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on primary school education in Ethiopia“

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On my honour as a student of the Diplomatische Akademie Wien, I submit this work in good faith and pledge that I have neither given nor received unauthorized assistance on it.

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## **Abstract**

Education is a basic human right, which has tremendous positive impact on both individual and societal level. Yet, despite considerable efforts in the past fifty years, there are still millions of children mainly in the poorest countries deprived from effective education, be it for being excluded from the education system or for the lack of learning at school. There are numerous potential levers to foster learning, including investments in school infrastructure, teacher formation and the development of relevant and pedagogically effective course material. However, all these measures remain ineffective for children, who don't come to school. The main reason why children fail to appear at school is poverty. If poor parents have to make a trade-off between sending their children to school or asking them to help finding food to survive, the decision is pretty clear. Sending their hungry children to school and letting them return even hungrier is not a realistic option. To overcome this hurdle, free school meals can be an effective tool to facilitate mainly underprivileged families to escape from the poverty trap and to allow their children – girls in particular – to access and remain in the education system. Furthermore, the nutrition effect of school meals can have a positive effect on concentration levels and on cognitive abilities – mainly socio-emotional skills – which can help to reduce the developmental gap between poorer and wealthier children.

This study tests statistically the effect of stopping a school feeding programme on access to education (enrolment, drop-out and attendance rates) and learning achievement (repeater rates) on primary school children in Ethiopia. Schools phasing out a school meal programme show 7% higher drop-out rate growth for girls than the control group, consisting of schools which did not provide any food over the observation period. Among the feeding schools, if one does not serve food on a particular day, attendance rates for male and female students drop by 19 and 8 percentage points. Repeater rate growth is slightly decreasing with stopping food provision, potentially affected by the higher drop-out rate, which on average affects more poorer and lower-performing students, who would rather have repeated class, if meals were still provided. In addition, the analysis shows higher enrolment growth for schools having stopped school feeding, especially for male students. Of these effects, male enrolment, female drop-out and attendance for both genders are statistically significant after controlling for fixed effects such as regional or seasonal impact. A potential sample selection problem, driven by a non-random selection of schools which received school feeding aid, could be the cause for a bias of the measured indicators.

Any measures to improve education systems, however, require two pre-conditions: first, a systematic and regular measurement of learning quality, which tracks performance development via different measures over time and second, a broad fit with international education measurement standards to facilitate cross-country system comparisons as far as possible.

## **Zusammenfassung**

Bildung ist ein allgemeines Menschenrecht, das einen enorm positiven Einfluss auf den Einzelnen wie auch auf die Gesellschaft als Ganzes hat. Trotz beträchtlichem Einsatz in den letzten fünfzig Jahren sind allerdings immer noch mehrere Millionen Kinder – vor allem in den ärmsten Ländern der Welt – vom Zugang zu effektiven Bildungsmaßnahmen ausgeschlossen, sei es aufgrund eines generellen Ausschlusses vom Bildungssystem oder dem ausbleibenden Lerneffekt in den Schulen. Unten den zahlreichen Hebeln zur Lernförderung seien Investitionen in die Schulinfrastruktur, die Lehrerausbildung sowie die Erarbeitung und Bereitstellung von relevanten und pädagogisch effektiven Lerninhalten hervorgehoben. All diese Maßnahmen verfehlen jedoch ihr Ziel für jene Kinder, die nicht in die Schule gehen. Das Fernbleiben von der Schule hat meist einen klaren Hintergrund: Armut. Wenn arme Eltern abwägen müssen, ihre Kinder in die Schule zu schicken oder deren Hilfe in Anspruch zu nehmen, um überlebenswichtige Nahrung zu beschaffen, ist die Entscheidung klar. Hungrige Kinder in die Schule zu schicken, damit sie noch hungriger nachhause kommen ist keine realistische Option. Kostenloses Schulessen kann hier ein effektives Mittel sein, um bedürftigen Familien einen Weg aus der Armutsfalle zu eröffnen, indem man ihren Kindern – insbesondere Mädchen – einen dauerhaften Bildungszugang verschafft. Darüber hinaus kann eine ausgewogene Schulernährung sowohl das Konzentrationsvermögen, als auch die kognitiven Fähigkeiten – vor allem sozial-emotionaler Natur – positiv beeinflussen. Dies kann sogar einen vorhandenen Entwicklungsrückstand von ärmeren Kindern reduzieren.

Diese Studie testet mit statistischen Methoden welchen Einfluss das Beenden eines Schulernährungsprogramms auf die Faktoren Bildungszugang (via Inskriptionszahlen, Abbrecher- und Anwesenheitsquoten) und Lernerfolg (via der Wiederholerquote) für Grundschulkinder in Äthiopien hat. Es zeigt sich, dass die Veränderung der Abbruchraten von Mädchen an Schulen, die ein kostenloses Mittagessen für Schüler wieder abschaffen, danach um 7 Prozentpunkte stärker steigt, als in der Kontrollgruppe, die kein Essen angeboten hat. Unter den Schulen mit Ernährungsprogramm ist die Anwesenheitsquote von Jungen und Mädchen an jenen Tagen, an denen kein Schulessen ausgegeben wird, um respektive 19 und 8 Prozent geringer. Das Wachstum der Wiederholerraten verringert sich nach Beendigung eines Ernährungsprogramms marginal. Dies kann durch die Steigerung der Abbrecherquoten erklärt werden, die vor allem ärmere – und im Durchschnitt leistungsschwächere – Schüler betreffen, die bei Beibehaltung von kostenlosen Schulessen in der Schule geblieben und, wenn

erforderlich, eine Klasse wiederholt hätten. Darüber hinaus zeigt sich in Schulen nach Beendigung des Ernährungsprogramms ein stärkerer Anstieg der Inskriptionszahlen, insbesondere für Jungen. Unter den beobachteten Einflüssen sind folgende, nach Berücksichtigung der fixen Effekte durch regionale und saisonale Unterschiede, statistisch signifikant: männliche Inskriptionszahlen, weibliche Abbrecherquoten sowie die Anwesenheitsraten beider Geschlechter. Da die Testgruppe, die Unterstützung zur Nahrungsbereitstellung bekommt, generell aus jenen Schulen besteht, die es am Dringendsten benötigen, kann nicht von einer zufälligen Stichprobenauswahl ausgegangen werden. Eine Verzerrung der Messergebnisse durch diesen Umstand kann daher nicht ausgeschlossen werden.

Alle Maßnahmen zur Bildungsförderung setzen zwei Dinge voraus: erstens, eine systematische und regelmäßige Prüfung der Lernqualität, die einen zeitlichen Vergleich und damit die Wirkung unterschiedlicher Maßnahmen ermöglicht, und zweitens, ein größtmögliches Einhalten internationaler Standards in der Bildungsevaluation, um länderübergreifende Systemvergleiche – mit allen inherenten Einschränkungen – zuzulassen.

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## **List of abbreviations**

AI	Artificial intelligence
ATR	Attendance rate
CAGR	Compound annual growth rate
DD	Difference-in-difference estimator
DOR	Drop-out rate
EMIS	Education Management Information System
EN	Absolute enrolment
FRESH	Framework for Focusing Resources on Effective School Health
GDP	Gross domestic product
GER	Gross enrolment rate
OECD	Organization for Economic Co-operation and Development
REA	Absolute readmitters
REP	Absolute repeaters
RER	Repeater rate
SNNPR	Southern Nations, Nationalities and People's Region
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States of America
USD	US Dollar
WASH	Water, sanitation and hygiene
WEI	World Education Indicators
WFP	World Food Programme
WHO	World Health Organization



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## 1. Introduction

### 1.1. Why education matters

*“Education is the passport to the future, for tomorrow belongs to those who prepare for it today.”* Malcolm X

Education, beyond being a human right, has tremendous positive impact on both individual and societal level. For individuals, education is a major investment in Human Capital, which permits to make more knowledgeable and therefore better decisions in all possible life situations. It allows a person to be a more conscious being, to live healthier, make better economic decisions and process information more critically, in short – to have more control about one’s life. Furthermore, the educational effect is inter-generational. There is broad evidence showing that the parents’ education level has strong impact on their children’s educational achievements. In the United States, tests showed that each additional year in the mother’s education increases her children’s math test scores by 0.1 standard deviations (Carneiro, Meghir, & Parey, 2013). In Pakistan, children spend one incremental hour of home study for each additional schooling year of their mother (Andrabi, Das, & Khwaja, 2012).

For societies, education fosters economic growth and innovation, reduces social cleavages, lowers crime rates and builds the fundamental basis of well-functioning democracies. The World Values survey (2015) has shown stronger belief about the importance of democracy of higher educated people throughout low-, middle and high-income countries. Furthermore, education has proven to reduce fertility by giving women more control over the family size and lowering teen pregnancies, which has a slowing effect on the demographic development.

There have been four waves of scientific research on the effect of education on economic growth. The most recent one influenced by Cohen and Soto (2007) found positive and significant correlation between schooling and income per capita.

In addition, recent OECD studies reveal that social and economic outcomes of both individuals and society are increasingly dependent on human capital development. A 2003 study states that “the comparison of growth patterns in OECD and WEI<sup>1</sup> countries suggests that while

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<sup>1</sup> Countries using the World Education Indicators (WEI): Brazil, Chile, Indonesia, Malaysia, Peru, Thailand and Uruguay

investment in human capital is important at early stages of industrialization, the role of human capital increases with industrial development and eventually grows in relative importance” (OECD, 2003). The study results have also shown, that an average increase of schooling of the adult population increases the long-term economic growth by 3.7% per schooling year (ibid).

Furthermore, Benhabib and Spiegel (1994) as well as Lutz et al. (2008) show that education has an impact on innovation and technology adoption. This impact will play an increasingly important role in a digitalising and globalising world.

The ongoing digital revolution – also sometimes called the Second Machine Age or the Fourth Industrial Revolution – will have a substantial mid- to long term impact on the global labour market situation. Artificial intelligence (AI) is expected to replace Humans in many current jobs or making them obsolete. In extreme scenarios, most of Human labour skills will lose their value, but even more realistic scenarios seem threatening. According to market researcher Forrester, 16% of US jobs will be replaced by AI by 2025, while 9% of new jobs will be created, resulting in a net loss of 7% of jobs (Forrester, 2016). Under the assumption, that a substantial number of new jobs for Humans will still exist in the future, education’s return will even increase; people who learned how to learn are more flexible to adapt to new labour skill requirements. Experts on technological change say for a long time that the higher the volatility in the technology state, the higher the productivity of education (Nelson & Phelps, 1966). During the Green Revolution in India, the more educated farmers – who completed primary schooling – led the adoption and promotion of innovations in farming technology, which boosted their education returns (Foster & Rosenzweig, 1996).

In developing countries, this expected labour market impact will not happen so drastically and will rather be incremental. Smaller agriculture farms and low-scale enterprises, which are predominant in many African states, will not see a massive automation wage in the near future, considering the massive lack of infrastructure, such as energy and water supply, let alone internet access in many developing countries. However, the rising demand of high-skilled graduates in the technology sector and the resulting high-wages in this field can widen inequality between the developed and the developing world. In fact, only about 50% of Sub-Saharan African countries include computer skills in their curriculum, compared with 85% globally (UIS (UNESCO Institute for Statistics), 2017). Thus, increasing access to technology skills is an important factor to fight rising inequality. Yet, it is not enough to teach computer

skills to succeed in our rapidly changing world. Creative thinking, problem solving skills and team work capabilities are fundamental tools in today's and tomorrow's labour market. However, all these skills necessary in the 21<sup>st</sup> century build on the same educational foundations as those in the 20<sup>th</sup> century: literacy and numeracy. Hence, it remains crucial to foster basic education in developing countries to reduce inequality in a globalising world – against many odds. Without education, the developmental gap between the industrialised and the developing world might attain unseen levels, endanger the stability of underdeveloped countries and might lead to dramatically increasing poverty and migration movements.

Table 1 summarises selected benefits on both individual and societal level, grouped by monetary and non-monetary factors.

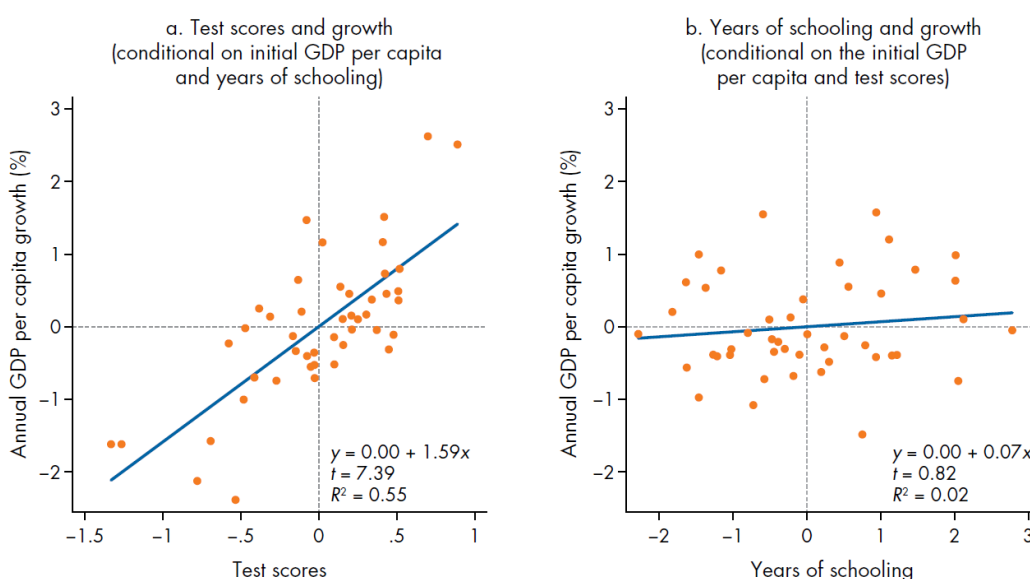
	Individual/Family	Community/Society
Monetary	Higher employment probability  Higher earnings  Better economic choices	Higher productivity  Higher economic growth  Lower poverty  Stronger long-run development
Non-monetary	Better health  Improved education and health of children/family  Greater resilience and adaptability  More engaged citizenship  More critical information processing  Better non-monetary choices	Increased social mobility  Better-functioning institutions/service delivery  Higher levels of civic engagement  Greater social cohesion  Better birth control  Reduced negative externalities

**Table 1 – Benefits of Education – Adapted from World Development Report 2018 – Learning (World Bank, 2018)**

## 1.2. Solutions to the learning crisis

Education systems all around the world have two top challenges: improve learning achievement and education access. It is worth noticing, that the second priority does not automatically affect the first one. More time at school does not always lead to higher learning outcome – and schooling without learning is not only a wasted opportunity, but also an injustice. When comparing the effect of years of schooling versus test scores on the growth of GDP per capita, the result is clear: both the effect and the significance of the correlation are much stronger for test scores than schooling years, as shown in Figure 1. More than 825 million young people in the poorest countries are expected to lack the basic secondary school skills to find a job by 2030, although enrolment rates have increased significantly. This clearly shows, that, apart from education access, there are other factors influencing learning achievements (World Bank, 2018).

Annual average per capita growth in GDP, 1970–2015, conditional on test scores, years of schooling completed, and initial GDP per capita



Source: WDR 2018 team, using data on test scores from Hanushek and Woessmann (2012) and data on years of schooling and GDP from the World Bank's World Development Indicators (database), 2017. Data at [http://bit.do/WDR2018-Fig\\_1-5](http://bit.do/WDR2018-Fig_1-5).

**Figure 1 – Test scores vs. years of schooling effect on GDP per capita growth**

The World Bank has defined four areas, which affect learning: Prepared learners, skilled and motivated teachers, other school inputs (e.g. building infrastructure and learning material) and effective school management. All four areas need to be well-functioning in order to achieve ideal learning conditions for students.

### **1.3. Focus and objective of the study**

The study focuses on education in the context of developing countries and analyses factors influencing the area “Prepared learners” for the following reasons:

- (1) For children out of school, any other investment in education remains ineffective. Still more than 25% of the children in Sub-Saharan Africa are not attending primary school and only 35% finish secondary school (World Bank, 2018);
- (2) The situation of out-of-school children is worsening; the global number of out-of-school children has risen in recent years, reaching 124 million by the end of 2013 (UNESCO, EFA, 2015);
- (3) The average student in low-income countries performs worse in literacy and numeracy than 95 percent of the students in OECD countries (Crouch & Gove, 2011)
- (3) The most vulnerable to schooling access are children from poor families, girls and disabled, thereby presenting a major source of inequality in life opportunities (Education Commission, 2016);
- (4) Poorer children on average perform worse at school and have lower learning capacities influenced by biological development deficits caused by lower health levels, stress and missing learning stimuli in the first 1000 life days : This perpetuates unequal opportunities for lower social classes (CPCE UDP, 2016) (Heckman, 2007) (Hong & Hikosaka, 2011) (McEwen & Gianaros, 2010).
- (5) Every day, 60 million children go hungry to school, which negatively affects their concentration and learning potential (Neeser, 2011)

Three factors, which influence learner preparedness, are proposed:

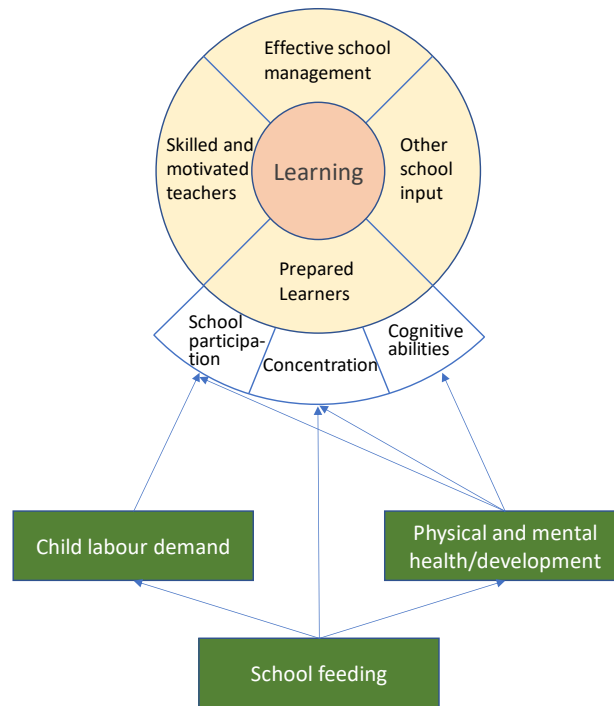
1. School participation
2. Concentration level
3. Cognitive ability

The study analyses the suitability of a specific tool, namely school feeding, to improve learner preparedness and its effect on the overall learning achievement. School feeding is the provision of food to school children. The multitude of implementation methods can be summarised in two main groups: first, in-school feeding, where children receive food in the school premises, and second, take-home rations, where families receive food, when their children attend school. In-school feeding can happen through warm meals or high-energy biscuits or snacks. Some



programmes include both in-school feeding and take-home rations, mostly to incentivise school participation for disadvantaged social groups, such as girls.

The framework proposed for this research builds upon the four dimensions of Learning from the World Bank's World Development Report 2018 and is visualised in Figure 2. It extends the area of Prepared Learners with the three proposed factors Access to education, Concentration and Cognitive ability. Furthermore, it explains the connection between school feeding and each of these three factors: School feeding can reduce the demand for child labour, as parents need to afford one meal less per day for each school child benefiting from meals at school. In addition, take-home rations can further reduce the pressure on parents to provide food for the family, either directly through the food brought home, or indirectly through the financial gain of selling the take-home rations to the local market (e.g. vegetable oil). These factors can incentivise parents to send their children to school and thereby increase enrolment and attendance as well as reduce drop-out rates, i.e. all factors related to school participation. The immediate effect of school meals is higher concentration of school children, who otherwise would be hungry and have more difficulties to follow class content. The longer-term effect of school meals is the improving health and nutrition status of the children, thereby reducing absenteeism through illness, increasing concentration capacity and improving cognitive abilities. Additional positive and negative feedback loops – not visualised for the sake of clarity – include the following: Lower child labour supply can reduce family income and food availability for the whole family. Parents may decide to shift food from the school children to other children who are not going to school, thereby reducing – or neutralising – the nutrition and health effect for the school children. On the other hand, better health condition of school children can have positive externalities on family spending on medical aid – thereby increasing available family income - and can improve family nutrition through the knowledge spill-over from the school children (e.g. better cooking habits learned at school and applied at home). This also fosters the health of school children, who might even improve their eating habits outside of school.



**Figure 2 – Study framework – Influence of school feeding on learning**

The objective of this study is to add to existing evidence on school feeding, which can support the decision-making process of leaders in developing countries, seeking for effective measures to improve the education outcome of their population and reduce social and economic inequalities within their society.

#### **1.4. Research questions**

The study scientifically tests the above mentioned connection between school feeding and education. The following research question is therefore proposed: **“What impact does school feeding have on educational outcomes?”**

This research includes an assessment of learner preparedness and its impact on learning outcome. For learner preparedness, the study focuses on access to education, due to the lack of data on the factors concentration level and cognitive ability. The effect of school feeding on access to education is measured looking at enrolment, drop-out and attendance rates; the learning impact is measured via repeater rates. These indicators are commonly used in such analyses and are part of the UNESCO education indicators. The proposed research question is therefore extended to the following sub-questions:

“Does school feeding have a significant impact on enrolment numbers?”

“Does school feeding have a significant impact on drop-out rates?”

“Does school feeding have a significant impact on attendance rates?”

“Does school feeding have a significant impact on repeater rates?”

To answer these questions, the study will focus on the case of Ethiopia, where the author conducted a cost-benefit analysis of school feeding for the UN WFP in May/June 2017 and could get first hand experience on school meal interventions, their implementation forms and gathered qualitative feedback from school directors, teachers, teacher-parent association members, school children and farmer associations during fifteen school visits and two farmer association visits in Southern Nations, Nationalities and People’s Region (SNNPR) and Somali.

## **2. Literature review**

### **2.1. Global literature about school feeding**

Systematic reviews about educational impact studies have been done by Kristjansson (2007), McEwan (2015) and Svilstveit (2015) which include 18, 12 and 16 studies on school feeding respectively. McEwan is thereby looking at a broader definition of school feeding, which includes food, beverages and micro-nutrients.

Kristjansson (2007) focused on in-school feeding targeted at socio-economically disadvantaged children. It showed significant improvement of attendance rates and learning outcome – specifically math skills – in lower income countries. Furthermore, a slight improvement in cognitive tasks was found.

McEwan (2015) compares different educational interventions – shown in Table 2 – and finds a small mean effect size of the provision of food, beverages and micronutrients at school of 0.035, with 10% significance level. The highest impact on learning was found in Asian countries where iron and micronutrients were provided to school children. The rather low and mixed results on learning are explained by different school quality contexts, which might affect the results. Regarding school participation, McEwan finds short-run effects on enrolment and attendance, citing the systematic review of Petrosino et al. (2012) and the randomised controlled trial (RCT) in Kenya of Vermeersch et al. (Petrosino, Morgan, Fronius, Tanner-Smith, & Boruch, 2012) (Vermeersch & Kremer, 2004). McEwan recommends a combination of access-based interventions, such as school feeding or conditional cash transfers, and instructional interventions in schools to create higher learning impact.

	Overall weighted average effect	Number of studies
<b>Instructional</b>		
Computers or technology	0.150***	10
Teacher training	0.123***	17
Class size or composition	0.117**	6
Instruction materials	0.078***	15
Monetary grants	-0.011	4
<b>Health or nutrition</b>		
Food, beverages, and/or micronutrients	0.035*	12
Deworming drugs	0.013	5
<b>Incentives</b>		
Contract or volunteer teachers	0.101***	8
Student/teacher performance incentives	0.089**	8
School management or supervision	0.055	5
Informational treatments	0.049**	7
Notes: * $p < 0.10$ , ** $p < 0.05$ , *** $p < 0.01$ . The p value is obtained with the wild cluster bootstrap-t, clustering by the number of studies. A single study may include more than one experiment if the experiments share samples and/or treatments.		

**Table 2 - Learning impact by educational treatment (McEwan, 2015)**

Svilstveit (2015), finds varying significance levels for different factors of school participation – clustered under “Access to schooling” –, and learning outcomes visualised in Table 3. While attendance shows significantly higher rates for treatment groups, enrolment and drop-out show improvements, but not significant at 5%. Furthermore, school feeding does not have any effect on completion rates. Regarding learning outcomes, math and language tests show significant improvements, while the composite test score remains non-significant. Finally, there is a significant improvement in cognitive skills for children receiving school meals. However, there is considerable variability for all estimates, suggesting a cautious interpretation. The author suggests, that school feeding programmes might have higher impact on educational outcomes in regions with high food insecurity and generally low school participation, such as Guyana. On the other hand, in regions with better food stability and higher enrolment rates, such as Chile, the effect of school feeding programmes might be smaller (Snilstveit, et al., 2015) (McEwan, 2013). Another finding was, that locally owned programmes had higher educational impact than centrally managed ones. In the analysed cases of Sri Lanka and Guyana, local

communities had to decide about their participation in the school feeding programme and the implementation was supported with funding and training of community members. These interventions showed consistently better results in school participation and learning outcomes than centrally managed programmes (Ismail, Jarvis, & Borja-Vega, 2014). Furthermore, among all analysed educational interventions, school feeding seems to be the only one potentially having a positive effect on both school participation and learning outcomes (Snilstveit, et al., 2015).

	<b>Overall weighted average effect</b>	<b>Number of studies</b>
<b>Access to schooling</b>		
Enrolment	0.14	7
Attendance	0.09**	6
Drop-out	-0.06	3
Completion	0	2
<b>Learning outcomes</b>		
Math scores	0.10**	10
Language arts scores	0.09**	8
Composite test score	0.14	3
Cognitive skills	0.11**	7

\*\*p<0.05

**Table 3 - Average education effect of school feeding (Snilstveit, et al., 2015)**

Another study from Northern Uganda also finds beneficial effects of school feeding on enrolment and attendance rates for two types of interventions, school meals and take-home rations (Alderman, Gillian, & Lehrer, 2010). A further study shows significant enrolment improvements for girls of the treatment group. However, attendance rates were lower in the same group. The authors explain this by the varying need for child labour, depending on the family size and the availability of non-schooled children available to support their parents at work. In fact, children in the test group with high family size showed growing attendance, while children with lower family size – and thereby more dependence on the tested children’s labour force – showed negatively impacted attendance rates (Kazianga, Walque, & Alderman, 2012) . The literature review shows varying impact and significance levels for school feeding programmes around the world. Filmer and Schady (2009) suggest, that the high number of often poorer students attracted by school meal incentives can lead to overcrowded classes, which can negatively affect the overall learning impact. Vermeersch & Kremer (2004) argue that the distribution of school meals can disturb the education process if children spend time collecting

firewood or if teachers are in charge of the food preparation or distribution, thereby reducing their teaching hours. The authors also find, that contrary to school meals, the teacher expertise had significant impact on the learning outcome of school children.

Kazianga et al. (2012) argue that parents might reduce the food provision for those children benefiting from school feeding, which could even worsen their nutrition input.

## **2.2. Literature about school feeding in Ethiopia**

Belachew et al. (2011) analysed the relationship of food insecurity, school participation and educational achievements of students aged 13 to 17 in the Jimma zone in South West Ethiopia. The study uses results from two consecutive surveys from 2009 with stratified random sampling. The results show significantly higher absenteeism and lower performance in the indicator “highest grade attained” for students and households with food insecurity. The authors therefore recommend integrating food interventions in programmes aimed at achieving universal access to primary education in food-insecure regions (Belachew, et al., 2011).

Moges et al. (2015) assessed the level of stunting and potential influencing factors among 6-59 months old children in the town Hossana in Southern Ethiopia. The study used a random sample approach with structured questionnaires. Among other factors, results show that the high level of stunting in the sample was related to the mother’s education level, household income and duration of breastfeeding and cup feeding. The authors conclude, that nutrition interventions are necessary to reduce stunting levels in the study area (Moges, Feleke, Meseret, & Doyore, 2015).

Dheressa (2008) has analysed various indicators of school participation using questionnaires collected from 102 households in Dara district, Sidama zone, Southern Ethiopia. The study finds no significant impact of school feeding on enrolment, attendance and drop-out levels. The factors affecting school enrolment in decreasing impact order were demand for child labour, cost of schooling, availability of school, teaching quality and school infrastructure, distance to school, availability of food incentives and safety concerns. The factors affecting attendance and drop-out, as well in decreasing impact order, were illness, work for money/food, domestic work, school hour hunger – i.e. how many school hours do children have to wait until food is served – and distance to school. Attendance rates in rural areas may vary across the school year depending on the seasonal child labour demand, such as for agricultural harvesting. For example, in the Ethiopian region SNNPR owners of coffee plantations require their children to work during the harvest period in September-October. According to Dheressa, many parents

think, that the opportunity cost of sending their children to school would be higher than the perceived benefits, even under the presence of school meals. The author recommends that both nutritional and economic values of the school feeding programme need to be improved to have more impact on school participation (Dheressa, 2008).

Yohannes (2017) analysed the effects of a school feeding programme on 320 school children between grade 3 and 7 in Arada sub city, Addis Ababa. The author applied a quasi-experimental design and calculated Difference in Difference linear regressions for academic achievement and attendance and independent sample t-tests for attention measures. The results show a small but not significant positive impact on academic achievement and attendance as well as no impact on attention.

Poppe et al. (2017) investigated the impact of school feeding programmes on different school catchment areas across rural Ethiopia, focusing on programme modality and implementation. The authors conclude that in-school meals combined with take-home rations can be beneficial for concentration and learning outcome, measured through reading, writing and arithmetic skills. However most of the links found are rather weak and not sufficiently systematic. Another interesting finding is, that the meal distribution timing plays a substantial role in the programme success. Specifically, programmes serving food early in the morning show the best results, whereas those waiting with the meal provision until the end of the school day seem to be less effective, notably for girls.

Zenebe et al. (2018) examined the impact of school meals on dietary diversity, nutritional status and attendance, using a structured questionnaire collected from 290 school children between 10 and 14 years. The authors find that in addition to higher dietary diversity, body-mass-index and height-for-age scores, students receiving school meals had a higher attendance rate at the 5% significance level.



### **3. School Feeding origins and policy development**

#### **3.1. Introduction**

School meal movements started in Europe in the late 18<sup>th</sup> century and were initially funded by individual donors and private organisations. The programmes had similar goals as those in developing countries today: reducing inequality by supporting disadvantaged people, improving health standards through better nutrition levels at children-age and stimulating the economy by improving the population's educational level through raising attendance rates and student attention. Besides these similar goals, additional public intentions raised interest among European and American leaders in this measure: forming a healthy – male – population base for military recruitment, as done by the British at the beginning of the 20<sup>th</sup> century or giving a public sales opportunity to the agricultural sector suffering from massive overproduction and plummeting market prices, as done by the United States in the 1940s. These purposes secured governmental funding for school meals (Levenstein, 2003).

#### **3.2. School meals from private initiatives**

The first school feeding initiatives can be traced back as far as to the end of the eighteenth century, when wealthy philanthropists supported the poor and tried to reduce famine. In 1790, Benjamin Thompson, also known as Count Rumford, started a programme aimed at teaching and feeding hungry children in the German city of Munich. This initiative was led by his Poor People's Institute, where poor and unemployed children and adults were paid in kind receiving clothing and food for working in an army clothes factory. Children worked part-time, while receiving lectures in reading, writing and math in the remaining hours. Due to the high feeding cost, Count Rumford was already trying to optimise the meal composition providing the best nutritional food at the lowest cost. The usual meal consisted of a "soup made from potatoes, barley, and peas. Meat was not included in the diet because of its high cost" (Brown, 2013). As a physicist, Rumford's efforts to increase the efficiency in the food preparation led to several inventions, such as the double boiler, the baking oven, the fire-less and the pressure cooker, which influenced the development of the modern compartment steamer and other commercial kitchen appliances of today. Rumford's developed expertise was highly sought after in the German Empire and in various other countries in Europe, where he installed further programmes in France, Switzerland, Scotland and England. In London, for instance, Rumford's soup kitchen fed sixty thousand children daily (Brown, 2013).

Similarly, the origin of school feeding in England was marked by private philanthropists supporting under-privileged children. The famous French author Victor Hugo, who gave warm meals to children going to a nearby school in Guernsey since the early 1860s. This initiative led to the establishment of “The Destitute Children’s Dinner Society” in London in 1866 and numerous other charitable organisations – mainly managed by teachers –, which reached the number of 360 all over England by 1905.

In the United States, the first school meal programme was established in 1853 by the Children’s Aid society of New York. However, it took forty years, until sporadic meal programmes started in other larger cities. Philadelphia and Boston were the first ones outside of New York to promote school feeding. In 1894, Philadelphia started to serve penny lunches in one school, and later in an additional eight in different areas of the city. In Boston, the Women’s Educational and Industrial Union implemented school feeding with centralised cooking. In January 1910, a combination of warm lunch on three days and milk and cold sandwiches on the other two days was offered by the Home Economics classes.

### **3.3. Rising public interest**

With the success of privately funded school meal programmes and the poor health condition of large parts of the population at the end of the 19th century, several European countries started to develop national legislation and dedicate funding for school feeding on a regional or national level.

In France, the National Guard of the Second District in Paris marked the beginning of the “Caisses des Ecoles” (school funds) in 1849, making use of some unexpected financial balance in the treasury, which they dedicated to facilitating schooling for underprivileged children. By 1882, these school funds became mandatory all over France and included the running of the “Cantines Scolaires” (school restaurants), which were already present nationwide.

In England, school feeding became a measure of national security. The military recruitment during the Boer War (1899-1902) revealed the poor physical condition of voluntary soldiers, resulting from malnutrition in childhood, as concluded by the British Parliament (Evans & Harper, 2009). As a result, the new Liberal government passed the first centralised policy about

school feeding, the Provision of Meals Act, in 1906. This provision allowed local authorities to include restaurant facilities as their standard school equipment. As a result, in three years, more than hundred towns and cities adopted school feeding programmes all over the country (Bryant, 1913). Interestingly, the Provision of Meal Act 1906 already contains a paragraph stating that “No teacher seeking employment or employed in a public elementary school shall be required as part of his duties to supervise or assist [...] in the provision of meals, or in the collection of the cost thereof.” Thereby, English authorities proved to be aware of potential negative implications of school feeding programmes on the effective teaching time through food preparation and distribution duties left to the teaching staff (English Parliament, 2018).

Until 1914, school feeding programmes spread over Europe. While France, Switzerland, the Netherlands, Great Britain, Denmark and Bavaria implemented national policies on the subject matter, other countries – Germany, Austria, Italy, Denmark, Sweden, Norway, Finland and Belgium – had attained national scope of their programmes without central policies in place<sup>2</sup>. Furthermore, Russia and Spain started with similar initiatives before the beginning of World War I (Bryant, 1913).

Only in 1932, the US federal government started to support school meal programmes by granting loans to several towns in Missouri to cover the labour cost for cooking and food distribution. This loan offer was extended to 39 States by 1934, facilitating the employment of 7,442 women (Gunderson, 2017). It took until 1946 and the marking events of World War II, when the National School Act recognised the importance of school feeding beyond a tool to handle short-term agricultural surpluses. The provision of meals at schools was named “measure of national security” which ensures children’s health and promotes the consumption of nutritious food beyond the school premises (United States Congress, 1946).

At the beginning of the twentieth century, school feeding programmes spread to the developing world. British-ruled India, for example, implemented its first public school feeding initiative in the 1920s, mostly financed by state governments and limited external support. Until today, the programme is largely decentralised. It, however, provides guidelines and commodity provision

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<sup>2</sup> In Germany, the fear of a resulting mass migration from rural areas to large cities prevented the passing of a bill similar to the British one, introduced by the Social Democrats. Therefore, it took until the end of World War II, when the occupying powers Great Britain, France and the United States introduced formal school feeding in their respective administration zones (Stern, 2008)

by the national government. In 2001, the Supreme Court in India introduced a law mandating school feeding in all government-led and -assisted primary schools. The Court thereby answered to the “Right for Food” Campaign led by the People’s Union for Civil Liberties. The central government distributes to the states free grains, such as rice or wheat, and reimburses the cost of transportation to the schools. Today, the programme has close to universal coverage, reaching 130 million school children all over India (Bundy, et al., 2009).

Another example of national school feeding legislation in the developing world is Brazil. Nutrition scientists in the country made their first school meal attempts in the 1940s. In 1955, the first official initiative was established under the name of Campanha de Merenda Escolar (National School Food Campaign) to address both child hunger and low school attendance rates. The initial focus on malnutrition was later broadened to include development and social protection as further aims of the programme supported by a universal public policy from the Brazilian government. Since 1970, the federal government funds the running cost of the programme. Today, the programme is one of the largest ones in the world, covering close to 37 million school children. Similar to India, the programme is now largely decentralised, leaving implementation and decision-making to the regions, districts and communities. The decentralisation process started in 1980 with the creation of an independent central body, the National Fund for Development of Education. This fund is responsible for the distribution of the financial resources as well as providing guidance and performing audits. Food is purchased through a public tender process. Since 1994, municipal and state governments are obliged to form School Feeding Committees as locally responsible body. These committees ensure locally acceptable meal composition as well as help to promote locally or regionally procured food (Nogueira, et al., 2016) (Bundy, et al., 2009).

### **3.4. England – From fighting hunger to fighting obesity**

The development of school feeding in England exemplarily shows its changing public interest and goals over time from the nineteen until the twenty-first century, when developed market economies are facing new societal issues.

Around 1900, wide-spread poverty was a main issue in England. One of its direct consequences was malnutrition. About 25% of the population of London was unable to live on their money and half of the wage-earning working-class population was physically unfit, because they did not earn enough to buy sufficient food. This also negatively impacted the diet of children in the

affected families. The Education Act from 1921 defined eligibility criteria for free school meals, but lack of funding led to a poor implementation and the fact, that depending on the region, up to 90% of the eligible children did not receive any meal at school, as education inspectors analysed. Also, local education authorities reacted to the Provision of Meals Act 1906. In 1939, less than fifty percent of the local authorities were offering a meal service to their school children. In that year, about 130,000 meals were served each day, targeting only three percent of the school age population. The first National School Meals policy, which also included nutritional standards for the served food, was introduced in 1941. It defined the levels of calories, protein and fat a school meal should contain. In 1944, the Education Act mandated the provision of school feeding by local education authorities, whenever there was a declared need. This was a reaction to the slow implementation of meal services in the country. Shortly after World War II, in 1947, the government took over funding of school meals in the country. In 1959, a standard charge per meal was introduced, however, since 1967, local education authorities are financially responsible for the service. Under Margaret Thatcher – first as Secretary of State for Education and Science and later as Prime Minister – public spending cuts became prevalent, which also affected school meal services. Meal fees were raised reaching 14 pence by 1971 and the provision of school milk was abolished. Further, the Education Act 1980 lifted the mandatory provision of school meals for local authorities and the minimum nutrition standards. In combination with the introduction of Commercial Competitive Tendering, the effect on school meal reach and quality was tremendous. Private companies took over a large share of the school kitchens and focused on popular fast food dishes, such as burgers and chips. In 1988, Thatcher further reduced the reach of school feeding by amending the Social Security Act, which removed the free school meal entitlement to thousands of children (Gillard, 2003). In the decades after Thatcher, there was growing evidence on the unhealthy nature of the nation's – and especially children's – diet as well as growing child obesity, which has doubled between 1980 and 2000. This also changed the political agenda on school meals. After several failed policies, new nutritional standards for school meals were introduced in 2000 – twenty years after Thatcher's deregulation. However, due to the lack of specific nutrient or calorie level standards, providers have not dramatically increased food quality. Therefore, the status of the school meal services is still criticised by nutrition experts. Following a television documentary of the famous cook Jamie Oliver, which received great attention by the public, the Department for Education and Skills established the School Food Trust in 2005. It was aimed at improving the nutritional quality of school meals. In 2017, however, it was closed again after being

converted to a private charity and losing the necessary funding for continuing its activity (BBC, 2017).

### **3.5. Ethiopia – Supporting the country's development**

With a population of close to 100 million, Ethiopia is the second most populous country in Africa. Almost half of the population is below the age of 16. Being classified as least developed country by the World Bank, the goal of the federal government is to transform the country, having a largely agriculture-based economy, to a lower-middle income country by 2025. This goal was set in the Growth and Transformation Plan II and should be reached meeting four objectives: (1) Achieve and maintain double-digit GDP growth, (2) improve productivity in agriculture and manufacturing, (3) strengthen public mobilisation and ownership and (4) foster nation building and democracy. School feeding can stimulate all mentioned objectives via promoting a healthier and more educated labour force. Various federal ministries endorse the positive impact of the school meal programme, such as the Ministry of Education in its Education Sector Development Program V and the Ministry of Health in its National Nutrition Program II.

In 1994, WFP started with an initial school feeding programme in the region Tigray, which was especially affected by the Ethiopian civil war, targeting 25,000 children in 40 schools. The support later extended to other five food-insecure regions - Afar, Amhara, Oromia, SNNPR and Somali – and included the ministry of education and the regional bureaus in the administration. Main target were areas with lower enrolment rates and higher gender disparity. In 2004, the programme reached 650,000 children in 1,200 schools. The concept of Homegrown school feeding was first introduced in the school year 2012-13 in 37 pilot schools in the region SNNPR (Programme, 2017).


The National transition process, which already started in 2009, led to a gradual programme take-over by the Ethiopian government. In 2017, the Minister of Education, Dr. Tilaye Gete, affirmed that the government will increase their budget for the national school feeding programme in 2018, targeting 1.3 million students in primary and – for the first time – secondary school. Priority will be given to displaced people who fled from the drought – provoked by the most severe El Niño climate shock in the last fifty years – and recent political clashes (Ethiopian News Agency (ENA), 2017).

### 3.6. Trends in School Feeding

#### 3.6.1. National ownership

Tightening budgets in the humanitarian sector and stricter project selection lead to thorough business case comparison of development projects and return on investment considerations by major public donors. Moreover, a targeted transition of aid programmes to national authorities and self-funding are increasingly important to reduce long-term dependencies on foreign aid.

Bundy et al (2009) has developed a five-stages model showing the transition of purely externally funded and managed programmes towards fully governmentally owned programmes, visualised in Figure 3.

	Stage 1		Stage 2	Stage 3	Stage 4	Stage 5	
	<i>Programs rely mostly on external funding and implementation</i>					<i>Programs rely on government funding and implementation</i>	
							
Policy framework for school feeding	limited		increased	strong	strong		strong
Government financial capacity	limited		moderate	increased	strong		strong
Government institutional capacity	limited		limited	moderate	increased		strong
Countries	Afghanistan	Malawi	Mali	Kenya	Lesotho		Nigeria India
	CAR	Ethiopia	Cambodia	Côte d'Ivoire	Ghana	El Salvador	Chile
	DRC	Haiti	Rwanda		Madagascar	Ecuador	Jamaica Brazil
	Sudan	Tanzania	Niger	Senegal	Honduras		Botswana
	Zimbabwe		Pakistan	Mauritania			Namibia
Case study examples	Sudan, Haiti (see chapter 6)		Cambodia, Mali (see chapter 3)	Kenya (see chapter 7)	Ecuador, El Salvador (see chapter 4)		India, Brazil (see chapter 2)

Source: Authors, based on information in the WFP database and on discussions with key informants.

Note: CAR = Central African Republic; DRC = Democratic Republic of Congo. The allocation of countries to a particular stage is a work in progress.

**Figure 3 - The transition of school feeding (Bundy, et al., 2009)**

Ecuador and El Salvador are two countries, which are currently in the transition phase from stage 4 to stage 5. Ecuador started with school feeding in 1987, when WFP targeted children in poor and underdeveloped areas of the country. The Ministry of Education established an operational unit to institutionalise the foreign aid intervention under national management. By 1999, 3,000 schools and 667,000 children in rural areas benefited from school feeding, with 80% of the food provided by the government. Since 2004, the national government finances all school meal programmes. External support is now focusing on operational efficiency and policy development. The programme, now reaching two million children in all 22 provinces – 15

percent of the population – is still using WFP as service provider for procurement and transportation.

School feeding in El Salvador started in 1984, in the middle of the Salvadoran Civil War, reaching 300,000 students or 90 percent of school-age children in rural areas. After peace was restored, the government decided to gradually take over programme management in 1997. Initial funding came from a trust fund, which managed funds from a national privatisation initiative. Later, regular government budgeting took over national programme funding responsibilities. Within the country's social safety net system, the National School Health Program included school feeding within their strategy. By 2006, more than 650,000 students in 3,500 schools – 88 percent of rural and poor urban schools – were reached through the programme. In 2008, 100 percent coverage was reached, and the government took over the sole responsibility of the programme. Similar to Ecuador, El Salvador still receives technical support from WFP including logistics and procurement expertise and operations (Bundy, et al., 2009).

### **3.6.2. Programme sustainability**

School feeding programmes in low income countries have large variation in cost. With economic growth and the transition from low to middle income country, the relative cost of school meal provision declines substantially. Therefore, the focus on cost effectiveness should lie especially on least developed countries. Important for the development of a sustainable programme is its inclusion in national policies and structural plans, such as the education sector plan, which ensures its inclusion in government budget negotiations among the different ministries. Furthermore, the establishment of adequate implementation capacity is crucial for an effective operation. In addition, a clear donor commitment including funding amount and timespan combined with a structured transition plan with intermediate milestones ensures, that funding and management of the programme are not endangered throughout the process (Bundy, et al., 2009).

### **3.6.3. Nutritional focus**

The most important period for child nutrition, with regards to its cognitive ability development, is the period from conception until the age of two years – also often called “the first 1000 days” – in which the brain neurones reach their peak in quantity and malleability. After that, the cognitive development possibilities diminish continuously. Therefore, foundational learning



skills should be taught as early as possible in preschool targeting children aged 3-6, while ensuring a balanced nutritional intake. However, latest findings in neuroscience have shown, that cognitive abilities can still be influenced at a later stage, especially socio-emotional capabilities. Therefore, the nutritional aspect of school feeding in primary school is receiving increasing interest in the research community, especially for interventions focusing on school-to-work transition or social inclusion of young people with weak foundational skills (Kautz, Heckman, Diris, Weel, & Borghans, 2014).

In 2000, the framework for Focusing Resources on Effective School Health (FRESH) was established at the World Education Forum in Dakar, Senegal by the UN, WHO, World Bank, WFP and other partners. This framework intends to maximise the benefits of health interventions by highlighting the synergies of the following four elements, which should be implemented in all schools: “effective school health and nutrition policies; a safe and sanitary school environment with potable water; health, hygiene, and nutrition education; and school-based health and nutrition services, such as school feeding and deworming” (Bundy, et al., 2009).

#### **3.6.4. Home-grown school feeding**

Successful school meal programmes in middle- and high-income countries often foster local food procurement, while most of the programmes in least developed countries depend on foreign aid and food imports. A move to locally produced food commodities, could stimulate local agricultural production and provide a safe and predictable selling opportunity for small farmers. The Comprehensive Africa Development Programme therefore included homegrown school feeding as target measure and numerous pilot projects were started in different Sub-Saharan countries (Bundy, et al., 2009).

In Western countries, there is increasing conscience about locally and biologically produced food, which can boost the local economy, reduce negative environmental impact, such as transportation-linked  $CO_2$  gas emissions, and increase food quality through healthier and more sustainable production methods and lower-scale production. This also shows effect on school feeding programmes. In 2004, East Ayrshire, in Scotland, started a school feeding pilot involving twelve schools, which localised their food chain to foster local economic development and support sustainable businesses. In 2007, 70 percent of the food was locally purchased, resulting in a local economic benefit of USD 320,000 per year (Sonnino, 2007).

## **4. Study approach**

### **4.1. Scope of the study**

The econometric analysis compares the schooling indicators Enrolment, Repeaters, Drop-out and Attendance of Ethiopian school children, depending on whether they were receiving school meals in the control period. In the test period, none of the school children received food at school. The schooling indicators Enrolment and Repeaters are analysed in a sample of 162 schools from the Oromia region, while for the indicator Drop-out a sub-sample of 31 schools is used. All three indicators are taken from the Ethiopian EMIS database or calculated based on EMIS data for the observation period 2012 to 2016 in the Gregorian (Western) calendar (Ethiopian Ministry of Education, 2018). The indicator Attendance is calculated based on WFP survey data for 2016 and 2017 (World Food Programme, 2017). It uses a sample of 159 schools from the regions Afar, Oromia, Somali and SNNPR. All indicators are analysed on a school level and by gender. The sample definition and test environment are detailed in section 4.2.

### **4.2. School sampling**

For the schooling indicators Enrolment, Repeaters and Drop-out a test or intervention group was defined, consisting of schools which have offered school feeding supported by the UN WFP until it was phased out in 2015 due to lack of programme funding. The academic years 2012, 2013 and 2014 in the Gregorian calendar are defined as control period, in which school feeding was still offered in the treatment group. The test period consists of the years 2015 and 2016, following the intervention stop. Thereby, the effects of stopping a school feeding programme are measured in the test group compared to a control group of schools, which have not offered any school feeding in the control nor in the test period.

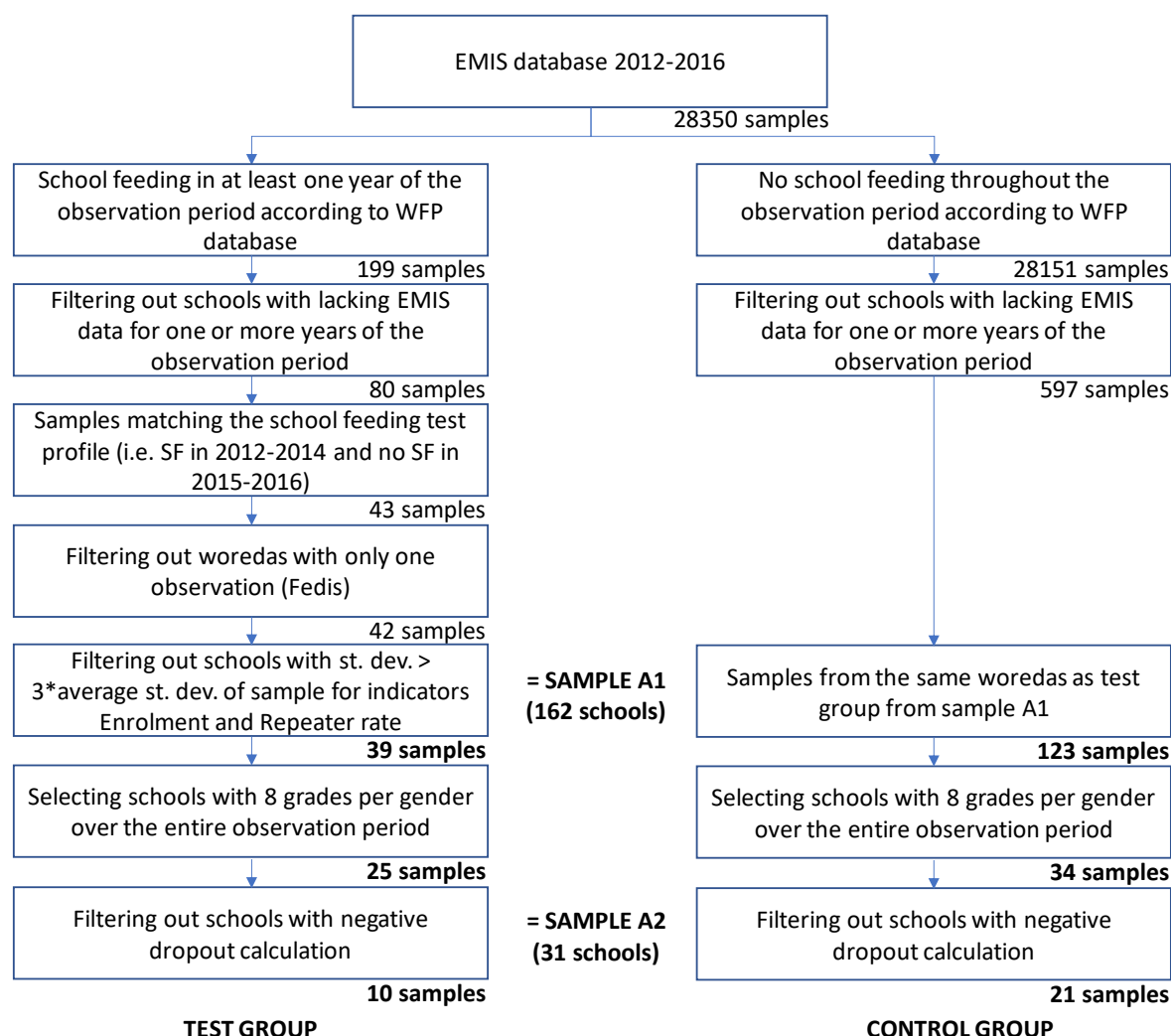
A first school sample A1 was defined including 162 schools from six woredas<sup>3</sup> in the region Oromia, containing 40 intervention and 122 control schools from the same woredas. The sampling logic is detailed in Figure 4.

This sample was created based on the EMIS database for 2012-2016, received from the Ethiopian Ministry of Education. First, schools were matched with the WFP programme school

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<sup>3</sup> Also called districts. After regions and zones, woredas represent the third administrative level of Ethiopia.

database to divide schools in those, which received food support in one or more years of the observation period 2012-2016 and those with no food support at all. Second, schools with



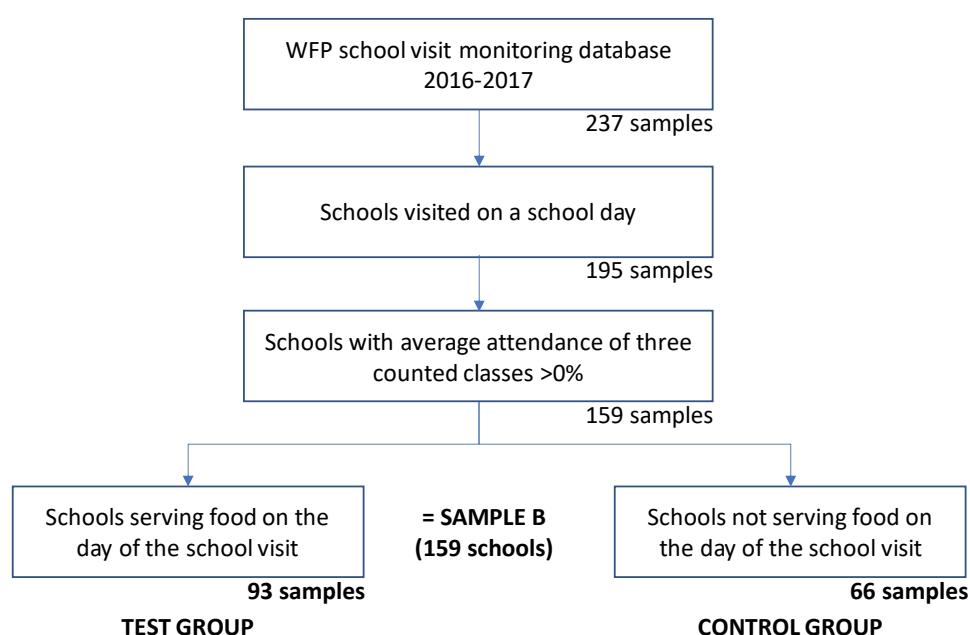
**Figure 4 - Sampling logic - Sample A**

lacking EMIS data in one or more years were excluded. Third, the schools, which received food were filtered to match the defined school feeding test profile, i.e. receiving food between 2012 and 2014 and not receiving any food between 2015 and 2016. In order to allow better regional comparison, one woreda with only one test school was eliminated. The control group schools were then filtered to match the woredas from the test group. This is necessary to compare similar schools, since WFP school feeding focuses on a “negative selection” of low-performing schools and poorer areas with special assistance need. Finally, three outliers with a standard deviation of more than three times the average standard deviation of the sample for the indicator Enrolment and Repeater rate were excluded. This leads to the sample A1 of 162 schools, used

for the econometric analysis of the school feeding impact on the indicators Enrolment and Repeaters.

For the indicator Drop-out, a sub-set A2 of sample A1 was created only selecting schools with eight grades for both genders throughout the observation period. This was necessary to be able to perform the proposed drop-out calculation method detailed in section 4.3.1. Furthermore, observations with negative drop-out calculation results – probably due to reporting errors – were excluded. The remaining subset A2 contains 31 samples including 10 test and 21 control schools.

For the indicator Attendance, a second school sample B was defined based on the WFP school visit monitoring database 2016-17, as detailed in Figure 5. The overall database contains 237 samples. First, only schools visited on a school day were selected. Second, schools which were reported to have an average attendance of 0% out of three counted classes were excluded. These visits have either not performed the class counting or they really showed zero attendance, which most likely has other influencing factors than school feeding. The remaining schools represent sample B of 159 schools, including 93 test schools having served food on the visit day and 66 control schools which have not. Since all schools are part of the school feeding programme and therefore represent areas of need, no further woreda selection was necessary. This cross-section analysis does not require any control and test period distinction.



**Figure 5 - Sampling logic - Sample B**

### 4.3. Indicator calculation

#### 4.3.1. School participation

##### a. Enrolment

The study uses total absolute enrolment numbers (EN) per school and year per gender. Since this data is directly available in the EMIS database, no calculation is necessary. To minimise potential effects of a change in population size, the analysis controls for woreda fixed effects. This procedure should discount for any demographic effect, since a change in population size would affect all schools in a woreda. The analysis avoids the use of enrolment rates, be it gross or net enrolment, since this would require the inclusion of census data, which could influence the results without any relationship with our tested variable school feeding.

##### b. Drop-out rate

Primary school in Ethiopia consists of 8 grades, so  $n$  equals to 8 in the subsequent formulas. The drop-out rate of a school (DOR) in year  $t$  is calculated based on the change in absolute enrolment (EN) of the cohort of grades 1 to 7 at time  $t$  and the cohort of grades 2 to 8 at time  $t+1$  discounted for repeaters (REP) and re-admitters (REA) – who re-join class at  $t+1$  and were not enrolled at time  $t$  – and divided by (EN) at time  $t$  as shown below:

$$DOR_t = \frac{\sum_{i=2}^n (EN_{i,t+1}) - \sum_{i=1}^{n-1} (REP_{i,t+1}) - \sum_{i=1}^{n-1} (REA_{i,t+1}) + REP_{n,t+1}}{\sum_{i=1}^{n-1} EN_{i,t}}$$

Note that in year  $t+1$ , we need to add repeaters of grade 8, since they did not belong to the considered cohort at time  $t$ . Furthermore, we cannot calculate drop-out of grade 8 students, since we have no information on whether students have joined secondary school after grade 8 or have dropped out. A condition for the DOR calculation is a consistent number of eight grades per school and gender. A variation of available grades could have a major influence on drop-out rates, e.g., when the available number of students is too low to form a class and are therefore forced to change school.

For all drop-out calculations, we assume, that students who have not passed to the next grade and do not appear under the repeater figures have dropped out. No moving to another school nor receiving students from other schools are considered in the calculation.

### c. Attendance rate

Attendance rates are based on WFP data, which is regularly collected for programme schools. This data contains information on school attendance of various classes of the school on the visited day. The school surveys include the information, whether food is served during the day of the visit. For our testing purpose, we will use the schools which served food on the day of the visit as test group and the schools without food serving on that particular day as control group. The calculation of the Attendance rate ATR is done as below:

$$ATR = \frac{\sum_{i=1}^n ATR_i}{n}$$

At each school visit, the attendance of up to three school classes is verified, so  $n$  is a number between one and three. The present students are then compared with the number of enrolled children in that class, which results in the attendance rate  $ATR_i$  of the class  $i$  on that particular day. For our purpose, we will use the average (ATR) of the verified classes for each school.

### 4.3.2. Learning outcome

For the calculation of the learning outcome, we use the repeater rate as proxy. Repeater rates are calculated as follows:

$$RER_t = \frac{\sum_{i=1}^n (REP_{i,t+1})}{\sum_{i=1}^n EN_{i,t}}$$

RER in the year  $t$  is calculated dividing the total number of REP in all grades 1 to  $n$  in year  $t+1$  by the total number of EN in the grades 1 to  $n$  in year  $t$ .

### 4.3.3. Gender effect

All above mentioned indicators are calculated for boys and girls separately. Thereby a potential gender effect of the school feeding treatment is empirically assessed.

## 4.4. Methodology

The econometric analysis is based on the calculation of Difference in Difference (DD) estimators for the indicators Enrolment, Drop-out and Repeaters. For the DD analysis, we will

first compare test and control group in the control period, the academic years 2012, 2013 and 2014. Then, we will analyse both test and control group performance in the test period, the academic years 2015 and 2016.

Enrolment (EN):

For the control period C, we will perform the following calculation:

$$\Delta_{EN,C} = \Delta_{EN,2012-2014} = \frac{(EN_{2013} - EN_{2012})/EN_{2012} + (EN_{2014} - EN_{2013})/EN_{2013}}{2}$$

The use of the average of the repeater rate growth 2012-2013 and 2013-2014 is aimed at reducing the impact of excluded influence factors, such as short-term people displacement due to drought emergencies and at reducing potential quality issues in the sample data.

For the test period T, we will do the following enrolment growth calculation:

$$\Delta_{EN,T} = (EN_{2016} - EN_{2015})/EN_{2015}$$

The Difference in Difference calculation for test and control schools is done as below:

$$DD_{EN} = \Delta_{EN,T} - \Delta_{EN,C}$$

Repeater rate (RER):

First, we need to calculate the repeater rate for each school, year and gender, as described in section 4.3.2.

For the control period C, we will then perform the following calculation:

$$\Delta_{RER,C} = \Delta_{RER,2012-2014} = \frac{RER_{2014} - RER_{2012}}{2}$$

The use of the average of the repeater rate growth 2012-2013 and 2013-2014 is aimed at reducing the impact of excluded influence factors, such as short-term people displacement due to drought emergencies and at reducing potential quality issues in the sample data.

For the test period T, we will do the following calculation:

$$\Delta_{RER,T} = RER_{2015} - RER_{2014}$$

The Difference in Difference calculation is done as below:

$$DD_{RER} = \Delta_{RER,T} - \Delta_{RER,C}$$

Drop-out rate (DOR):

For the control period C, we will do the following drop-out rate growth calculation:

$$\Delta_{DOR,C} = \Delta_{DOR,2012-2014} = \frac{DOR_{2014} - DOR_{2012}}{2}$$

For the test period T, we will perform the following drop-out rate growth calculation:

$$\Delta_{DOR,T} = DOR_{2015} - DOR_{2014}$$

The Difference in Difference calculation is done as below:

$$DD_{DOR} = \Delta_{DOR,T} - \Delta_{DOR,C}$$

Attendance rate (ATR):

For the indicator Attendance, a within-without comparison is performed via a cross-section analysis. The underlying dataset consists of snapshot information from school visits, in which the attendance of three classes was counted for that particular day. The ATR calculation is done by gender and detailed in section 4.3.1.

#### 4.5. Limitations

The model focuses on school participation indicators and an arguably weak proxy for learning outcome, namely repeater rates. Other important learning factors, such as teacher expertise and motivation, school management as well as other school inputs, including curriculum relevance, are omitted. As many surveys on school feeding programmes have concluded, nutrition intervention effectiveness often depends on other factors and depend on the environment and situation. Since most of these factors are not controlled for in our study, the analysis results have to be interpreted carefully and under the awareness of the existence of potential further crucial factors influencing schooling indicator levels.



There might be a sample selection problem, since the test group is not randomly chosen. In fact, WFP chooses the schools in most need, which are usually the worst-performing ones in their areas. This selection bias might also apply to the programme stop school selection process. When school feeding funding was shortened, it is very likely, that the better performing schools among the programme schools were out-phased earlier than others. Since in 2015-2016, there were still some schools in Oromia, which received food support, the ones which were out-phased in 2015 – i.e. our test group – might represent the better part of the supported schools. The school feeding stop might have affected those schools to a lesser extent than other programme schools might have. We therefore potentially underestimate the average effect of a feeding stop on programme schools.

Since the data for the selected educational indicators comes from two different sources, it is not possible to measure the effect of all educational indicators on a unique school sample. Furthermore, the attendance rate impact of school feeding is approximated by daily snapshots of programme schools, which are regularly visited by WFP staff, counting the attendance in up to three classes on that particular day as data point for our analysis.

The analysis is based on secondary data from the national EMIS database provided by the Ethiopian government, as well as on a WFP-generated school feeding school database over the analysed time period and data from regular visits in programme schools, provided by the UN WFP.

The cleansing of the EMIS database showed to be particularly difficult due to two main challenges: first, there is a lack of year-over-year consistency of school, woreda and zone name spelling, and second, the geographical classification of the individual schools is not entirely consistent over the academic years. Under the absence of any other school identifier, these two challenges required a manual matching of the whole school sample over the entire observation period.

## 5. Study results

### 5.1. Enrolment

The Difference in Difference OLS (Least Square) estimator for the Enrolment growth regression shows an unexpected result, detailed in Table 4 - Econometric results - Enrolment. For male students, the school feeding phase out shows a positive coefficient of 0.15 at the 1% significance level. This means, that schools stopping school feeding have a 15 percentage points higher increase in male enrolment growth than schools without any school meal offering in the observation period. This rather counter-intuitive result remains significant after controlling for potential geographical differences at the woreda level. For female students, there is a similar effect, showing an enrolment growth impact of 10 percentage points for the test group. This effect, however, becomes insignificant after controlling for woreda fixed effects.

<i>Results</i>	Male	Female
Coefficient	0.153413***	0.096345*
Std. Error	0.044071	0.051377
p-value	0.0006	0.0626
R <sup>2</sup>	0.070403	0.021506
Adjusted R <sup>2</sup>	0.064593	0.01539
Controlling for Woreda fixed effects		
Coefficient	0.163334***	0.076654
Std. Error	0.043553	0.053891
p-value	0.0002	0.1569
R <sup>2</sup>	0.274026	0.139114
Adjusted R <sup>2</sup>	0.245924	0.105789
<i>*p&lt;0.1 **p&lt;0.05 ***p&lt;0.01</i>	Observations	162
		162

**Table 4 - Econometric results - Enrolment**

### 5.2. Drop-out rate

For male students, School Feeding phase out has no significant effect on the drop-out rate growth. This remains valid after controlling for the woreda fixed effect on the tested indicator. For female students, however, there is an 8 percentage points increase in the drop-out rate

growth in schools after stopping the school feeding intervention, significant at 5%. This effect remains significant after controlling for the woreda fixed effect. Details of the regressions are shown in Table 5.

<i>Results</i>	Male	Female
Coefficient	0.021107	0.080731**
Std. Error	0.035001	0.031056
p-value	0.5512	0.0145
R <sup>2</sup>	0.012385	0.188984
Adjusted R <sup>2</sup>	-0.021671	0.161018
Controlling for woreda fixed effects		
Coefficient	0.001834	0.083433**
Std. Error	0.042937	0.037185
p-value	0.9663	0.0343
R <sup>2</sup>	0.192004	0.367886
Adjusted R <sup>2</sup>	-0.009996	0.209857
<i>*p&lt;0.1 **p&lt;0.05 ***p&lt;0.01</i>	Nr. of observations	31

**Table 5 - Econometric results - Drop-out**

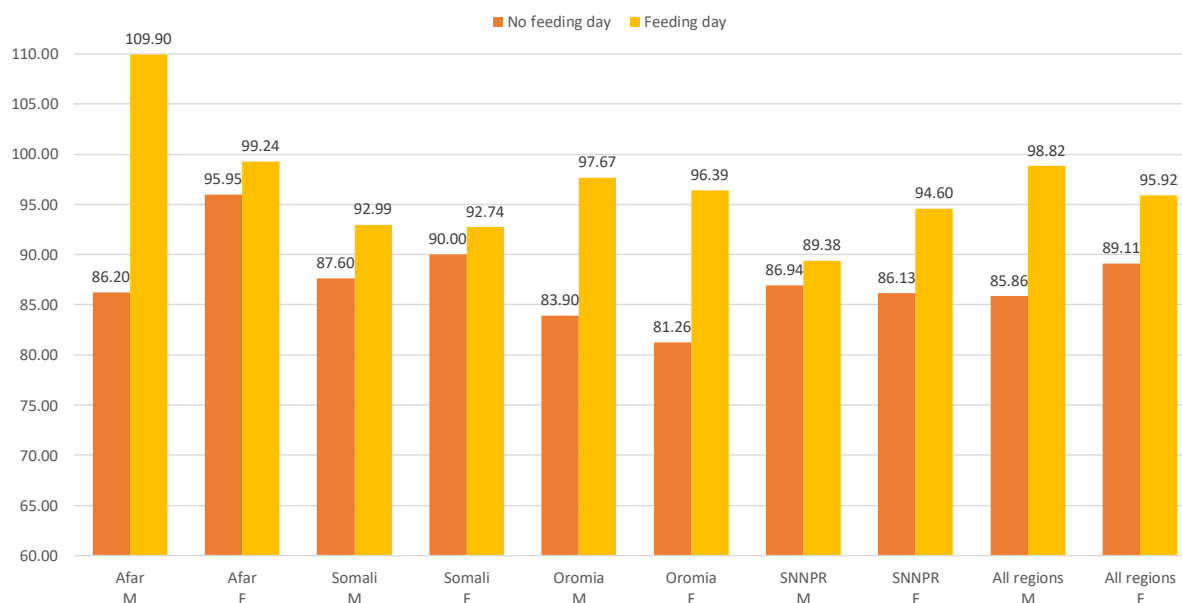
### **5.3. Attendance rate**

As detailed in Table 6, the cross-section analysis of the effect of serving food on a particular school day on Attendance rates is significantly positive for both genders. Male and female students show 13 and 7 percentage points higher attendance rates respectively, when food is served on a school day. When controlling for the region fixed effect, the results remain similar. When controlling for seasonality, however, the female impact becomes insignificant, while the effect on male students remains strong at 5% significance level. When combining fixed effects from regions and seasonality, both the positive effect on male and female attendance are significant at 1% and 10% respectively. With 19 versus 8 percentage points higher attendance for male and female students on days with served meals, the effect seems stronger for boys. However, as shown in Figure 6, girls start from a higher attendance rate basis of 89% versus 86% average boys' attendance over all regions on days without food serving. This higher female attendance is driven by the regions Afar and Somali, where girls are incentivised to go to school by receiving take-home rations of vegetable oil for their families under minimum monthly

attendance requirements. This explains, why girls would rather stay in class, even if food is not served on a day, in order to receive their regular take-home ration.

<i>Results</i>	Male	Female
Coefficient	12.95862**	6.808244*
Std. Error	5.347737	3.97274
p-value	0.0165	0.0886
R <sup>2</sup>	0.036052	0.018363
Adjusted R <sup>2</sup>	0.029912	0.01211
Controlling for region fixed impact		
Coefficient	14.08727**	6.957995*
Std. Error	5.590266	4.148174
p-value	0.0128	0.0955
R <sup>2</sup>	0.058367	0.043273
Adjusted R <sup>2</sup>	0.033909	0.018423
Controlling for seasonality fixed effect		
Coefficient	14.64391**	5.857041
Std. Error	5.660087	4.119593
p-value	0.0106	0.1564
R <sup>2</sup>	0.075116	0.09592
Adjusted R <sup>2</sup>	0.044891	0.066375
Controlling for region and seasonality fixed effect		
Coefficient	18.92065***	8.27093*
Std. Error	5.864471	4.307859
p-value	0.0015	0.0568
R <sup>2</sup>	0.126858	0.130625
Adjusted R <sup>2</sup>	0.080291	0.084258
<i>*p&lt;0.1 **p&lt;0.05 ***p&lt;0.01</i>	Nr. of observations	159

**Table 6 - Econometric results - Attendance**



**Figure 6 – Average attendance rates by region, gender and school meal provision (World Food Programme, 2017) [%]**

#### 5.4. Repeater rate

Schools which stopped school feeding show marginally decreasing repeater rate growth for male and female students. The non-significant results are similar when controlling for the woreda fixed effect. Further details are shown in Table 7.

<i>Results</i>	Male	Female
Coefficient	-0.002162	-0.004664
Std. Error	0.004065	0.003666
p-value	0.5956	0.2051
R <sup>2</sup>	0.001765	0.010017
Adjusted R <sup>2</sup>	-0.004474	0.003829
Controlling for Woreda impact		
Coefficient	-0.003339	-0.006246
Std. Error	0.004514	0.004054
p-value	0.4606	0.1254
R <sup>2</sup>	0.015624	0.031969
Adjusted R <sup>2</sup>	-0.022481	-0.005503
<i>*p&lt;0.1 **p&lt;0.05 ***p&lt;0.01</i>	Nr. of observations	162
		162

**Table 7 - Econometric results – Repeaters**

## **5.5. Gender effect**

When comparing the econometric results for the selected schooling indicators by gender, it becomes evident, that the negative impact of stopping school feeding affects in particular female students. They face a higher increase in drop-out rates combined with a slightly stronger reduction in repeater rates – the latter although not significant. The attendance rate increase is higher for boys on feeding days. This is also due to a higher average female attendance rate on days without school meals. In the regions Oromia and SNNPR girls have lower attendance on non-feeding days, which again suggests that female students are under-privileged compared to their male fellows. However, in the regions Afar and Somali, this issue is being tackled with incentives via take-home rations offered exclusively for girls who reach a minimum attendance threshold. In total, the higher female average attendance partially explains the higher male attendance increase, starting from a slightly lower basis. The unexpected rise in Enrolment after a school feeding programme termination is also stronger for male than for female students, with 16 versus 8 percentage points and only significant for boys at 1% after controlling for woreda fixed effects.

## **5.6. Discussion**

The positive effect of stopping a school feeding programme on the enrolment rate growth is an unexpected result. The following hypotheses are proposed as possible explanations:

- Hypothesis 1: Considering the potential over-crowding of schools, which offer midday meals in under-privileged areas, as proposed by Filmer and Schady (2009), wealthier families might decide to bring their children to another school without feeding. They could thereby try to escape the negative learning impact of larger classes filled with poorer and – on average – lower-performing students. Once, a school feeding programme ends, poorer families are forced to take out their children of school. This might stimulate wealthier parents to bring back their children to the initial school, which could lead to an actual growth in enrolment.
- Hypothesis 2: The causality of the effect is rather reversed. Aid organisations as the WFP monitor the emergency situation in their areas of support. Under tightening project funding, a necessary programme termination will most probably start with the best-performing schools and support the low-performers as long as possible. Thereby, schools, which have left an emergency state, such as a severe draught, may see

pastoralist families returning to the area and sending their children back to school. The shifting food support would then happen in parallel to a schooling indicator recovery, such as Enrolment.

- Hypothesis 3: One or more variables, which the econometric analysis is not accounting for, are influencing enrolment rate growth. This might be a singular effect in the observation period or a more pertinent variable, which would need to be discovered. A future repetition of the analysis with a new observation period could help to identify if this unknown variable had indeed a singular effect on the indicator enrolment.

The discovered drop-out rate growth and the slight reduction in repeater rates can be explained more easily. They appear to be the consequence of poorer and lower-performing students leaving school once midday meals disappear. In the first year after the programme stop, students from poorer families who perform worse on average rather leave school and support their families in the search for food or in other work tasks than repeat grade. Since both drop-out rate and repeater rate impact are more significant for female students, this explanation seems to be especially valid for girls. This suggests a special vulnerability for female students to access education.

## **6. Conclusion and recommendations**

The study has shown that stopping a school feeding programme harms female students in particular. They show a significantly higher drop-out rate, which also explains a slight reduction in female repeater rates, usually driven by more vulnerable students. Furthermore, the immediate effect of stopping a school meal service could be quantified by a significant drop of 19 and 8 percentage points in attendance rates for male and female students respectively after controlling for regional and seasonal fixed effects. As some Ethiopian students explained to me during my field visit in 2017, when they walk to school in the morning and do not see smoke coming out of the school kitchen, they turn around and go back home. The take-home ration initiative in Afar and Somali helps to dampen this negative effect for girls. The explanation for the increase in enrolment, particularly for male students, remains unclear. The proposed hypotheses, in particular the one suggesting higher numbers of returning wealthier students who changed school to avoid a negative learning impact of over-crowded and less-performing classes, would need to be validated through further investigation and family interviews.

To facilitate future analyses of the school feeding programmes in Ethiopia, it is recommended to introduce a unique numerical school identifier in EMIS, which would enable an easier tracking of schools over years. Currently, it requires a considerable manual effort to match schools in EMIS data from different years, since the phonetic transfer of school names to the Latin alphabet varies over the years. A numerical coding would substantially reduce the analysis effort. It is also recommended to include geographical information in the school identifiers, which would also avoid mistakes in woreda or zone allocation. I recommend a twelve-digit code including two digits for the region, two digits for the zone, three digits for the woreda, one digit for the school type (private or public), one digit for the school level (primary grades 1 to 4, primary grades 1 to 8, secondary) and three digits for the individual school.

To reach its full potential, school feeding needs complementary activities: with regards to the health impact, de-worming programs should be aligned with school feeding programs, to make sure to feed the children and not the worms. Further alignment with hygiene programs at school, such as WASH, and nutrition education increase the health impact and help promoting nutrition consciousness beyond the school premises. With regards to the education impact, it is important to adapt school input, such as teacher quantity and quality, school facilities and learning material to the expected rise of school children attracted by school feeding programmes. Failing this can lead to overcrowded classes, overstrained teachers and can eventually even harm the



learning impact for children at school. And finally, an effective school management and proper measurement taking is necessary to monitor learning achievements over time and adapt methodologies if the education goals are not reached. This requires trust between the public staff in schools, local, regional and central ministries as well as the political leaders, so that no one is incentivised to hide problems or beautify numbers. The issue at stake is too important for this – it is about the children; the future belongs to them.

## 7. Bibliography

- Abrigo, M. R., Lee, S.-H., & Park, D. (2017). Human Capital Spending, Inequality, and Growth in Middle-Income Asia. (A. D. Bank, Ed.) *ADB Economics, Working Paper Series*, 529.
- Ahmed, A. U. (2010). *Impact of feeding children in school: Evidence from Bangladesh*. Washington D.C.: International Food Policy Research Institute.
- Alderman, H., Gillian, D. O., & Lehrer, K. (2010). *The Impact of Food for Education Programs on School Participation in Northern Uganda*. Iowa State University.
- Andrabi, T., Das, J., & Khwaja, A. I. (2012). What Did You Do All Day? Maternal Education and Child Outcomes. *Journal of Human Resources* 47 (4), 873-912.
- Asian Development Bank. (2012). *Asian Development Outlook 2012: Confronting Rising Inequality in Asia*. Manila: ADB.
- Asian Development Bank. (2017). *Transcending the Middle-Income Challenge*. Manila: ADB.
- BBC. (2017). *Children's Food Trust charity to close after funding stops*. London: BBC. Retrieved May 7, 2018, from Children's Food Trust charity to close after funding stops
- Belachew, T., Hadley, C., Lindstrom, D., Gebremariam, A., Lachat, C., & Kolsteren, P. (2011). Food insecurity, school absenteeism and educational attainment of adolescents in Jimma Zone Southwest Ethiopia: a longitudinal study. *Nutrition Journal*.
- Benhabib, J., & Spiegel, M. (1994). The role of human capital in economic development: Evidence from aggregate cross-country data. *Journal of Monetary Economics*, 34, 143-173.
- Brown, S. (2013). *Count Rumford - Physicist Extraordinary*. Whitefish: Literary Licensing, LLC.
- Bryant, L. S. (1913). *School Feeding - Its history and practice at home and abroad*. Philadelphia: J. B. Lippincott Company.
- Bundy, D., Burbano, C., Grosh, M., Gelli, A., Jukes, M., & Drake, L. (2009). *Rethinking School Feeding*. Washington: The International Bank for Reconstruction and Development / The World Bank.
- Carneiro, P., Meghir, C., & Parey, M. (2013). Maternal Education, Home Environments, and the Development of Children and Adolescents. *Journal of the European Economic Association* 11 (S1), 123-60.

- Cohen, D., & Soto, M. (2007). Growth and human capital: good data, good results. *Journal of Economic Growth*, Vol. 12, Issue 1, 51-76. doi:10.1007/s10887-007-9011-5
- CPCE UDP. (2016). *Informe de resultados TERCE Tercer estudio regional comparativo y explicativo - Factores asociados*. Centro de Políticas Comparadas de Educación de la Universidad Diego Portales. Santiago: UNESCO.
- Crouch, L., & Gove, A. K. (2011). Leaps or One Step at a Time: Skirting or Helping Engage the Debate? The Case of Reading. In J. N. Hawkins, & W. J. Jacob, *Policy Debates in Comparative, International, and Development Education* (pp. 155-74). New York: Springer.
- Dheressa, D. K. (2008). *Education in focus: Impacts of School Feeding Program on School Participation: A Case study in Dara Woreda of Sidame Zone, Southern Ethiopia*. Norwegian University of Life Sciences.
- Education Commission. (2016). *The Learning Generation: Investing in Education for a Changing World*. New York: International Commission on Financing Global Education Opportunity.
- English Parliament. (2018, April 30). *legislation.gov.uk*. Retrieved from <http://www.legislation.gov.uk/ukpga/1906/57/enacted>
- Ethiopian Ministry of Education. (2018). *Education Management Information System (EMIS) data extraction 2012-2016*. Addis Ababa. Retrieved May 31, 2018
- Ethiopian News Agency (ENA). (2017, December 26). Over 1.3m Students to Benefit from School Feeding Program. *Ethiopian News Agency*. Retrieved May 4, 2018, from <http://www.ena.gov.et/en/index.php/social/item/4094-over-1-3m-students-to-benefit-from-school-feeding-program>
- Evans, C. E., & Harper, C. E. (2009). A history and review of school meal standards in the UK. *Journal of Human Nutrition and Dietetics*, Vol. 22, 89-99.
- Filmer, D., & Schady, N. (2009). *School enrollment, selection and test scores (Policy Research Working Paper 4998)*. Washington D.C.: World Bank.
- Forrester. (2016, June 22). Robots, AI Will Replace 7% Of US Jobs By 2025. *Forrester.com*. Retrieved February 22, 2018, from <https://www.forrester.com/Robots+AI+Will+Replace+7+Of+US+Jobs+By+2025/-/E-PRE9246>

- Foster, A. D., & Rosenzweig, M. R. (1996). Technical Change and Human-Capital Returns and Investments: Evidence from the Green Revolution. *American Economic Review*, vol. 86(4), 931-953.
- Gelli, A. (2015). *School Feeding and Girls' Enrollment: The Effects of Alternative Implementation Modalities in Low-Income Settings in Sub-Saharan Africa*. *Frontiers in Public Health*. Retrieved 01 2018, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4440399/>
- Gillard, D. (2003). *Food for Thought: child nutrition, the school dinner and the food industry*. Retrieved May 7, 2018, from [www.educationengland.org.uk/articles/22food.html](http://www.educationengland.org.uk/articles/22food.html)
- Gunderson, G. W. (2017, April 25). *National School Lunch Programme (NSLP)*. (U. S. (USDA), Producer) Retrieved May 4, 2018, from [www.fns.usda.gov](http://www.fns.usda.gov): [https://www.fns.usda.gov/nslp/history\\_4](https://www.fns.usda.gov/nslp/history_4)
- Heckman, J. J. (2007). The Economics, Technology, and Neuroscience of Human Capital Formation. *Proceedings of the National Academy of Sciences* 104 (33), 13250–55.
- Hong, S., & Hikosaka, O. (2011). Dopamine-Mediated Learning and Switching in Cortico-Striatal Circuit Explain Behavioral Changes in Reinforcement Learning. *Frontiers in Behavioral Neuroscience* 5 (15).
- Ismail, S. J., Jarvis, E. A., & Borja-Vega, C. (2014). Guyana's hinterland community-based school feeding program (SFP). In B. Thompson, & L. Amoroso, *Improving Diets and Nutrition* (pp. 124-136). Washington D.C.: The Food and Agriculture Organization of the United Nations and CABI.
- Kautz, T., Heckman, J. J., Diris, R., Weel, B. T., & Borghans, L. (2014). *Fostering and Measuring Skills: Improving Cognitive and Non-cognitive Skills to Promote Lifetime Success*, *NBER Working Paper 20749*. Cambridge, MA: National Bureau of Economic Research.
- Kazianga, H., Walque, D. d., & Alderman, H. (2012). Educational and Health Impact of Two School Feeding Schemes: Evidence from a Randomized Trial in Rural Burkina Faso. *Journal of African Economies*, 21, 723–760. doi:10.1093/jae/
- Kristjansson, E. G. (2016). *Costs, and cost-outcome of school feeding programmes and feeding programmes for young children. Evidence and recommendations*. . *International Journal of Educational Development*, 48, 79-83.
- Levenstein, H. (2003). *Paradox of Plenty: A Social History of Eating in America, revised edition*. Berkeley: University of California Press.

- Levine, D. I. (2015). *Working in the twenty-first century : policies for economic growth through training, opportunity, and education*. London: Routledge.
- Lutz, W., Crespo Cuaresma, J., & Sanderson, W. (2008). The demography of educational attainment and economic growth. *Science*, 319, 1047-1048.
- McEwan, P. J. (2013). The impact of Chile's school feeding program on education outcomes. *Economics of Education Review*, 122– 139.
- McEwan, P. J. (2015). Improving Learning in Primary Schools of Developing Countries: A Meta-Analysis of Randomized Experiments. *Review of Educational Research Vol. 85, No. 3*, 353–394. doi:10.3102/0034654314553127
- McEwen, B. S., & Gianaros, P. J. (2010). Central Role of the Brain in Stress and Adaptation: Links to Socioeconomic Status, Health, and Disease. *Annals of the New York Academy of Sciences 1186 (1)*, 190-222.
- Moges, B., Feleke, A., Meseret, S., & Doyore, F. (2015). Magnitude of Stunting and Associated Factors Among 6-59 Months Old Children in Hossana Town, Southern Ethiopia. *Journal of Clinical Research & Bioethics*. doi:10.4172/2155-9627.1000207
- Neeser, K. (2011). Home Grown School Feeding - Smallholder Farmers Providing Local Food for Local Children. *A Global Village, Issue 3*, 42-44. Retrieved April 25, 2018, from <http://aglobalvillage.org/site/assets/files/1104/issue3.pdf>
- Nelson, R. R., & Phelps, E. S. (1966). Investment in Humans, Technological Diffusion, and Economic Growth. *The American Economic Review, Vol. 56, No. 1/2.*, 69-75.
- Nogueira, R. M., Barone, B., Barros, T. T., Guimaraes, K. R., Rodrigues, N. S., & Behrens, J. H. (2016). Sixty years of the National Food Program in Brazil. *Rev. Nutr.* 29 (2), 253-267.
- OECD, U. I. (2003). *Education Trends in Perspective*. Paris: OECD Publishing.
- Petrosino, A., Morgan, C., Fronius, T. A., Tanner-Smith, E. E., & Boruch, R. F. (2012). Interventions in developing nations for improving primary and secondary school enrollment of children: A systematic review. *Cochrane Database of Systematic Reviews (19)*. doi:10.4073/csr.2012.19
- Poppe, R., Frölich, M., & Haile, G. (2017). School Meals and Educational Outcomes in Rural Ethiopia. *Journal of Development Studies*. doi:10.1080/00220388.2017.1311405
- Snilstveit, B., Stevenson, J., Phillips, D., Vojtkova, M., Gallagher, E., Schmidt, T., . . . Evers, J. (2015). Interventions for improving learning outcomes and access to education in low- and middle-income countries - A systematic review. *3ie Systematic Review 24*.

- Sonnino, R. (2007). *Local School Meals in East Ayrshire, Scotland: A Case Study*. Paper presented to the World Food Programme.
- Stern, C. (2008). *Schwedenspeisung und Rotes Kreuz in Hamburg – Massenspeisungen 1946–1949 für Hamburger Kleinkinder in der Hungerzeit*. Neumünster: Wachholtz.
- UIS (UNESCO Institute for Statistics). (2017). *Curriculum and ICT in Education*. Montreal: UIS. Retrieved from <http://data.uis.unesco>
- UNESCO, EFA. (2015). *A growing number of children and adolescents, Policy Paper 22/Fact Sheet 31*. Montreal: UNESCO.
- United States Congress. (1946). *House Committee on Agriculture Report P.L. 396-79th Congress*. Washington D.C. Retrieved from <http://legisworks.org/congress/79/publaw-396.pdf>
- Vermeersch, C., & Kremer, M. (2004). *School meals, educational achievement, and school competition: Evidence from a randomized evaluation (Policy Research Paper No. 3523)*. Washington DC: World Bank.
- Wooldridge, J. M. (2006). *Introductory Economics - A modern approach*. Michigan: Michigan State University.
- World Bank. (2018). *World Development Report - Learning*. Washington DC: International Bank for Reconstruction and Development / The World Bank.
- World Food Programme. (2017). *Food for Education - School Visit Monitoring database 2016-2017*. Addis Ababa.
- World Food Programme. (2017, May 15). Development of school feeding in Ethiopia. (R. Gallenbacher, Interviewer) Addis Ababa.
- World Values Survey Association. (2015). *World Values Survey Wave 6 2010-2014 Official Aggregate V.20150418*. Old Aberdeen: King's College. Retrieved from <http://www.worldvaluessurvey.org/WVSDocumentationWV6.jsp>
- Yohannes, A. (2017). *The effect of School Feeding Program on the school performance of primary public school children in Arada Sub City, Addis Ababa - Master thesis*. Addis Ababa: Addis Ababa University.
- Zenebe, M., Gebremedhin, S., Henry, C. J., & Regassa, N. (2018). School feeding program has resulted in improved dietary diversity, nutritional status and class attendance of school children. *Italian Journal of Pediatrics*. doi:10.1186/s13052-018-0449-1