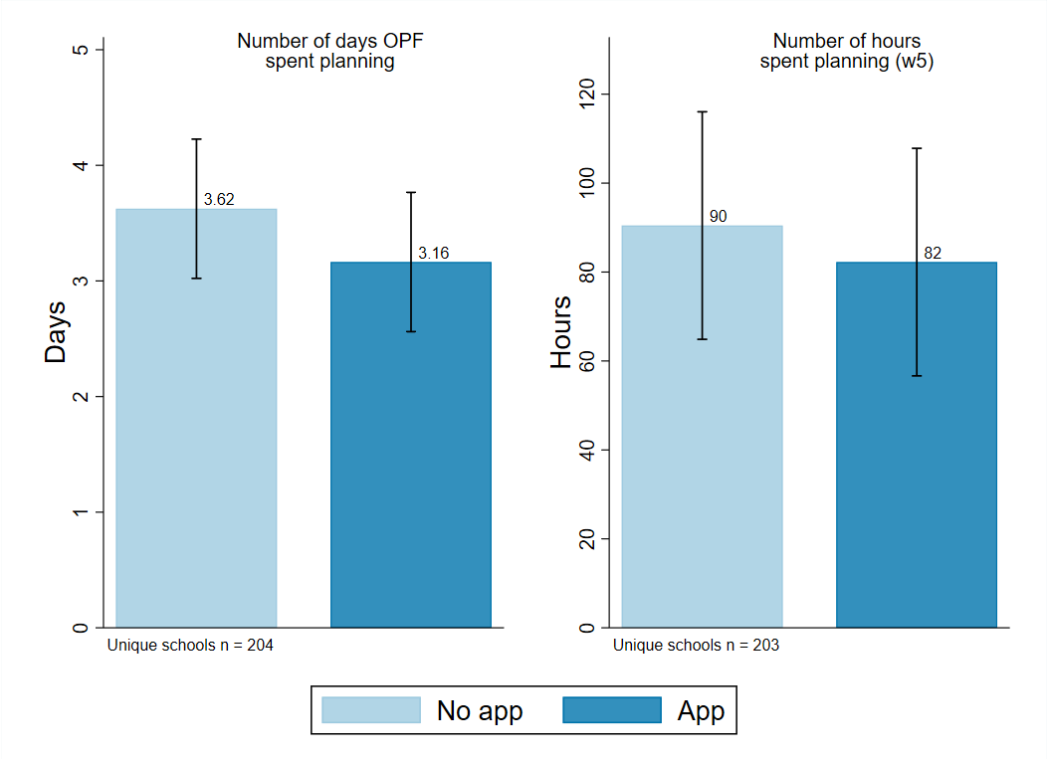
4.3 Schools' procurement efficiency

Summary of findings: There is modest (though not significant) evidence that app features assisted schools in making procurement decisions more efficiently by reducing the hours spent on planning. Moreover, when ingredients specified in the official menus were not available, the app's flexibility allowed schools to find alternative food products as substitutes .

42. In addition to connecting schools with suppliers more easily, the app was designed to increase procurement efficiency by automatically populating the required quantity of food items, based on the number of children entered into the app and the selection of menus. This section will explore whether the use of the app changed procurement efficiency and how it relates to the nature of the food procured.

43. Figure 13 shows that schools that were offered the app spent fewer days (3.16 as opposed to 3.62) and fewer hours (82 hours as opposed to 90 hours) on planning, when compared with schools where the app was not introduced. While the difference is not statistically significant, it is encouraging to see that at least the estimate is in the expected direction, and it might further decrease as schools gain experience with the app.

Figure 13: Procurement efficiency



44. Another outcome of interest was whether use of the app also changed the nature of the food procured. In theory, if the app automates the procurement process, it may also lead to increased adherence to the official menus and ingredients specified in the procurement guideline published by the Ministry of Education. On the other hand, some recommended food items may not be easily accessible in some schools, and a feature of the app automatically recommends substitution items that schools can choose to procure as alternatives.

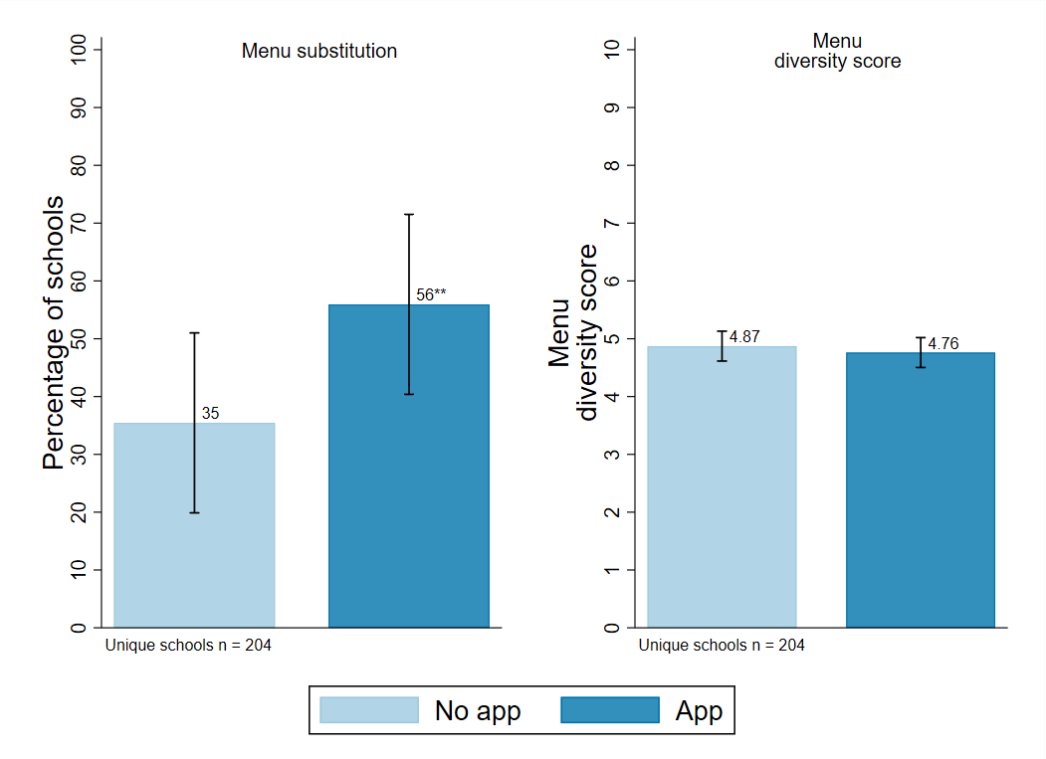
45. Figure 14 shows that the app increased the likelihood of substituting the official food items with acceptable alternative products by 21 percentage points (on a base of 35 percent). The magnitude is large, but it is not implausible. While the proportion of schools completing a purchase on the app was only 7 percent, the proportion of schools that reported using the app for meal purchase planning was 28 percent.

Product substitutions did not compromise meal diversity (right panel of Figure 1

46. Figure 4). While the menu diversity score[10] was slightly higher for the schools without access to the app (almost five of the nine food groups for both groups) the difference is not significant.

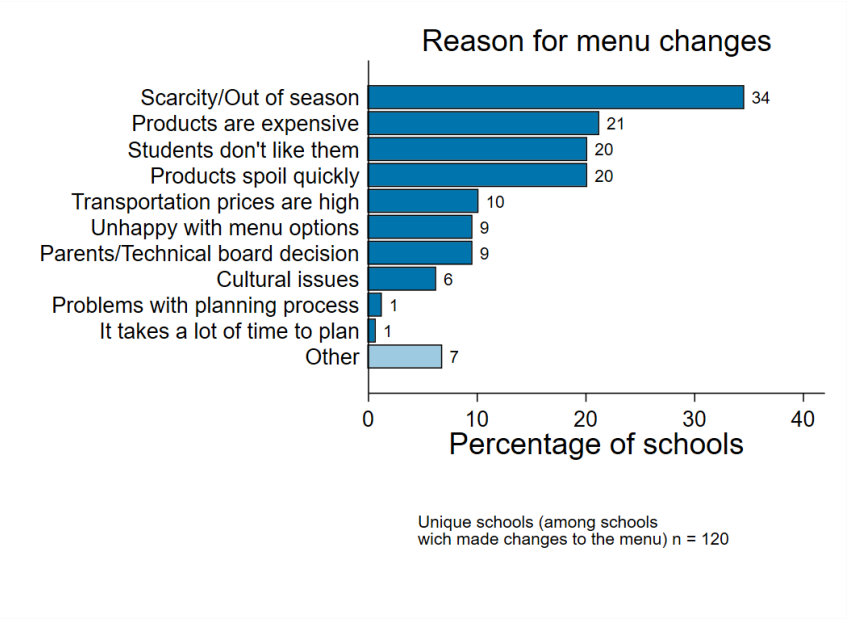
10 The menu diversity score ranges from 1 to 9. Each food group is assigned a score of 1 if purchased by the school (included in the invoices). The score equals the total number of food groups included in the school invoices.

Figure 14: Menu substitution and nutritional diversity



47. The evaluation further examined the reasons for menu substitutions. Figure 1**Error! R eference source not found.**5 shows that the most common reasons included student diet preferences (19 percent), spoilage of products (19 percent), and expensive food items (17 percent). Combined with the little to no change in dietary diversity with product substitutions, the evaluation interprets flexible product substitution as an additional positive benefit of the app.

Figure 15: Reasons for menu substitution

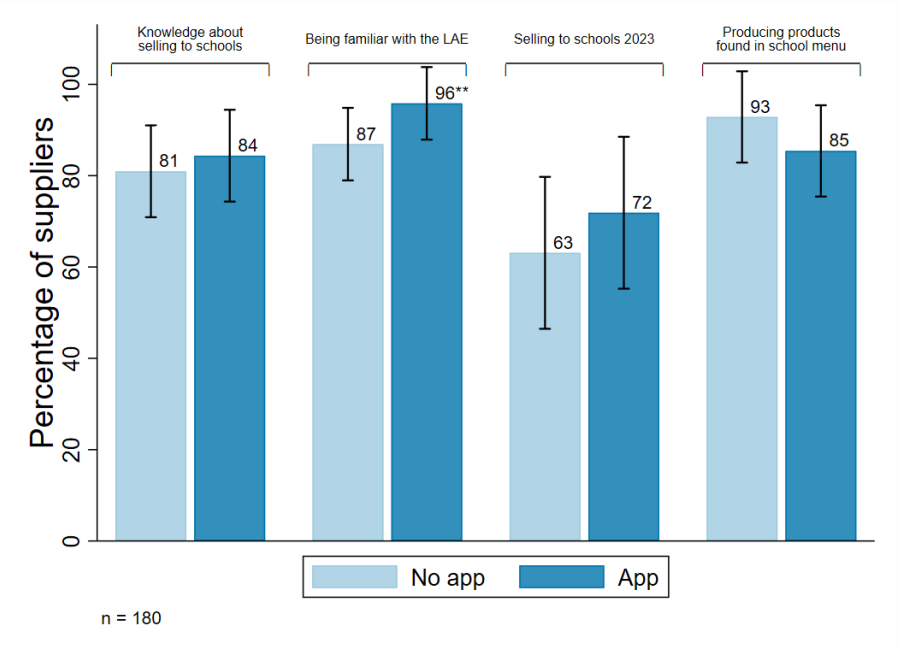


4.4 Suppliers' awareness and readiness

Summary of findings: Although both suppliers with and without access to the app participated in the training which covered the importance of the LAE and how to comply with the law, the percentage of suppliers familiar with the LAE was significantly higher among the suppliers in the municipalities where the app was offered.

48. If search and information frictions are barriers for suppliers in finding schools, then the app could encourage market participation by reducing search and transaction costs. The analysis first measured differences in awareness and readiness between suppliers who were offered the app and those who were not offered the app, analysing all sampled suppliers in the supplier survey, regardless of the participation in training and the app usage. This compares with the analysis in section 5.1, which relied on the supplier survey data in the municipalities where a training session was conducted.
49. No large difference between the two groups of suppliers were found across all the measures (Figure 16). The vast majority of suppliers were familiar with the opportunity to sell to schools as well as the LAE requirement (as they should be, since these farmers were sampled from the registered list of farmers maintained by the Ministry of Agriculture). The proportion of suppliers producing products found in school menus did not change eight months after the training. Similarly, the proportion of suppliers who sold to schools during *entrega* 2 and 3 in 2023 is 63 percent and 72 percent, respectively, and is not statistically significantly different. The lack of changes in their interest in selling to schools is consistent with the low adoption of the app.

Figure 16: Suppliers' ability/readiness to sell to schools (not conditional on training)



50. Given that the take-up of the app was extremely low among the farmers, any differences in these outcomes between those offered the app and those not are best interpreted as the baseline differences between the two groups, but not as the causal impact of using the app.

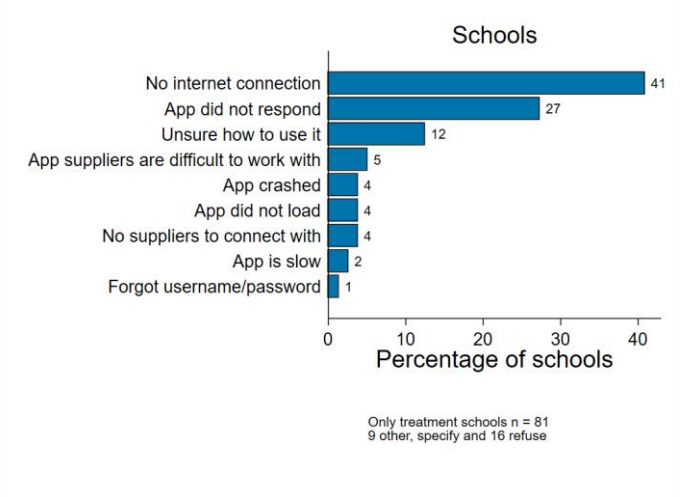
4.5 Challenges

Summary of findings: One of the main barriers for schools is internet connection, while limited support is the main constraint for suppliers.

51. This section explores technical issues experienced by the users of the app, desirable features of the app and general challenges when working with schools and smallholder suppliers.

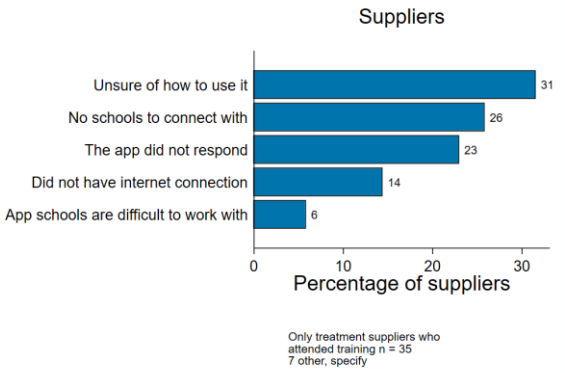
52. Figure 17 shows that a large number of schools did not have stable internet connection (41 percent), which limited the use of the app. Beyond the connectivity issue, app functionality issues were also reported by schools (27 percent said the app did not respond, 4 percent reported that the app crashed, and 4 percent said the app did not load, etc). Despite the multiple app training sessions, 12 percent of schools still reported that they were not sure how to use the app for procurement.

Figure 17: Challenges in using SFMA (schools)



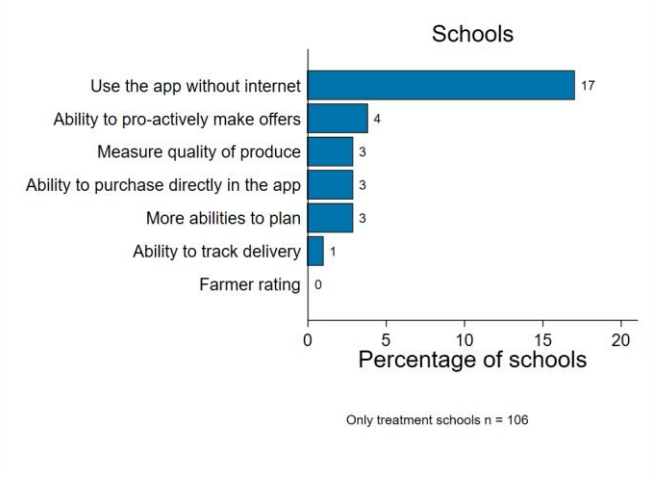
53. Among the suppliers who attended training, and therefore had been introduced to the app, 31 percent of them reported doubts on how to use the app, while 26 percent of them reported that there were no purchase orders to respond to. Consistent with the self-reports from schools, the suppliers also indicated that app freeze was an issue (23 percent). But a smaller fraction of suppliers (14 percent) faced internet connectivity issue (Figure 18).

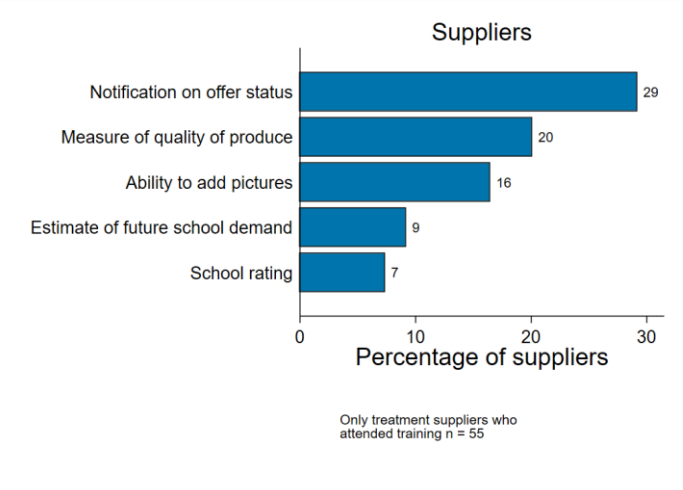
Figure 18: Challenges in using SFMA (suppliers)



54. Closely related to the challenges experienced using the app, the findings suggest that the app may be more effective if additional features were added. The main request among schools was to be able to use the app without an internet connection (17 percent), whereas suppliers who attended the training expressed that they would like to receive notifications on the status of the offers (29 percent) and to be able to indicate the quality of the products (20 percent) to differentiate their products from those of lower quality (Figure 19).

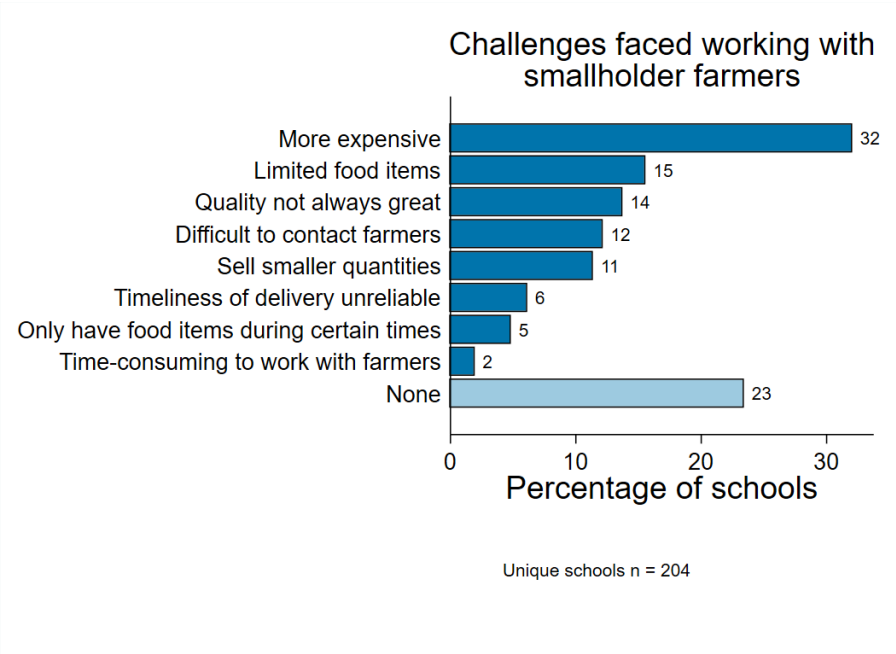
Figure 19: Features missing from SFMA

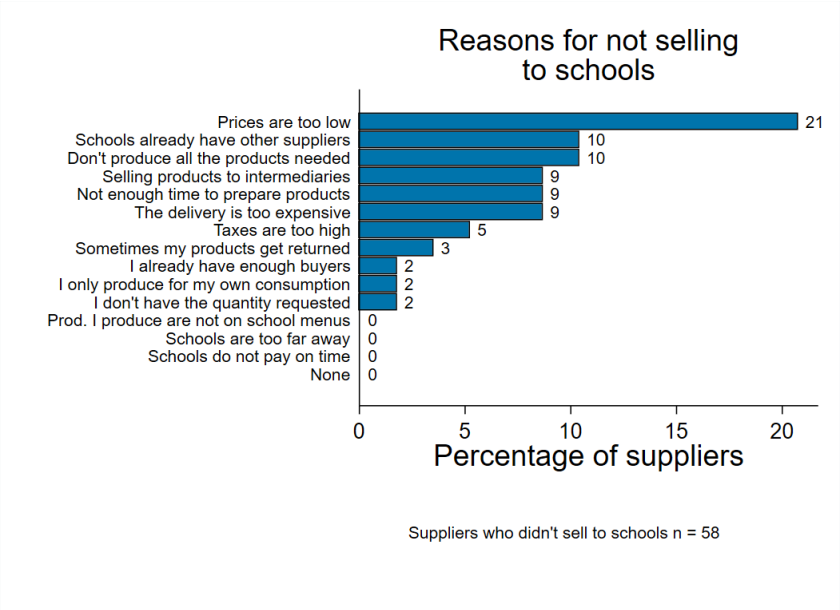




55. In addition to facing technical challenges in using the app, schools and suppliers also reported difficulties in collaborating with each other. The main challenge was related to the price of products, with schools complaining about that they were too expensive (32 percent) and suppliers asserting the opposite (21 percent). Other challenges reported by the schools were the limited supply of certain products (15 percent) and the inferior quality of certain products (14 percent). On the suppliers' side, other reasons given for not selling to schools were that schools already have other suppliers (10 percent) and that suppliers do not produce some of the products demanded (10 percent) (Figure 20).

Figure 20: Challenges working with smallholder farmers/schools





4.6 Revised feasibility

56. The final aim of this pilot was to inform the feasibility of a potential impact evaluation which would assess the impact of HGSF on farmers' income and agricultural practices. This impact evaluation would exploit the introduction and expansion of the app to identify a credible counterfactual. However, based on the findings from this pilot, the take-up rate for the app is currently too small to enable the detection of an impact. It is therefore not advised to scale up the app and conduct a full-scale impact evaluation at this time.

5. Conclusions and considerations

5.1 Take-up

57. Findings from this pilot impact evaluation indicate that, overall, the usage of the app was low. Despite school training participation being high, with 99 percent of schools having representatives attend at least one training session, only approximately one-third of schools attempted to use the app for procuring school meals. Only 12 percent posted a purchase order on the app, and only 7 percent completed a purchase on the app. The main reasons given for not using the app were internet connectivity issues and functionality issues. It is also worth noting that during the pilot, schools continued to use manual records as part of their regular accountability process. This practice may have rendered the app redundant and contributed to its low usage.

58. Beyond the technical issues, even the successful purchase orders did not generate many offers from suppliers. First, only 24 percent of the registered suppliers attended the training for the app. Training participation was a requirement to receive the login credentials to access the app. The main reasons reported by suppliers for not participating in the training included not being informed on time about the training, a high opportunity cost, and distance from the training location. Second, the app usage was low even among the suppliers who attended the training. Only 15 percent of the training participants attempted to use the app, and only 4 percent of the suppliers reported completing an offer on the app successfully.

5.2 School procurement behaviours

59. Consistent with the low adoption rate, there was little to no change in school procurement behaviours. The purpose of the app was to assist in facilitating schools' identification of more competitive suppliers for school meal purchases via digital transactions. However, there was neither a change in the number of unique suppliers from whom schools buy meals nor a change in the number of transactions (measured by the number of unique invoices). Furthermore, the app did not help in finding suppliers who could supply at more competitive prices. The evaluation identified no changes in the total value of procurement, while the total quantity of procurement remained the same.

60. One of the most important objectives of the app, from the Ministry of Education's perspective, was to encourage schools to procure more from smallholder family farmers by connecting them directly through the app, as stipulated in the Guatemalan School Feeding Law. The pilot found that the share of purchases from family farmers is almost the same between schools that had access to the app and those that did not, at around 44 percent. Consequently, the share of schools satisfying the requirement of the law (i.e., purchasing at least 70 percent of meals from family farmers) did not differ between the two school groups.

5.3 School procurement efficiency

61. While the app fell short of its original expectations regarding procurement goals, its unique features assisted school procurement committees in efficiently planning procurement parameters for different meals. This process is typically cumbersome for OPFs, who are responsible for procurement decisions and lack experience in purchasing products on such a large scale. The pilot found some modest (though not statistically significant) evidence that app features assisted schools in making procurement decisions more efficiently by reducing the hours spent on planning.

62. Moreover, the schools with access to the app were more likely to procure alternative food products when the ingredients specified in the official menus of the Ministry of Education were not easily available. This may be attributed to a feature in the app that displays the list of acceptable alternative products for each item, encouraging schools to switch easily to those preferred options. Schools reported high prices, student preferences and spoilage as reasons why they made substitutions for the officially recommended products. These substitutions did not compromise meal diversity, as there was no discernible difference in the diversity score of meals distributed between schools with and without access to the app.

5.4 Feasibility of large-scale impact evaluation

63. The pilot recognized that evidence on the impact of HGSF on the local economy and local farmers would be significantly valuable from a policy perspective. However, the take-up of the app is currently too low to enable an impact evaluation to detect any impact. Therefore, the scale-up of the app and a larger-scale impact evaluation is paused until such time as the app usage increases and both the country office and Office of Evaluations agree that conditions are favourable for an impact evaluation to be usefully undertaken.

64. In the meantime, the programme is encouraged to consider the following aspects:

- With the aim of increasing usage, the programme is encouraged to:
    - further develop the app to improve users' experience; and
    - consider reducing redundancy in entering manual and digital records.
- With the aim of reaching a greater number of farmers, the programme is encouraged to:
    - ensure better farmers' outreach and training involvement;
    - consider exploring log-in credentials which do not require in-person training; and
    - consider allowing farmers to bid on individual products rather than provide entire menus.

Annex I. Representativeness of the study sample

Table A1: How study schools compare to other schools in the country

	(1) Other schools		(2) Experiment Sample		T-test Difference
Variable	N	Mean/SE	N	Mean/SE	(1)–(2)
Total value of purchases by school (in GTQ)	24 719	47 005.309	210	1.14e+05	6.66e+04
		(12 138.612)		(4 752.099)	
Number of purchases by school	24 719	29.759	210	31.381	-1.622*
		(0.080)		(0.926)	
Share of invoices from family farmers	24 719	0.189	210	0.295	-0.106***
		(0.002)		(0.018)	
Share from family farmers	24 719	0.177	210	0.274	-0.097***
		(0.002)		(0.018)	
Schools buying 50% or more from local farmers	24 719	0.183	210	0.252	-0.069***
		(0.002)		(0.030)	
Number of suppliers school has bought from	24 719	1.771	210	2.386	-0.614***
		(0.006)		(0.085)	
Number of invoices by school	24 719	4.327	210	5.233	-0.907***
		(0.015)		(0.164)	
Number of months in which schools purchased	24 719	1.953	210	1.962	-0.009
		(0.004)		(0.044)	

Notes: The value displayed for t-tests are the differences in the means of the groups. Standard errors are clustered at variable municipality. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level, respectively.

Annex II. Baseline balance

As the assignment of the sample was randomized across two groups, and sampling was conducted before the randomization, the schools and suppliers across the two groups should be comparable on both observable and unobservable characteristics at the beginning of the evaluation. The randomization ensures that all differences observed at the end are attributable (as causal impacts) to the project.

To assess the balance between groups for the schools, the evaluation used administrative data on school purchase orders which was provided by the WFP Guatemala country office.
On the supplier side, there was no data collected at the start of the project. Therefore, instead of using key outcomes of interest, the evaluation used predetermined variables which should not have been affected by the project.
Tables A2 and A3 present the "balance tables" comparing the means of the two groups for key outcomes of interest for the schools and pre-determined conditions for suppliers. T-tests are conducted to identify any statistically significant differences between these two groups. The differences between the groups are statistically insignificant at 1 percent level.

Table A2: Balance of key variables for schools

Variable	Status quo N/[Clusters]	Status quo Mean/SE	SFMA N/[Clusters]	SFMA Mean/SE	Difference (1)-(2)
Total value of purchases by school (in GTQ)	99 [29]	1.19e+05 [9 063.093]	103 [30]	1.17e+05 [7 924.177]	2 344.854
Number of purchases by school	99 [29]	32.293 [1.819]	103 [30]	32.942 [1.501]	-0.649
Share of invoices from family farmers	99 [29]	0.302 [0.042]	103 [30]	0.310 [0.037]	-0.008
Share from family farmers (as a % of total value of purchases)	99 [29]	0.279 [0.042]	103 [30]	0.290 [0.039]	-0.011
Schools buying 50% or more from local farmers (as a % of total value of purchase	99 [29]	0.273 [0.065]	103 [30]	0.252 [0.059]	0.020
Number of suppliers school has bought from	99 [29]	2.374 [0.200]	103 [30]	2.505 [0.176]	-0.131

Number of invoices by school	99 [29]	5.222 [0.321]	103 [30]	5.573 [0.266]	-0.351
Number of months in which schools purchased	99 [29]	1.960 [0.082]	103 [30]	2.039 [0.105]	-0.079
Number of registered students	102 [29]	306.912 [18.308]	108 [30]	311.787 [19.782]	-4.875
F-test of joint significance (F-stat)					0.618
F-test, number of observations					202

The value displayed for t-tests are the differences in the means across the groups.
The value displayed for F-tests are the F-statistics.
Standard errors are clustered at variable municipality.
***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table A3: Balance of key variables for suppliers

Variable	N/[Clusters]	(1) Status quo Mean/SE	N/[Clusters]	(2) SFMA Mean/SE	t-test Difference (1)-(2)
Male	84 [28]	0.679 [0.066]	96 [27]	0.594 [0.054]	0.085
Age	84 [28]	40.869 [1.291]	96 [27]	43.250 [1.077]	-2.381
Civil status: married	81 [27]	0.704 [0.052]	93 [27]	0.634 [0.045]	0.069
Educational level: Primary school and above	83 [28]	0.880 [0.044]	90 [27]	0.933 [0.033]	-0.054
F-test of joint significance (F-stat)					2.149*
F-test, number of observations					167
F-test, number of clusters					54

The value displayed for t-tests are the differences in the means across the groups.
The value displayed for F-tests are the F-statistics.
Standard errors are clustered at the municipality level.
***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Annex III: Limitations and ethical considerations

Limitations

The pilot's findings should be read and interpreted considering the following limitations:

- **Representativeness of the schools in the pilot**: Annex 1 (Table A1) describes the baseline characteristics of the 210 impact evaluation schools in our study relative to the universe of 24,719 primary schools in the country using Mis Compras administrative data for the period between September 2020 and January 2021. This data includes electronic registry of invoices and purchases made by schools: specifically, it includes item-level purchases with information on suppliers, quantities and pricing, and dates of purchase. This period covers approximately two purchase events (*entregas*). A typical school purchased 47,000 GTZ (approximately USD 6,000) during this period. The number of transactions is limited. On average, schools bought from 1.8 unique suppliers and recorded only 4.3 invoices. The numbers are slightly higher for 210 schools included in the study. The value of purchases by impact evaluation schools is twice as large as the typical school in the country, buying from 2.4 suppliers with 5.2 invoices. Notably, the study sample schools are more likely to buy from local farmers than all other schools in the country. The average share of purchases bought from local registered providers is 27.4 percent among the 210 schools in the sample and 17.7 percent among the remaining schools. As a result, only one-quarter of the impact evaluation schools reached the 2017 LAE-mandated threshold of 50 percent value bought from local farmers, while the number is even lower (18 percent) for the non-impact evaluation sample schools.
- **Limited timing for the pilot:** The timing for this pilot was limited during the 2nd and 3rd *entrega* events of the 2023 school year. This only represents an assessment at a specific point in time. Continuous efforts also informed by this pilot will allow the WFP Guatemala country office and the Government of Guatemala to improve the connection between the home-grown school feeding programme and local farmers and producers.
- **Supplier surveys are not for causal estimates:** The purpose of this pilot was to inform the scale-up of the app while simultaneously determining the feasibility of a large-scale impact evaluation assessing the impact of HGSF on local farmers. Given its limited sample size and limitations in app usage, the supplier survey shall not be used to make causal claims. This is in line with the lean impact evaluation approach, which focuses on causal claims about outputs rather than outcomes, and the expectation that the final outcomes data collected during a pilot are typically not large enough to make causal claims.

Ethical considerations

WPF impact evaluations conform to the 2020 United Nations Evaluation Group (UNEG) ethical guidelines. Accordingly, the Office of Evaluations and DIME are responsible for safeguarding and ensuring ethics at all stages of the evaluation cycle. This includes, but is not limited to: ensuring informed consent; protecting the privacy, confidentiality and anonymity of participants; ensuring cultural sensitivity; respecting the autonomy of participants; ensuring fair recruitment of

participants (including women and socially excluded groups); and ensuring that the evaluation results in no harm to participants or their communities.

The following ethical issues, related risks, safeguards, and measures have been considered:

- **IRB and ethical oversight:** Ongoing monitoring and management of ethical issues occurred during the study, with additional concerns addressed in line with established guidelines. The pilot impact evaluation received ethical approval from the Solutions Institutional Review Board under application number 2022/06/26.
- **Programme exclusion:** Refusing to partake in the survey had no bearing on eligibility for WFP support. Assignment to different groups had no bearing on ability to participate in the school feeding programme; schools continued to operate the programme and suppliers continued to work within the programme irrespective of group assignment.
- **Informed consent:** Informed consent was collected separately for each survey round. For the registration surveys, informed consent was obtained from both school representatives and suppliers during the survey interview. Consent for the school high-frequency surveys was obtained during the survey phone calls. Finally, consent for the supplier survey was obtained during the survey interviews. Consent was written into the beginning of the survey collection instrument (ODK Collect), and it was made impossible to progress past the introduction of the survey without affirmative consent.
- **Training and protocols:** Enumerators went through extensive training and piloting before each survey round. This ensured uniform and contextually appropriate questioning, as well as a clear understanding of the ethical expectations and best practices involved in the data collection.
- **Privacy during interviews:** In-person interviews were conducted individually, in private settings. Phone interviews were conducted on an individual basis and respondents were allowed to respond in a setting comfortable to them.

In summary, the study prioritized ethical conduct, covering informed consent, privacy, cultural sensitivity and vulnerable participant protection. Ethical integrity was consistently upheld and monitored to safeguard participants throughout the research process.

Bibliography

Congreso de la Republica. 2021. *Cobertura del programa de alimentación escolar llegaría a 3.6 millón de estudiantes*. Ciudad de Guatemala, Guatemala, Congreso de la Republica.

Congreso de la Republica. 2017. Ley de Alimentación escolar, Derecto 16-2017.

IFAD. 2021. *Linking Families, Farmers and Schools in Guatemala*, https://www.ifad.org/en/w/rural-voices/linking-families-farms-and-schools-in-guatemala (accessed on 10 April 2025).

Ministerio de Educación. 2021. "Estado de Aplicación de la Ley de Alimentación Escolar y su Reglamento". Ciudad de Guatemala, Guatemala, Ministerio de Educación.

WFP. 2021a. *School feeding programmes in low- and lower-middle-income countries. A focused review of recent evidence from impact evaluations*. Rome, World Food Programme.

WFP. 2021b. *School-based Programmes Impact Evaluation Window: Concept note*. Rome, World Food Programme, https://www.wfp.org/publications/school-based-programmes-impact-evaluation-window-concept-note (accessed on 2 April 2025).

WFP. 2022. *State of School Feeding Worldwide 2022*. Rome, World Food Programme.

Abbreviations

DIME	Development Impact Evaluation
HGSF	Home-grown school feeding
LAE	Ley de Alimentación Escolar
OPF	Organizaciones de Padres de Familia
PAE	Programma de Alimentación Escolar
RCT	Randomized controlled trial
SFMA	School Feeding Management Application
WFP	World Food Programme

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