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Running Head: MGD READING COMPREHENSION IN CENTRAL AMERICA

***The McGovern-Dole Food for Education and Child Nutrition Program (MGD): A  
Comparative Analysis of Reading Comprehension Gains in Central America***

Thomas M. Crea<sup>1</sup>, Sarah E. Neville<sup>1</sup>, Antonia Diaz-Valdes<sup>2</sup>, Kerri Evans<sup>1</sup>, Brenda Urizar<sup>3</sup>, Emily  
Drummer<sup>3</sup>, Jose Acevedo<sup>4</sup>, Olga Canelas<sup>5</sup>, Marlon Medina<sup>5</sup>, Jennifer Mallman<sup>5</sup>

<sup>1</sup> School of Social Work, Boston College, 140 Commonwealth Ave., Chestnut Hill, MA 02467  
U.S.A.

<sup>2</sup> Society and Health Research Center, Escuela de Sociología, Facultad de Humanidades,  
Universidad Mayor, Chile

<sup>3</sup> Catholic Relief Services (CRS) Guatemala, Quetzaltenango, Guatemala, C.A.

<sup>4</sup> School of Sociology, National Autonomous University of Honduras, Blvd. Suyapa Ciudad  
Universitaria, Tegucigalpa, M.D.C., Honduras, C.A.

<sup>5</sup> Catholic Relief Services (CRS) Honduras, Colonia Castaño Sur, Sendero Senecio, Tegucigalpa,  
M.D.C., Honduras, C.A.

31 *Abstract*

32 The McGovern-Dole Food for Education and Child Nutrition Program (MGD), funded by the US  
33 Department of Agriculture (USDA), is one of the most prominent school feeding programs  
34 implemented globally. MGD's primary objective is to increase childhood literacy. Yet, despite  
35 MGD's being in operation since 2002 - and school feeding programs' being implemented in  
36 Central America for decades - few empirical studies have examined the extent to which school  
37 feeding programs are linked to increased literacy, and specifically reading comprehension. This  
38 study examines increases in reading comprehension associated with implementation of MGD  
39 over a three-year period in rural departments of Guatemala and Honduras. Specific attention is  
40 paid to differences in program design and implementation between the two countries. Results  
41 show that reading comprehension significantly increased over time in both countries. Children in  
42 lower grades showed more pronounced gains, suggesting that early intervention is important in  
43 terms of school feeding and curriculum supports. Effect sizes were greater in Guatemala but with  
44 lower scores than Honduras, though measurement differences make side-by-side interpretation  
45 difficult. These results are discussed in light of evaluation constraints that point the way towards  
46 improved research designs in the future – and to the importance of rigorous evaluation in helping  
47 secure the political will to sustain and scale up programs.

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THE MCGOVERN-DOLE FOOD FOR EDUCATION AND CHILD NUTRITION PROGRAM  
(MGD): AN ANALYSIS OF LITERACY GAINS IN CENTRAL AMERICA

***Introduction***

School feeding programs in low- and middle-income countries (LMICs) are designed to reduce hunger, increase school enrollment and attendance, and improve learning outcomes (Alderman & Bundy, 2012; Cheung & Perrotta Berlin, 2015; World Food Programme, 2007). The McGovern-Dole Food for Education and Child Nutrition Program (MGD), funded by the Foreign Agricultural Service (FAS) of the US Department of Agriculture (USDA), is one of the most prominent school feeding programs implemented globally, and one of its primary objective is to increase childhood literacy (the other primary objective is increased use of health and dietary practices that can also lead to greater literacy) (USDA FAS, n.d.-b). Yet, despite MGD's being in operation since 2002, and school feeding programs' operating in Central America since the 1950s (Prensa Libre, 2017), few empirical studies have examined the extent to which MGD programs are linked to increased literacy. We surmise that field-based constraints related to research and evaluation capacity are behind such a lack of evidence, a long-standing problem in international development (Bamberger, Rugh, Church, & Fort, 2004; Thomas, 2010). Nevertheless, the consequences of not adequately addressing evaluation capacity constraints can be dire in securing the political will to support or even sustain programs: the Trump Administration's 2017 "America First" budget proposal suggested eliminating MGD because of reported concerns that the program lacks evidence (Dewey, 2017).

Since 2015, our research team has worked with Catholic Relief Services (CRS), one of the major implementing organizations for MGD globally, to evaluate the ability of the program to increase literacy in rural regions of Guatemala and Honduras. Our team faced many of the

evaluation constraints endemic to international development, including lack of access to a comparison group and severe time constraints related to the timeline of required deliverables (Bamberger et al., 2004). To offset some of these challenges and identify some means of establishing causality, we combined data from multiple discrete MGD evaluations to examine literacy gains over time. The purpose of this study, therefore, is to examine educational gains associated with implementation of MGD over a three-year period in rural departments of Guatemala and Honduras, respectively, with particular attention paid to differences by grade level. We also reflect on the challenges to evaluating such a large-scale program in a way that points the way towards more rigorous future evaluations.

### ***The Relationship Between School Feeding and Educational Gains***

Though few empirical studies have specifically examined MGD's educational effects, literature exists on the educational impact of school feeding more generally, especially the UN's World Food Programme (WFP). USDA is the largest contributor to the WFP's school meals program and the US government more broadly was responsible for 32% of contributions to WFP's overall budget in 2018 (World Food Programme, 2018). In addition, 16 out of the 46 MGD projects active in 2018 are implemented by WFP (USDA Foreign Agricultural Service, n.d.-a).

Research has consistently found that WFP positively influences enrollment, but otherwise results are mixed. It is also unclear which, if any, of such research has focused on WFP programs using the MGD model. Gelli, Meir, and Espejo (2007) conducted a multi-country study of WFP programs in 32 countries in Sub-Saharan Africa via retrospective surveys of a representative sample of schools in the region. They found in the first year of WFP assisting a school, enrollment increased by 28% for girls and 22% for boys. Providing take-home rations also reduced girls'

dropout rates. In a systematic review, Kristjansson and colleagues (2007) found that children enrolled in school feeding programs fared better on math assessments. Similarly, Bundy and colleagues (2009) found strong and positive associations between school feeding and math scores, but weaker associations with improvements in literacy.

Among country-specific studies, one study in Bangladesh found that a WFP school feeding program raised school enrollment, reduced dropout, increased school attendance, and raised math test scores (Ahmed, 2004). In camps for internally displaced persons in Northern Uganda, WFP school feeding programs were found to increase enrollment and decrease grade repetition for boys while weakly improving attendance and weakly decreasing the age at which children enter school, but they did not have an impact on children's progression from primary to secondary school (Alderman, Gilligan, & Lehrer, 2012). In Burkina Faso, a WFP program was found to increase school enrollment as well as girls' mathematics scores (Kazianga, de Walque, & Alderman, 2012). An evaluation of a WFP program in Cambodia, which included deworming and water and sanitation interventions along with school feeding, found positive significant effects on school enrollment but not on the completion of higher grades (Cheung & Perrotta Berlin, 2015).

Among MGD program participants, environmental factors have been linked to reading outcomes. In Honduras, parents' reports of higher social bonding in the community were associated with higher reading comprehension, while experiencing community violence exerted a negative influence (AUTHORS, 2017). A study of food intake in Guatemala found that dietary diversity had no influence on reading comprehension in the context of MGD, although egg intake on the day of assessment was associated with higher comprehension (AUTHORS, 2019a).

Overall, there is mounting evidence that school feeding programs improve children's enrollment and retention in school (Jomaa, McDonnell, & Probart, 2011), and potentially on gains in mathematics (Kazianga et al., 2012; Kristjansson et al., 2007). However, the effects of these programs on literacy may be limited and need further research (Jomaa et al., 2011).

### ***Possible Reasons for Limited Educational Gains in School Feeding Programs***

Researchers have identified a number of reasons why school feeding programs may not directly influence educational outcomes, particularly the presence or absence of high-quality education in addition to school feeding. A meta-analysis of school feeding programs worldwide—which includes WFP and MGD programs as well as others—found relatively small effects on learning achievement and cognitive function (Rassas, Ariza-Nino, & Peterson, n.d.). The authors hypothesized that cognitive gains depend on the quality of education available, such that school feeding “may be more effective if combined with quality education programs, including an appropriate curriculum, quality teachers, high teacher to student ratios, and suitable textbooks” (p. 24). Similarly, Bundy, Drake, & Burbano (2013) asserted that while school feeding alone may not be the most effective use of education dollars, it can complement a good education system and be an important element of larger investments in education. This stance is supported by Vermeersch and Kremer's (2004) evaluation that found a Dutch NGO's school feeding program in Kenya only led to higher student test scores in classes where the teacher was experienced.

It is therefore important to consider the design features of a school feeding program to assess its effectiveness in achieving educational outcomes. In the case of MGD, school feeding is augmented with significant curriculum supports and other activities that support the overall strategic objective of improved literacy. Importantly, many school feeding programs target

primary school aged children who are beyond the critical developmental window where proper nutrition is most likely to produce better cognitive outcomes (Victora, Adair, Fall, et al., 2008). New MGD projects (starting in 2019) have more of a holistic focus on working with pregnant and lactating mothers and within the early childhood development window, rather than primary school aged children only. New MGD projects also include the 5 T's approach to effective reading instruction - Teaching, Time, Text, Tongue, Test – in combination with school feeding to ensure quality of education and gains in literacy (RTI International, 2013). The MGD programs reviewed in this paper, however, focus only on reading comprehension for primary school aged children. In the following section, we turn our attention to the design of MGD and its theory of change that includes additional curriculum and infrastructure support beyond school feeding.

#### ***McGovern-Dole Food for Education and Child Nutrition Program***

MGD was established by US federal law with the passing of the Farm Security and Rural Investment Act of 2002. USDA allocated billions of dollars to MGD to implement school feeding programs to LMICs with the primary strategic goal of improving literacy in school-aged children (other goals also include improving health, diet and nutrition outcomes, but these are beyond the scope of the current study). Since 2003, MGD has provided school meals to an estimated 40 million children in 40 nations (Dewey, 2017). In 2018 alone, MGD was operating 46 discrete projects in 23 countries (USDA Foreign Agricultural Service, n.d.-a). Available data indicate that USDA awarded almost \$1 billion to these projects between 2013 and 2017.

Despite the calls for comprehensive approaches to school feeding (WFP, 2013), existing studies either measure school feeding in isolation, or fail to mention if programs include any other components (with the exception of Cheung & Perrotta Berlin, 2015). Indeed, despite the large amount of funding MGD has received, we identified no scholarly work that examined the



effectiveness of the MGD program model to date. Part of its model, like those of many other school feeding programs, hypothesizes that school feeding will: (1) incentivize families to send their children to school, and this increased enrollment and attendance will improve children's learning through greater exposure to the learning environment; and (2) reduce children's hunger during school hours, allowing them to be more attentive in the classroom and thus learn more effectively. In addition, however, MGD programs aim not only to provide increased access to food, but also to improve literacy instructional materials, provide access to school supplies and books, and increase the skills and knowledge of teachers and administrators (Secretary of Agriculture, 2015).

MGD projects are designed according to its program-level results framework (see Figure 1<sup>1</sup>). This framework specifies the overall strategic objective of the program (Improved Literacy of School-Age Children) as well as the causal pathways through which it is expected that intermediate results will contribute to achieving these strategic objectives (Improved Quality of Literacy Instruction; Improved Attentiveness; and Improved Student Attendance). USDA allows individual projects to add or remove intermediate results from their own project frameworks if the country context necessitates it (FAS, 2015). The individual projects also design the activities that, according to the context, they hypothesize will result in the achievement of each intermediate result.

**[insert Figure 1 about here]**

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<sup>1</sup> This paper does not reference the MGD framework related to health outcomes.

### *Comparative Analysis of McGovern-Dole in Guatemala and Honduras*

In this paper we examine two MGD projects, one in Guatemala and one in Honduras, both implemented by Catholic Relief Services (CRS). Phase I of the Guatemala MGD project operated in 221 schools in the Department of Totonicapán, Guatemala, from 2013 to 2016 (the project is now in Phase II of implementation, scheduled for completion in 2021). These schools were located in four municipalities in the Department of Totonicapán: Momostenango, Santa Lucia, San Andrés Xecul, and San Bartolo Aguas Calientes. This project adhered to all of the MGD program-level framework components (see Figure 1).

The Honduras MGD project operated in 1,047 schools (509 schools and basic education centers, 308 kindergartens and 230 pre-school centers and non-formal centers) in 17 municipalities of the Department of Intibucá, Honduras, from 2012 to 2015 (the project is now in Phase II of implementation, scheduled for completion in 2020). This project deviated slightly from the program-level results framework, lacking *MGD 1.1.3 Improved Literacy Instructional Materials*, *MGD 1.2 Improved Attentiveness*, *MGD 1.2.1 Reduced Short-term Hunger* (see Figure 1). The key differences in program design between Guatemala and Honduras are articulated below.

#### *Activities to Improve the Quality of Literacy Instruction (MGD 1.1)*

The MGD program model specifies that activities must be undertaken to improve teacher attendance (MGD 1.1.1; see Table 1). In Guatemala, this meant guiding teachers, administrators, and PTAs to create School Improvement Plans to encourage communities to support teachers to comply with their responsibilities. Efforts to improve teacher attendance in Guatemala were often met with resistance from teachers' unions, necessitating ongoing negotiations. A system was also established whereby teachers who attended class 95% of the time and demonstrated

high quality reading instruction received recognition at a special event, and were given a certificate along with material prizes. In Honduras, a different approach was taken: local community organizations were trained and supported to develop a volunteer substitute teaching program so that when teachers were absent there would be substitutes.

Another result prescribed by the model is better access to school supplies and materials (MGD 1.1.2). The Guatemala project distributed school bags and teaching materials to all students and classrooms. The Honduras project similarly distributed teaching and classroom supplies, supplementary educational material kits, and school supply kits.

To provide access to improved literacy instructional materials (MGD 1.1.3), the Guatemala project printed and distributed bilingual literacy instructional materials including student and teacher books, workbooks, and supplementary reading materials. Finally, they established activities to promote literacy, namely the *Spaces to Grow* afterschool program for struggling children, for which dedicated workbooks were printed and distributed. In Honduras, no new curricula were created.

To increase the skills and knowledge of teachers (MGD 1.1.4), teachers in Guatemala were trained in a new methodology (complementary to the Guatemalan government's National Base Curriculum) called *Kemom Ch'ab'äl*, a bilingual K'iche' and Spanish reading program that highlighted interculturality, gender equity, peace and human rights, and logical thinking. Depending on the grade level of the children, the methodology focuses on having teachers model reading strategies, explore the reading, read, complete and revise exercises, and reflect on the reading together. Facilitators were also trained to support students with reading or self-esteem difficulties using the *Spaces to Grow* afterschool program methodology. Finally, a scholarship program was established to allow interested teachers to receive intensive training and receive a

certificate in reading competencies. In Honduras, teachers were trained using existing Honduran Ministry of Education curriculum.

To increase the skills and knowledge of school administrators (MGD 1.1.5), the Guatemala project trained administrators in *Kemom Ch'ab'äl* and allowed them to participate in the scholarship program. In Honduras, administrator trainings were focused on management, Honduran Ministry of Education standards and processes, and the formation of new Drop-out Prevention & Response Teams.

**[insert Table 1 about here]**

*Activities to Improve Attentiveness (MGD 1.2) Through Reduced Short-Term Hunger (MGD 1.2.1)*

To provide increased access to food (MGD 1.2.1.1, 1.3.1.1), the Guatemala project provided school meals every day at every school. In order to do this, all stakeholders were trained in good health and nutrition practices; government officials were trained in management skills for managing the program and in ways the National School Feeding Policy could be improved; PTAs were trained in commodity management; and volunteer cooks were trained in food preparation, storage practices, good health and nutrition practices, and diversified menus. The project also distributed cooking supplies to schools.

The Honduras project also provided daily school meals (including breakfast, snack, and lunch), but this activity was only listed under *MGD 1.3.1* in their results framework.

*Activities to Improve Student Attendance (MGD 1.3)*

To increase the economic and cultural incentives and decrease disincentives for school attendance (MGD 1.3.1), the Guatemala project provided take-home food rations for students who attended Spaces to Grow afterschool program, as well as uniforms and shoes to fifth and

sixth grade girls. They also supported the Ministry of Education in training principals, teachers, and students in the formation of student governments. The Honduras project also gave take-home rations to parent volunteers, but in addition, provided families who lived far from school with funds for their children's school transportation and organized and trained safety patrol groups to help children, especially girls, get to school safely.

To reduce health-related absences (MGD 1.3.2), the Guatemala project ran health and nutrition campaigns and trained stakeholders in health and hygiene. They also established school gardens as both a pedagogical strategy to integrate the academic learning into hands-on gardening activities and to teach children how to grow culturally relevant foods locally. The Honduras project engaged in the same activities.

To improve school infrastructure (MGD 1.3.3), the Guatemala project provided energy-saving stoves for kitchens, built or rehabilitated latrines so students had safe and hygienic spaces for using the bathroom, and built or rehabilitated wells and water sanitation systems to ensure access to handwashing. The Honduras project did not provide stoves to schools, but did build and repair classrooms, school structures, kitchens, eating areas, food storage spaces, latrines, and handwashing stations.

To increase student enrollment (MGD 1.3.4) and the community understanding of the benefits of education (MGD 1.3.5), the Guatemala project ran a radio-based enrollment campaign in K'iche' and Spanish. Another way they increased community understanding of the benefits of education was to train PTAs in their own roles and responsibilities, support PTAs to create a municipal network of PTAs for advocacy in education, and hold literacy fairs in the community. In Honduras, the MGD project trained individuals to provide peer-to-peer tutoring and raised awareness of the importance of having birth certificates to increase student enrollment

(MGD 1.3.4). To increase community understanding of the benefits of education (MGD 1.3.5), they followed a similar approach to Guatemala, running media campaigns and local meetings, and strengthening PTAs, but they also formed Drop-out Prevention and Response Teams.

In summary, the biggest differences between the Honduran and Guatemalan programs were as follows: (1) a new, bilingual curriculum was developed for Guatemala, while Honduras used the existing curriculum; (2) Honduras formed Drop-out Prevention and Response teams and safety patrols for the way to school, which was appropriate for their unique context; (3) Guatemala incentivized teachers to improve their attendance, while Honduras created a substitute teacher program; and (4) Guatemala included the special after school *Spaces to Grow* intervention for struggling students while Honduras did not. Yet, all program activities are designed to lead to increased reading comprehension (Secretary of Agriculture, 2015). With these important differences in program design and implementation in mind, our research questions are as follows: (1) To what extent does reading comprehension increase alongside MGD implementation in Guatemala and Honduras? and (2) Within each country, how are changes in reading comprehension over time related to children's grade level?

## ***Methods***

### ***Sample***

Guatemala: Department of Totonicapán. Repeated cross-sectional data were collected at three time points: baseline (2014), midterm (2015), and final (2017). At each time point, schools were randomly selected from a target population of 221 schools who were participating in MGD, and all third and sixth graders at the time were included in the study. At baseline, 2,387 students from 74 schools were included, at midterm 3,833 students from 120 schools were included, and at final, 3,624 students from 120 schools were included.

Honduras: Department of Intibucá. Repeated cross-sectional data were collected at three time points: baseline (2013), midterm (2014), and final (2015). At each time point, a probability sample was drawn from a target population of 1,047 schools who were participating in MGD, and all second, third, and fourth graders at each school were included in the study. At final, for schools too large to have all their children included, a simple random sample of children was drawn from class rosters. At baseline, 3,862 students from 129 schools were included, at midterm, 4,448 students from 149 schools were included, and at final, 3,235 students from 176 schools were included.

#### *Measures*

Guatemala: Reading Comprehension Assessment (RCA). Literacy in school-age children was measured through the RCA, a 30-item assessment written in Spanish (one for 3<sup>rd</sup> graders and one for 6<sup>th</sup> graders) and developed by Proyecto de Desarrollo Santiago (PRODESSA). This test measures the accomplishment in literacy as the percentage of correct responses, which ranged from 0% to 100%. The reading comprehension assessment includes 10 subscales: new words, identifying themes, main ideas, cause and effect, problem and solution, comparison, identifying sequence, prediction, character and environment, and logic. Literacy achievement was roughly normally distributed overall and at each time point.

Honduras: Early Grade Reading Assessment (EGRA) reading comprehension subscale. The EGRA is a tool designed by Research Triangle Institute (RTI) with funding from USAID for assessing reading capabilities in children in the early grades, and has been used in 35 countries. It was adapted for Latin America by RTI and Center for Educational Research and Social Action (CIASES). It contains subscales for phonemic awareness, alphabetic code, vocabulary, fluency, reading comprehension, and listening comprehension. Our analysis focuses on the reading

comprehension subscale of the EGRA. There are five questions and we measured literacy scores as percent correct out of the five.

### *Analysis*

To test whether literacy achievement improved over time, we conducted one-way analysis of variance (ANOVA) tests. For robustness analysis, Welch's test was used because unequal variances across groups were identified. Welch's test is designed to test mean differences when controlling by Type I error related to unequal variances (Ruxton, 2006). Stata 15.0 was used to perform the analysis (StataCorp, 2017). We also tested whether there were differences between males and females, and children's grade levels, using two-tailed t-tests and one-way ANOVAs.

## **Results**

### *Guatemala*

The mean literacy scores are displayed in Table 2 and Figure 2. The literacy scores were significantly different ( $p < 0.001$ ) at all three time points (Table 2), with sixth graders showing greater literacy but third graders showing a greater increase over time. For both third and sixth graders, increases were statistically significant at the  $p < 0.001$  level from baseline to midterm (Cohen's  $d = 0.518$  for third,  $d = 0.468$  for sixth), from midterm to final ( $d = 0.999$  for third,  $d = 0.193$  for sixth), and also from baseline to final ( $d = 1.328$  for third,  $d = 0.649$  for sixth) (see Table 3). No significant difference emerged between boys and girls at baseline or final, but boys scored significantly higher than girls at midterm ( $p < .01$ ). There were no concerns about independence between groups or normality of the residuals. However, a Levene's test for equal variances indicated that the group variances significantly differed ( $W(2, 9841) = 57.61, p <$



0.001). Thus, Welch's test was performed to control by the groups' unequal variances, and the results were consistent with ANOVA tests.

**[insert Table 2 and Table 3 about here]**

**[insert Figure 2 about here]**

### *Honduras*

Mean scores by grade are presented in Table 4. ANOVA results indicated that within each grade, the changes over time were significant ( $p < .001$ ). As seen in Figure 3, scores trended upward but there were some slight decreases for third and fourth graders between midterm and final. Post-hoc tests (see Table 5) revealed that second graders improved significantly from baseline to midterm ( $d = 0.286$ ), midterm to final ( $d = 0.133$ ), and also from baseline to final ( $d = 0.418$ ). Third and fourth graders also improved significantly from baseline to midterm ( $d = 0.275$  for third,  $d = 0.239$  for fourth). Though third and fourth grade scores declined slightly from midterm to final, post-hoc tests revealed these decreases were not significant (and the effect sizes were  $d = -0.075$  for third and  $d = -0.086$  for fourth). Third graders had a significant increase from baseline to final ( $d = 0.193$ ). However, for fourth graders, there was no significant increase from baseline to final ( $d = 0.141$ ). Girls scored significantly higher than boys at baseline ( $p < .001$ ), at midterm ( $p = .0628$ ), and at final ( $p < .001$ ). There were no concerns about independence between groups or normality of the residuals. However, a Levene's test for equal variances indicated that the group variances significantly differed ( $W(2, 11542) = 37.11, p < 0.001$ ). Thus, Welch's test was performed to control by the groups' unequal variances, and the results were consistent with ANOVA tests.

**[insert Table 4 and Table 5 about here]**

**[insert Figure 3 about here]**

## Discussion

This study is the first to document significant increases in reading comprehension associated with the MGD program, in two different geographic and cultural contexts. In Totonicapán, Guatemala, 97% of the population is indigenous, and K'iche' is spoken widely in the region because of significant cultural and linguistic preservation efforts (Gobierno de Guatemala INE, 2014). On the other hand, Intibucá, Honduras, does not have the same indigenous presence. While many in the region identify as Lenca (AUTHORS, 2019b), the Lenca traditions and language are mostly lost (Gregorčič, 2009) given persistent social marginalization (Campbell, Chapman, & Dakin, 1978). Totonicapán also has a much higher malnutrition rate than Intibucá (UNICEF, n.d.). The Honduran government operates school feeding programs for students in the rest of the country (and plans to begin serving Intibucá after the CRS program ends). In Guatemala, advocates reached an agreement with the government's Ministry of Education to provide school feeding starting in 2018, although funding had not yet been allocated by the end of the project in 2017. Finally, the journey to school for children in Intibucá can be more dangerous than for children in Totonicapán; the routes are usually longer, and the department-wide homicide rate in Intibucá is 29.9 per 100,000 compared to 2.6 per 100,000 in Totonicapán (Instituto Universitario en Democracia, Paz y Seguridad, 2018; Mendoza, Espinoza, Menaldo, & Zapeta, 2018).

In spite of these significant programmatic differences, the gains in literacy scores across contexts suggest that the overall program as outlined in the MGD Results Framework is effective. In Guatemala, there were significant increases in third and sixth graders' scores baseline to midterm, from midterm to final, and also from baseline to final. In Honduras, second graders saw the same pattern of significant gains. Notably, the school feeding program did not

change or increase operations from the midterm to final, but provided the same amount of food to the same number of children. Importantly, MGD is not solely a school feeding intervention. The increases from midterm to final could be related to other non-food related components of the intervention whose impacts on the education system accumulated over time, such as teacher and administrator trainings, school improvements, and interventions to reduce teacher absenteeism—such that the program resulted in gradual and cumulative effects over time.

This explanation is supported by other literature on school meal programs that posit that it is not meals alone, but meals in the context of a quality education system, that improve learning outcomes. For example, a school feeding program in Kenya only led to higher student test scores in classes where the teacher was experienced (Vermeersch & Kremer, 2004). School feeding “may be more effective if combined with quality education programs” (i.e., curriculum, textbooks, high teacher-student ratio, quality teachers) (Rassas et al., n.d.). School feeding is an important aspect of educational investment along with other critical educational system improvements (Bundy et al., 2013).

The results of this study also suggest that earlier exposure, even in primary school, may increase the capacity for improvement in reading comprehension. In Guatemala, effect sizes were larger for third graders compared to sixth graders, and this pattern largely held true in Honduras albeit with more variability. Existing literature suggests that earlier exposure and intervention is associated with greater effects over time. Malnutrition occurring early in life triggers epigenetic changes that persist for decades and correlate with cognitive impairments (Szutorisz & Hurd, 2016). In the US, for example, fewer boys who attend Head Start programs with school feeding were below 25<sup>th</sup> percentile in height compared with those in free lunch programs later in life (Gietzen & Vermeersch, 1980). Eighth grade children who benefited from

Head Start & school meals had higher math scores and lower absenteeism rates as compared to kids who did not (Phillips, Gormley, & Anderson, 2016). The findings of these studies and the current study support the presence of a critical developmental window in early childhood (Vanda et al., 2008) that is most amenable to intervention, and that this window gradually closes as children get older. This study furthers the literature by suggesting that earlier intervention in primary school may be effective in improving reading outcomes for children in LMICs.

The increases seen from midterm to final in both countries may also indicate that school feeding programs have a cumulative effect—the longer that children have been well fed, the higher capacity for learning they obtain. In Honduras, third and fourth graders both improved significantly from baseline to midterm. Third graders had a significant increase from baseline to final, meaning that at the third point of measurement, the intervention was still associated with higher test scores than before it began. However, for fourth graders, there was no significant increase from baseline to final. This plateau may mean the intervention was not ultimately helpful in improving fourth graders' reading comprehension, perhaps because of a developmental leveling off. A similar dynamic also emerged for 6<sup>th</sup> graders in Guatemala. An alternative theory is that teachers in grades 1-3 teach children to *learn to read*, whereas from 4<sup>th</sup> to 6<sup>th</sup> grade teachers should transition to teaching children to *read to learn*. However, the skills transfer that teachers need to achieve to be successful in this transition often falls short and represents an area that MGD projects should explore for improving upper primary grade teacher trainings.

#### *Limitations and Suggestions for Future Research*

This study has limitations. First, we were not able to access a longitudinal cohort of children because of donor priorities in measuring grade levels instead of cohort effect. As such,

different groups of children were sampled at each time point. This means that multivariate longitudinal analysis was not possible, and the analysis cannot account for autocorrelation within schools or classrooms. While each country implemented its own variation of MGD, we were not able to disentangle which program components are more or less effective in improving reading comprehension. Another limitation is the lack of a comparison group. By time our research team was contracted, MGD had already been implemented across all study sites, leaving no sites as a comparison group. For this reason, it is not possible to conclude that the MGD program caused the literacy gains seen from year to year, because we cannot establish whether non-MGD students were seeing similar gains.

Future evaluations of MGD should include comparison groups, perhaps by using a randomized phased design (Feldman, Wang, Willan, & Szalai, 2001) where all schools eventually are enrolled in MGD after some are initially assigned to a waitlist. Future evaluations should also adopt a longitudinal cohort design so that the progress of the same participants is being measured. Also, because the Honduras and Guatemala MGD projects used different reading comprehension assessments, it is not possible to compare raw scores between countries. Although it would require cross-country planning in advance, an additional recommendation is to use the same or similar measures of reading comprehension so that direct comparisons are more easily made. Future studies could also benefit from examining the relationships among school feeding programs, malnutrition, and stunting, as educational outcomes are likely to be linked with developmental outcomes.

### ***Conclusion***

The results of this study show that reading comprehension consistently increased over three years alongside MGD implementation, and between two different cultural and geographic

contexts. These gains are the best evidence to date we could locate that MGD is an effective program. Funding for MGD programming in Central America has been under multiple threats in recent years. The Trump administration's 2017 "America First" budget proposal suggested eliminating MGD to all countries entirely because of reported concerns that the program lacks evidence (Dewey, 2017). The Trump administration also threatened to end aid to Central American countries including Honduras and Guatemala, and in March 2019, the Department of State ceased funding foreign assistance programs to those countries as well as El Salvador (Hesson, 2019). It is unclear if this move will eliminate MGD's programming in Central America, as MGD is administered by United States Department of Agriculture rather than the Department of State.

The USDA is to be commended for requiring external evaluations of all MGD programs globally. Yet, our evaluation team was brought in well after the design and implementation of the programs in Guatemala and Honduras, such that our research designs were forced to be cross-sectional rather than based on longitudinal cohorts with comparison groups. While these types of constraints are common in humanitarian aid and international development programs (Bamberger et al., 2004), we suspect that these constraints are also responsible for the lack of existing evidence on the effectiveness of MGD more generally. We also suspect that these constraints are related to intervening in "crisis mode" where direct intervention supersedes considerations of effectiveness – or of seeing evaluation as a post-hoc activity secondary to direct intervention, rather than as an integral part of intervening effectively. The consequences, of course, can result in the elimination of an effective program that serves the basic needs of the world's most vulnerable populations. Our hope is for the field to embrace the concept of the "researcher-practitioner" where research and practice are not stand-alone activities but are

interlinked to improve outcomes, to document these improvements, and to gather and use evidence on how to strengthen programs. In doing so, the field stands to gain not only more effective programming in the short term but also significant contributions to the knowledge base on how best to intervene in the future.

These constraints aside, the current study demonstrates that reading comprehension improves alongside MGD implementation, such that substantial progress has been achieved towards the program's primary goal. The effectiveness of MGD should also be considered within the wider context of Central America and the record numbers of people leaving there to migrate to the US, driven by endemic poverty and community violence (Restrepo & Garcia, 2014). School feeding and curriculum support programs such as MGD cannot stem this tide alone, even with the encouraging evidence of improving outcomes. Educational reform must also be considered in the larger context (Bundy et al., 2013) of improved governance at the local, municipal and national levels—with linkages to further educational pathways to secondary education, higher education opportunities, and employment. Cutting a promising program in the region such as MGD—one that demonstrates significant improvements in reading comprehension over a relatively short period of time—is likely to contribute to the continued destabilization of the region, pushing more youth and families to leave in search of better opportunities.

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624 **Table 1. Comparison of activities in Guatemala and Honduras**

	Guatemala program	Honduras program
MGD 1.1.1 More consistent teacher attendance	<ul style="list-style-type: none"> <li>• School Improvement Plans</li> <li>• Recognition of effective teachers</li> </ul>	<ul style="list-style-type: none"> <li>• Volunteer substitute teaching program</li> </ul>
MGD 1.1.2 Better access to school supplies & materials	<ul style="list-style-type: none"> <li>• Distributed school bags and teaching materials</li> </ul>	<ul style="list-style-type: none"> <li>• Distributed school supplies</li> </ul>
MGD 1.1.3 Improved literacy instructional materials	<ul style="list-style-type: none"> <li>• Created new literacy instructional materials</li> </ul>	N/A
MGD 1.1.4 Increased skills and knowledge of teachers	<ul style="list-style-type: none"> <li>• Trained teachers in in <i>Kemom Ch'ab'al</i> methodology</li> <li>• Trained teachers for <i>Spaces to Grow</i></li> <li>• Offered teacher scholarships</li> </ul>	<ul style="list-style-type: none"> <li>• Trained teachers in existing Honduran Ministry of Education curriculum</li> </ul>
MGD 1.1.5 Increased skills and knowledge of school administrators	<ul style="list-style-type: none"> <li>• Trained administrators in <i>Kemom Ch'ab'al</i> methodology</li> <li>• Offered administrator scholarships</li> </ul>	<ul style="list-style-type: none"> <li>• Trained administrators in management, Honduran Ministry of Education standards &amp; processes, and Drop-out Prevention &amp; Response Teams</li> </ul>
MGD 1.2.1.1/1.3.1.1 Increased access to school feeding	<ul style="list-style-type: none"> <li>• Provided daily school meals</li> <li>• Trained stakeholders on providing school meals</li> <li>• Distributed cooking supplies to schools</li> </ul>	<ul style="list-style-type: none"> <li>• Provided daily school meals</li> </ul>
MGD 1.3.1 Increased economic/cultural incentives	<ul style="list-style-type: none"> <li>• Provided take-home food rations to students</li> <li>• Provided uniforms and shoes to fifth and sixth grade girls</li> <li>• Established student governments</li> <li>• <i>Spaces to Grow</i></li> </ul>	<ul style="list-style-type: none"> <li>• Provided take-home rations to parent volunteers</li> <li>• Provided funds for transportation to school</li> <li>• Created safety patrol groups</li> </ul>
MGD 1.3.2 Reduced health-related absences	<ul style="list-style-type: none"> <li>• Ran health and nutrition campaigns</li> <li>• Trained stakeholders in health and hygiene</li> <li>• Established school gardens</li> </ul>	<ul style="list-style-type: none"> <li>• Ran health and nutrition campaigns</li> <li>• Trained stakeholders in health and hygiene</li> <li>• Established school gardens</li> </ul>

	Guatemala program	Honduras program
MGD 1.3.3 Improved school infrastructure	<ul style="list-style-type: none"> <li>• Provided energy-saving stoves for kitchens</li> <li>• Built/rehabilitated latrines, wells, and water sanitation systems</li> </ul>	<ul style="list-style-type: none"> <li>• Build or rehabilitated classrooms, school structures, latrines, and handwashing stations</li> </ul>
MGD 1.3.4 Increased student enrollment	<ul style="list-style-type: none"> <li>• Ran a radio-based enrollment campaign in K'iche' and Spanish</li> </ul>	<ul style="list-style-type: none"> <li>• Peer-to-peer tutoring</li> <li>• Raised awareness about birth certificates</li> </ul>
MGD 1.3.5 Increased community understanding of benefits of education	<ul style="list-style-type: none"> <li>• Held literacy fairs</li> <li>• Strengthened PTAs</li> </ul>	<ul style="list-style-type: none"> <li>• Media campaigns and local meetings</li> <li>• Strengthened PTAs</li> <li>• Drop-out Prevention and Response Teams</li> </ul>

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**Table 2. Means and standard deviations of Reading Comprehension Assessment scores over time – Guatemala**

	<u>Baseline</u>			<u>Midterm</u>			<u>Final</u>		
	Score	SD	N	Score	SD	N	Score	SD	N
Grade 3	12.5%	.128	1,259	18.3%	.101	2,040	30.5%	.140	2,041
Grade 6	25.4%	.132	1,036	31.2%	.119	1,793	33.5%	.120	1,583



**Table 3. ANOVA and Welch's test results of reading comprehension scores over time with post-hoc analysis – Guatemala**

	<i>F</i> statistic	Welch's statistic	Tukey's Post-hoc Comparison	Mean difference	Effect size ( <i>d</i> )
Grade 3	949.38***	546.266***	Baseline-Midterm***	5.8%	0.518
			Midterm-Final***	12.2%	0.999
			Baseline-Final***	18.0%	1.328
Grade 6	139.09***	84.741***	Baseline-Midterm***	5.8%	0.468
			Midterm-Final***	2.3%	0.193
			Baseline-Final***	8.1%	0.649

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$

**Table 4. Means and standard deviations of EGRA reading comprehension scores over time – Honduras**

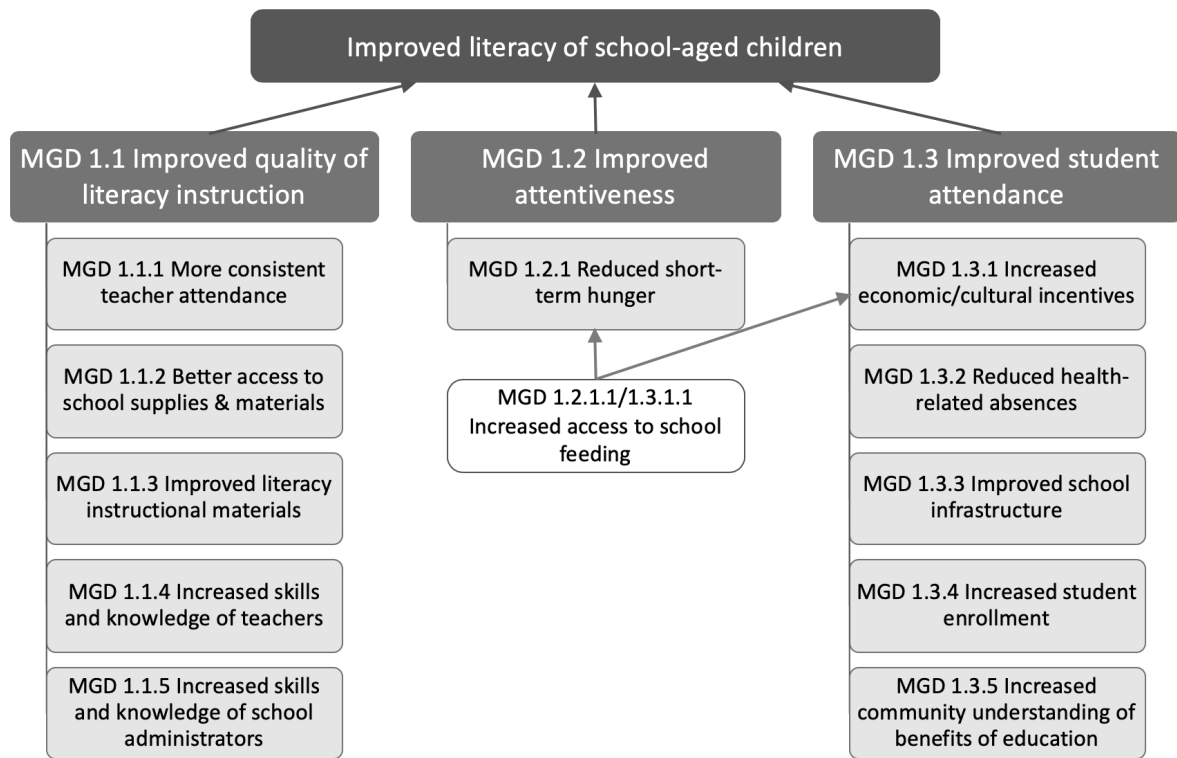
	<u>Baseline</u>			<u>Midterm</u>			<u>Final</u>		
	Score	SD	N	Score	SD	N	Score	SD	N
Grade 2	34.7%	.387	1,302	48.7%	.402	1,501	54.1%	.415	1,002
Grade 3	62.2%	.371	1,281	71.9%	.337	1,507	69.3%	.364	1,153
Grade 4	77.6%	.280	1,279	83.9%	.248	1,440	81.6%	.286	1,080

**Table 5. ANOVA and Welch's test results of reading comprehension scores over time with post-hoc analysis – Honduras**

	<i>F</i> statistic	Welch's statistic	Tukey's post-hoc comparison	Mean difference	Effect size ( <i>d</i> )
Grade 2	75.68***	50.693***	Baseline-Midterm***	14.0%	0.286
			Midterm-Final***	5.3%	0.133
			Baseline-Final***	19.3%	0.418
Grade 3	26.72***	17.518***	Baseline-Midterm***	9.7%	0.275
			Midterm-Final	-2.6%	-0.075
			Baseline-Final***	7.1%	0.193
Grade 4	18.47***	12.619***	Baseline-Midterm***	6.3%	0.239
			Midterm-Final	-2.3%	-0.086
			Baseline-Final	4.0%	0.141

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$

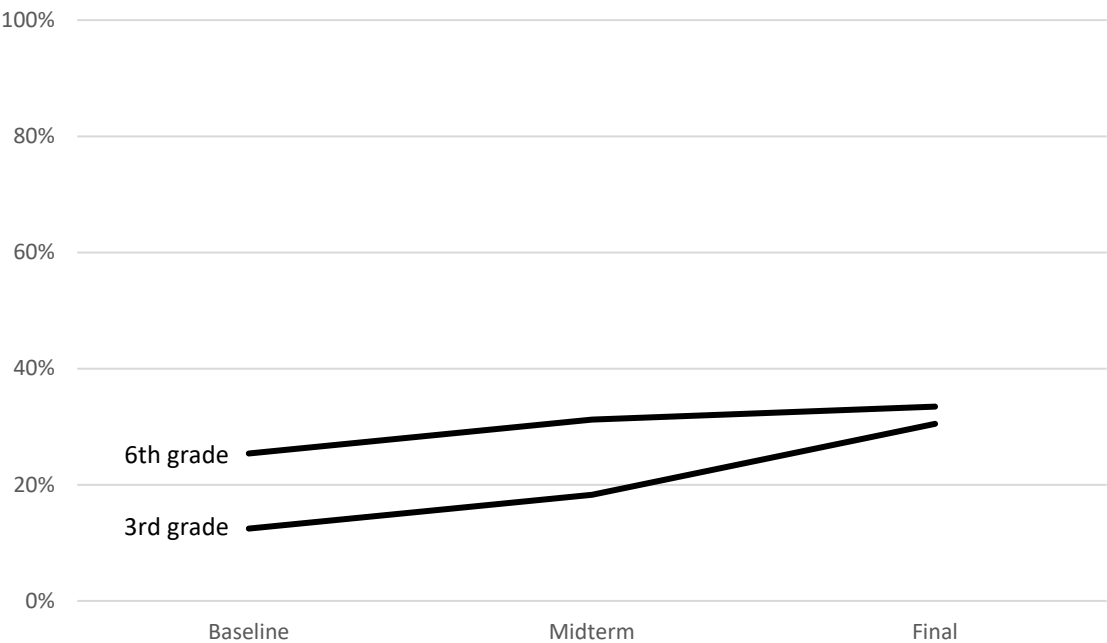
655 **Figure 1. McGovern-Dole Results Framework**



657 *Source: USDA Foreign Agricultural Service (2018)*

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**Figure 2. Guatemala literacy improvement (overall)**



**Figure 3. Honduras literacy improvement (overall)**

