



THE TIGER BRANDS  
FOUNDATION



# EVALUATION STUDY OF THE NATIONAL SCHOOL NUTRITION PROGRAMME AND THE TIGER BRANDS FOUNDATION IN-SCHOOL BREAKFAST FEEDING PROGRAMME IN THE LADY FRERE AND QUMBU DISTRICTS OF THE EASTERN CAPE

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The Tiger Brands Foundation was established for broad based community impact. It benefits non-fee paying schools, vulnerable groups in society as well as projects that promote sustainable livelihoods in the areas in which such non-fee paying schools exist. To achieve this vision, the Foundation plays a funding, thinking, co-ordination and delivery role in partnership with a number of stakeholders.



The aim of the Department of Basic Education (DBE) is to develop, maintain and support South African schools nationwide by providing leadership with respect to provinces, districts and schools in the establishment of a South African education system for the 21st century. A key programme of the DBE is the (National School Nutrition Programme (NSNP). The NSNP aims to enhance the learning capacity of learners through the provision of healthy meals at schools. Where it is implemented, the programme has shown to improve punctuality, regular school attendance, concentration and the general wellbeing of participating learners.



The Eastern Cape Department of Education (ECDoE) strives to offer quality public education that transforms schools into centres of community which promote shared moral values, good governance and sustainable development.

This study was a collaborative initiative between the Centre for Social Development in Africa, University of Johannesburg, the Tiger Brands Foundation, the National Department of Basic Education (DBE) and the Eastern Cape Department of Education (ECDoE).

The views expressed and information contained in this report are not necessarily those of or endorsed by the Tiger Brands Foundation, the National Department of Basic Education (DBE) and the Eastern Cape Department of Education (ECDoE).

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## List of acronyms

<b>BMI</b>	Body Mass Index
<b>CSDA</b>	Centre for Social Development in Africa, University of Johannesburg
<b>DBE</b>	Department of Basic Education
<b>GHS</b>	General Household Survey
<b>ISAK</b>	International Society for the Advancement of Kinanthropometry
<b>NSNP</b>	National School Nutrition Programme
<b>SANHANES</b>	South African National Health and Nutrition Examination Survey
<b>TBF</b>	The Tiger Brands Foundation
<b>WHO</b>	World Health Organization

## Definition of key terms

<b>Stunting</b>	Between two and three standard deviations below the median range for height-for-age
<b>Severe stunting</b>	More than three standard deviations below the median range for height-for-age
<b>Underweight</b>	Between two and three standard deviations below the median weight-for-age
<b>Severely underweight</b>	More than three standard deviations below the median weight-for-age
<b>Wasting</b>	Between two and three standard deviations below the median BMI-for-age
<b>Severe wasting</b>	More than three standard deviations below the median BMI-for-age
<b>Overweight</b>	Between one and two standard deviations above the median BMI-for-age
<b>Obese</b>	More than two standard deviations above the median BMI-for-age



# Executive summary

School nutrition programmes are widely regarded as excellent interventions to improve the health and well-being of children living in poor circumstances. They reduce short-term hunger, improve children's food security, lead to more effective short and long-term learning at school, mitigate children's vulnerability to stunting, and help manage cognitive delays associated with malnutrition. They may also help to protect children from childhood and adult obesity associated with early stunting and the over-consumption of low-nutrient foods. In the long-term these gains are believed to have economic, health, and human development benefits for the population at large.

South Africa's National School Nutrition Programme (NSNP) delivers a cooked lunch consisting of a starch, a protein and a vegetable, to all Quintile 1 – 3 schools nationally. These schools service the most deprived communities in South Africa. The NSNP reaches approximately 8,8 million poor children daily. The recently introduced Tiger Brands Foundation (TBF) nutrition programme delivers breakfast in the form of fortified cooked porridge to approximately 50,000 children nationally, primarily in Quintile 1 and 2 schools. TBF is a private foundation working in partnership with the state in all nine provinces to offer this programme.

The NSNP is the second largest state investment into alleviating the effects of childhood poverty, after the Child Support Grant, and it has never been assessed for its impact on anthropometric outcomes, learner performance and learner attendance. The TBF in-school breakfast feeding programme was evaluated at its pilot stage (Hochfeld, Graham, Peters, Patel, Nyathela, Moodley, 2013), but not since it has been substantially expanded. This study represents the first attempt to evaluate the outcomes of such programmes, and to assess their effects relative to one another. The findings point to the positive and protective effects of both programmes. Such gains should be celebrated but also need to be corroborated and tested further. Nevertheless this is a good story that needs to be told.

**The study**

The study took place in the district of Lady Frere – one of the poorest rural areas of the Eastern Cape. It comprised a comparative research design in which results from two groups – schools receiving only the NSNP and schools receiving both the NSNP and the TBF in-school breakfast feeding programme – were compared. In addition results from both comparison groups were compared to a control group – schools in the Qumbu district that had been re-quintiled from quintile 4 to quintile 3 schools and therefore qualified to begin receiving the NSNP. A natural pre- and post-test occurred in the study in that the control schools started receiving the NSNP in the second term of 2014. We were therefore able to collect baseline data as well as follow up data (five months after they began receiving the meals) from learners at these schools.

The story that emerges from these schools is a very positive one.

**Wasting and stunting:**

- Despite high levels of poverty in the district, children at all of the schools showed lower rates of underweight and wasting than the Eastern Cape provincial averages for children. This is in part explained by the fact that the provincial averages are for children 0 – 15 years and the highest levels of undernutrition are for children 0 – 3 years (Shisana *et al.*, 2012). Once children reach school they are benefitting from the NSNP.
- With regard to height-for-age data, children in the schools receiving both nutritional interventions and those in the relatively better off control schools had low stunting rates (9% and 6.5% respectively) when compared to the national average for learners aged 4-14 years of 13% (Shisana *et al.*, 2014).
- Those at the schools receiving the NSNP only had somewhat higher stunting rates (14.5%) than children at the control schools and those received the TBF breakfast. This latter figure is in fact in line with the national average but is far lower than the average for children (0 – 15 years) in the Eastern Cape (23%) (Shisana *et al.*, 2014). The differences between learners at schools receiving the breakfast and those receiving only the NSNP suggest that the addition of a nutritious breakfast can positively shift stunting levels. Such a finding requires further research for confirmation as there is some debate about the intractability of stunting over the life course of a child. However, evidence from the Tiger Brands Foundation breakfast pilot study conducted in Alexandra shows that



levels of severe stunting were reduced by 4.7 percentage points over a ten month period (Hochfeld *et al.*, 2013). The data from both the Lady Frere and the Alexandra studies is cause for optimism although further research is required to confirm this finding.

Overweight:

- The second major finding relates to the protective effects of both programmes on overweight and obesity. In South Africa we have a growing obesity problem with implications for the national disease picture in South Africa – on top of conditions of undernutrition such as kwashiorkor and rickets, obesity drives a second layer of non-communicable diseases such as diabetes, hypertension, and cardio-vascular problems.
- However, children at both the comparison group schools were significantly less likely to be overweight or obese when compared to the learners at the control schools.
- In addition, learners at the schools receiving both nutritional interventions were significantly less likely than those receiving only the NSNP to be overweight or obese. These effects were particularly strong for girls.
- Further, the data from the control schools show that once learners start receiving the NSNP there is a reduction in overweight rates. Although further research is needed to understand this change it does seem to confirm the protective effects of the NSNP for overweight and obesity in children.

Learner performance:

- Children at the schools receiving the NSNP had higher marks than those at control schools in both the first and the last term. Children receiving the breakfast had higher marks at both points in time than either those at the control or the NSNP only schools.
- Although school performance is shaped by a myriad of factors and cannot be attributed solely to the interventions it is clear that children receiving meals during the day are doing better.
- Educators and principals at the schools are very clear about the positive effects on learning that the meals have. They note that children concentrate better and participate more during class after eating. These benefits accrue from the start of the school day for learners at schools receiving both the breakfast and the NSNP lunch.

Other benefits:

- Stakeholders identified a number of other benefits of the feeding programmes, including: infrastructure and skills development at schools; the development of food gardens at schools; the opportunity for food handlers to earn a stipend; community and family benefits when surplus food is given to vulnerable learners to take home; improved nutrition literacy; and increased knowledge of hygiene among learners.
- School stakeholders felt very positive about the complementarity of the TBF and NSNP programmes, and also mentioned other useful partnerships brought on board through these programmes.

Conclusions

The study provides strong support for the continuation of the NSNP in quintile 1 – 3 schools in the Lady Frere district. This



significant state investment needs to be recognised for the impact it is having on protecting children from the effects of poverty as well as the potential long term effects it will have on health and economic prospects.

These findings are positive both in terms of the short term outcomes for children as well as the long term health benefits. Because both stunting and obesity are related to adult obesity as well as non-communicable diseases such as Type II diabetes and heart disease, protecting children from early obesity or stunting is a good return on investment.

That being said, there is certainly room to intervene in childhood nutrition early on in a child’s life. The higher stunting rates in NSNP only schools compared to the other school types in the district suggests that there is a need to intervene in the first three years of a child’s life and to make efforts to focus on nutrition in early childhood development interventions.

The findings also provide important evidence for the value of a breakfast programme in schools. The protective effects for stunting, overweight and obesity, in combination with the better learner performance amongst learners receiving the breakfast in the Lady Frere district suggests that the additional meal results in very positive outcomes for children. The public-private partnership model is one that seems to be yielding positive results and is a model that can be learned from as new partners are brought on board to expand the breakfast reach.

1. Introduction

In 2012, 66 million children throughout the developing world attended school hungry (World Food Programme (WFP), 2012). Nutritional deprivation in childhood can have severe and long-lasting negative effects on the physical and intellectual development of children (Agüero, Carter & Woolard, 2006). Without adequate nutrition from birth throughout childhood, many children will not fulfil their intellectual, physical, social, and, later, their employment potential (Labadarios, Mchiza, Steyn, Gericke, Maunder, Davids & Parker, 2011; Ruel & Alderman, 2013; Singh, Park & Dercon, 2013; Jomaa, McDonnell & Probart, 2011; Iverson, du Plessis, Marias, Morseth, Høisæther & Herselman, 2011; Vorster, 2010). Globally, high levels of poverty, inequality and discrimination constitute the key barriers to adequate nutrition for many children (Iverson *et al.*, 2011:72).

It is well recognised that improved nutrition in childhood has positive effects not only for the child’s future, but also for whole societies in the long-term as it produces positive social and economic returns (Devereux & Sabates-Wheeler, 2011; Agüero *et al.*, 2006; World Bank, 2006). School nutrition programmes are widely praised as an effective way to reduce short-term hunger and to invest in children’s long-term nutritional health (Gelli, 2010; Adelman, Gilligan & Lehrer, 2008). In addition, they have important social and achievement effects, such as improved school enrolment, attendance, and achievement in terms of test scores, improved attention span, memory, and cognitive, psychomotor and mental development (World Food Programme, 2009; Bundy, Burbano, Grosh, Gelli, Jukes & Drake, 2009; Briggs, 2008; World Health Organization, 2007; Bennett, 2003; Buhl, undated).

Despite the fact that South Africa is a middle income country, poverty and food insecurity remain a major challenge due

to the country’s stark inequality. According to the South African National Health and Nutrition Examination Survey (SANHANES) conducted in 2012, 26% of the population experience hunger, with a further 28.3% of the population classified as being at risk of hunger (Shisana *et al.*, 2014: 10).

The population of children between the ages of 0-18 living in South Africa is somewhere around 18 million (Statistics South Africa (StatsSA), 2013b: 5), and too many face persistent hunger. Of the 18 million, 22.8% of children are reported to have inadequate access to food while a further 7.8% have severely inadequate access to food. The worst cases were found to be in the North West, Northern Cape and the Eastern Cape provinces, with the latter documenting a food insecurity prevalence rate of 39.1% (StatsSA, 2013b: 20). This number, while an improvement from 47% in 2002 (StatsSA, 2002), continues to be unacceptably high.

To date, the South African government has implemented three policy initiatives to address the underlying causes of insufficient nutrient intake. These initiatives include the provision of social grants, the Integrated Food Security and Nutrition Programme and the National School Nutrition Programme (Hendricks & Bourne, 2010; StatsSA, 2013b: 4). Together these programmes represent massive state investments designed to alleviate the effects of childhood poverty. Their effects can be seen in Table 1 below, which reports on data from various studies conducted over the past 21 years. As can be seen, stunting levels remain high despite these investments, suggesting that interventions in early childhood (when stunting is determined) are necessary. What is positive is the reduction both in the number of children who are underweight and those who are overweight.

Table 1: Progression of SA Children’s nutritional status since 1994

	1994 (≥6)*	1999 (1-9)	2005 (1-9)	2012 (0-9)
Stunting	25%	20%	20%	21%
Underweight	10%	10%	10%	6%
Overweight	No available data	20%	14%	14%**

\*Columns one and four are limited by the different age ranges used

\*\* Reported for children aged 2-9 years

Source: (Iverson *et al.*, 2011; Shisana *et al.*, 2014)

1.1.The National School Nutrition Programme

The National School Nutrition Programme (NSNP) is a state funded nutritional intervention in all nine provinces which feeds 8.8 million needy children a meal every school day (Department of Basic Education, 2014). The South African government allocated R5.2 billion in conditional grant

transfers to provinces for the NSNP in the 2013/2014 financial year (Republic of South Africa National Treasury 2015:46). The intervention provides one mid-morning meal<sup>1</sup> consisting of one protein, one starch, and one vegetable, chosen according to a nationally developed menu with

<sup>1</sup> The serving time of the meal varies, especially when a breakfast is also being served. This aspect will be discussed further later in the report.



adaptations according to local taste preferences. Meal size, cooking practices, hygiene, and other preparation protocols are all set down in NSNP regulations and guidelines and are monitored by district officials across the country.

Historically, feeding schemes were introduced as early as 1916 in South Africa. They were aimed at the 'neediest' children; however, only white children benefited (Swartz, 2009). By the end of apartheid, child hunger amongst the poorest South Africans, largely black, was severe. With the advent of democracy in 1994 a primary concern was to eliminate the unacceptable rate of child death due to insufficient nutrient intake. Therefore, Section 28(1)(c) of the Bill of Rights in the South African Constitution emphasises the government's commitment to 'providing every child with the right to basic nutrition'.

The NSNP was initiated in 1994 by the President's Office as a key feature of poverty alleviation and in line with a particular focus on addressing hunger in children (Iverson *et al.*, 2011). School feeding was originally the responsibility of the Department of Health, but over time this programme grew and evolved, and the NSNP is now run by the Department of Basic Education.

The NSNP focuses on the link between education and nutrition. It is premised on evidence that poor school performance, attendance, and punctuality, along with reduced concentration, attention, and intellectual capacity are strongly related to poor short and long-term nutrition (Napier, Oldewage-Theron, & Kearney, 2009; Labadarios *et al.*, 2011; Singh *et al.*, 2013; Devereux & Sabates-Wheeler, 2011). In Africa, including South Africa, research has demonstrated that school feeding can result in improved school enrolment, attendance and decreases in school dropout rates (Hochfeld *et al.*, 2013; Bundy *et al.*, 2009; Richter, Rose & Griesel, 1997).

The objectives of the NSNP are to:

- Contribute to enhanced learning capacity through school feeding programmes,

- Promote and support food production and improve food security in school communities, and
- Strengthen nutrition education in schools and communities (Department of Basic Education, 2014: 151).

The intended result of the NSNP is improved educational outcomes for individual learners as well as the country as a whole, but the social development and health effects of this intervention have positive impacts far beyond education alone. It is thus considered a key social investment of the state. Nevertheless, due to the high rates of unemployment and poverty in South Africa, the NSNP has reduced but not eradicated child hunger (Hall & Wright, 2011).

All primary and secondary schools that are categorised as Quintile 1 – 3 (most deprived schools) take part in the NSNP (Republic of South Africa National Treasury, 2014a: 25). For the financial year 2013/2014 the Department of Basic Education provided 8 827 419 learners in 19 877 schools with one nutritious mid-morning meal per day (Department of Basic Education, 2014a). The average current cost (as of 2014/15) per meal was R2.73 per primary school learner per day and R3.55 per secondary school learner per day (Department of Basic Education, 2014b). This amount includes feeding costs, gas for cooking, transport as well as the monthly stipend for Food Handlers which is R900 per Handler.

The Department of Basic Education has good information on the reach and functioning of the NSNP and on how the programme is meeting the targets set each year (Department of Basic Education, 2014a). Regular school visits are conducted to monitor progress and to support schools in implementing the scheme. Furthermore, officials assess schools' readiness to implement feeding in the coming year (Department of Basic Education, 2014a). Provincial departments also partner with organisations to ensure that they are able to effectively monitor the implementation of the programme and manage problems that are identified (Personal communication with Carina Muller). However, the NSNP has no method or system in place to evaluate the *impact* of the intervention.

## 1.2. The Tiger Brands Foundation in-school breakfast feeding programme

Breakfast is thought to have positive effects on immediate cognitive performance and feelings of well-being. Long-term benefits include improved nutrient intake and diet quality and some studies have shown associations between breakfast consumption and reduced risk of cardiovascular disease, diabetes and more effective weight management (O'Neil, Byrd-Bredbenner, Hayes, Jana, Klinger & Stephenson-Martin 2014). One of the reasons that breakfast consumers tend to have higher micronutrient intakes, is partly due to breakfast cereal and porridge fortification (Hayland, Dye & Lawton, 2009). Minerals like magnesium and iron are often missing in diets that are characterised by refined foods and low protein intake (Taljaard, Covic, Van Graan, Kruger & Jerling, 2013).

The Tiger Brands Foundation established its in-school breakfast feeding programme in 2011 in order to contribute to improved nutrition for learners in no-fee primary schools. They currently provide a daily breakfast during term time to

almost 41 246 learners in eight provinces in South Africa. Therefore learners in schools participating in the TBF school feeding programme are receiving two meals per day at school: breakfast provided by the TBF and a second meal provided by the NSNP. The TBF programme is an example of a successful public-private partnership aimed at improving the lives of poor children in South Africa.

The objectives of the TBF programme are to:

- Improve the lives of vulnerable school children and their communities by implementing sustainable, scalable and replicable programmes.
- Complement the national education policy by partnering with the Department of Education through its National School Nutrition Programme (NSNP).
- Support school leadership through the improvement of professionalism, teaching abilities and management of school resources.



- Work collaboratively in order to strengthen community development by leveraging of existing infrastructure to ensure sustainable continuity (TBF Annual Report, 2014: 14).

The aforementioned objectives are implemented through the provision of a nutritious breakfast and also through the installation or upgrading of kitchen facilities, nutrition education, skills and community development, as well as job creation.

A typical Tiger Brands Foundation breakfast consists of either a fortified sorghum, maize or oats-based porridge. A Food Handler arrives anywhere between 05:00 – 07:00 to start preparation of the meal. Usually breakfast is served between 07:30 and 08:00. Each child is provided with one plate and a set of eating utensils. TBF conducts training of the Food Handlers on how to cook in bulk as well as how to use the sponsored mobile kitchens optimally. Once a month a TBF truck makes a bulk delivery of the fortified porridge. This process is designed to be efficient and easy for schools to manage. TBF is entirely responsible for costs, distribution, training, and monitoring of their in-school breakfast feeding programme, although it utilises systems developed by the NSNP (such as Food Handlers, school storage). For example, TBF encourages schools to use the same Food Handlers that cook the NSNP meals. These Food Handlers are paid an extra R300 per month stipend over and above the monthly amount allocated to them by the Department of Basic Education (Rendell- Nkosi, Vwenhold & Sibanda, 2013: viii). Funding to pay the Food Handlers the increased amount comes directly from the TBF.

In 2013 the CSDA completed an evaluation of the pilot phase of the TBF school breakfast programme. This research was conducted in six pilot primary and combined schools in Alexandra Township in Johannesburg over the period July 2011 – June 2012. The findings showed that in all six of the schools there were positive measurable impacts on nutrition, school performance and school attendance among the learners. However, the study could not differentiate impacts of the NSNP and the TBF interventions as all pilot schools were also receiving the NSNP. Principals and other school stakeholders also reported positive school impacts and broader social benefits (Hochfeld *et al.*, 2013). The TBF model of partnering with the NSNP and engaging in community consultation was shown to be effective and positive.

Since the pilot phase, TBF has expanded their programme considerably to cover primary and combined schools in eight provinces. As the pilot phase evaluated the programme in a setting that was urban, high density, migratory and transient, it was anticipated that the impacts in a completely disparate, rural context might be different. In addition, there is a need to generate empirical research data on the impact of the NSNP itself as an extensive national government programme, as well as to generate knowledge on the combined impact of the NSNP and the TBF programmes.

The current research focuses on the impact of the school feeding programmes of the NSNP and TBF, in an area different to the urban setting of the pilot study. In 2013 the TBF programme was rolled out in 27 rural primary schools in the Lady Frere district, a rural, low density area of the Eastern Cape, with a relatively stable population and small schools. This location is where the research took place.

## 1.3. Research aims and objectives

The overall aim of the research was to evaluate the impact of the NSNP and the TBF feeding programmes on the learners in primary and combined schools in the Lady Frere district of the Eastern Cape.

Primary objectives related to this aim were to:

- Evaluate the impact of the programmes on learner anthropometric measurements (weight-for-age, height-for-age and BMI-for-age).
- Assess programme impact on school attendance.
- Assess programme impact on school performance.

Secondary objectives related to this aim were to:

- Determine whether there were school development benefits associated with the programmes.
- Determine whether there were broader social benefits associated with the programmes.
- Identify key areas of challenge related to the programmes in order to recommend areas for improvement.

It should be noted that despite the reach of the NSNP the programme has never been evaluated for impact. The partnership with TBF has allowed this to happen for the first time.



## 2. A review of the literature: childhood nutrition and school feeding programmes

Food insecurity is of major global concern, which is why goal number two of the Sustainable Development Goals aims to end hunger, achieve food security and improve nutrition, and promote sustainable agriculture (United Nations, 2015). According to the Food and Agriculture Organization, “food

security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (2005:5; Labradarios *et al.*, 2011).

### 2.1. Nutritional deficits in children

Africa is home to 23 million children who are persistently hungry as they live in food insecure households (World Food Programme, 2011). Poor nutrition has both short and long-term impacts. In the short-term children without adequate nutritional intake lack energy and concentration and therefore their ability to play (particularly important for younger children) and work at school is compromised. Children who do not eat regularly also have difficulties with the recall of new information, and verbal fluency (Bennett, 2003 in Tomlinson 2007). Vaisman, Voet, Akivis and Vakil (1996) reveal that shortly after a meal children performed significantly better on various cognitive activities. Childhood nutrition therefore plays an important role in helping children learn. In addition, in times of environmental or socio-economic crisis, children often withdraw from school to contribute to household income, and a school meal provides an incentive for these children to attend school in difficult times (Singh *et al.*, 2013; Tomlinson, 2007).

As children who are not adequately nourished do not reach their developmental milestones at the right age and their achievements remain behind their age groups, longer term impacts of poor childhood nutrition include a lack of attainment of intellectual and physical potential which leads to restricted livelihood and educational opportunities. Childhood nutrition has been shown to impact physical and intellectual human capital, which in the longer term is associated with increased earnings as adults, particularly in countries which depend on industry which is labour intensive (Victoria, Adair, Fall, Hallal, Martorell, Richter, Sachdev, 2008).

There are complex associations between stunting as an outcome of poor nutrition and obesity. In 1996 Popkins, Richards and Monteiro noted that there was a strong association between stunting and overweight and obesity in the same children across four countries. While in the South African context evidence of an association between stunting and childhood obesity is mixed (refs as below), (Iverson *et al.*, 2011; Jinabhai, Taylor & Sullivan, 2003; Mukkudem-Petersen & Kruger, 2004), poor nutrition in childhood has been linked to an increase in the risk of degenerative diseases in later life like diabetes, cardiovascular disease and poor weight management (Iverson *et al.*, 2011: 72; O’Neil, Byrd-Bredbenner, Hayes, Klinger & Stephenson-Martin, 2014). This may be because childhood stunting is associated with both adolescent and adult overweight and obesity, which in turn is associated with metabolic



syndrome and Type II diabetes (Kimani-Murage *et al.*, 2010). Furthermore, malnourished adult women are likely to have low birth weight children who are vulnerable to slower achievement of developmental milestones. Studies have shown that undernourished girls tend to become short adults, and thus are more likely to have small children (Victoria *et al.*, 2008). Poor nutrition in childhood can therefore contribute to the intergenerational cycle of poverty and deprivation.

On the other side of the nutrition coin is the challenge of obesity, which is fast becoming a worldwide burden affecting rich and poor populations (The Maternal & Child Nutrition Study Group (MCNSG), 2013). In the developing world obesity is increasing due to low quality diets high in fat, starch, sugar, salt and low in nutritional benefits. A Discovery Vitality report titled “Healthy active kids report card 2014” shows that, according to the WHO, 23% of girls and



10% of boys aged 10-14 years are overweight or obese which totals approximately 44 million children globally. As many as 10 million of these children are in Africa. Staple food in most parts of the world consists of starch, such as maize meal in South Africa. An overconsumption of starch in relation to other food types is a survival strategy in income constrained environments, but it contributes to a rise in overweight populations, particularly when it is not sufficiently supplemented by high-nutrient vegetables and fruit (Temple & Steyn, 2011). A study by Jacobs (2009) shows that a low quality food basket, high in salt, fats and refined carbohydrates is cheaper than a nutritious basket of goods. This means that people living in poor contexts are likely to be consuming the foods that drive obesity, which in turn contribute to increased risk for the non-communicable diseases discussed above. People who are overweight or obese run much higher risks of non-communicable diseases. Obese and overweight children run higher risks of being overweight and obese adults, with increased risk for the concomitant diseases of obesity such as cardiovascular diseases, mainly heart disease and stroke; diabetes; musculoskeletal disorders, especially osteoarthritis; and cancers of the endometrium, breast and colon (WHO, 2012: 1). Given the above discussion on stunting and its relationship to obesity and non-communicable diseases, what emerges is a complex interaction between undernutrition in childhood and low quality nutrition driving obesity and in turn vulnerability to non-communicable diseases.

A major complexity in low and middle income contexts is the changing nature of people’s food security environment and nutritional habits over their life course. Individuals can often

grow up in rapidly changing socio-economic environments which can result in shifts from poor early life nutrition, causing stunting, and then a later diet that contributes to obesity and chronic disease risk (often related to urbanisation or improved economic circumstances) (Adair, 2013). Researchers say that in such contexts more longitudinal studies are important (Adair, 2013).

What is clear is that we have a growing obesity problem in South Africa and this is in line with the now established trend of multiple nutrition burdens globally: of all countries which have nutrition data, 45% have both undernutrition and overweight problems (IFPRI, 2014). The double burden of malnutrition has implications for the national disease picture in South Africa. As shown in other parts of the world with both undernutrition and overweight problems, this combination creates, on top of conditions of undernutrition such as kwashiorkor and rickets, a second layer of diseases that until quite recently was mainly confined to the developed world: diabetes, hypertension, and cardio-vascular problems such as strokes being the most common (Haddad, Cameron, & Barnett, 2014). South Africa is already feeling the costs of this double burden.

Worryingly, global evidence on the rise of obesity and its related health problems in the developing world show that “people of lower social and economic positions fare far worse [than those with better standards of living]. Vulnerable and socially disadvantaged people get sicker and die sooner as a result of NCDs [non-communicable diseases] than people of higher social positions” (WHO, 2014:2). In addition, “the costs to health-care systems from NCDs are high and projected to increase. Significant costs to individuals, families, businesses, governments and health systems add up to major macroeconomic impacts... Economic analysis suggests that each 10% rise in NCDs is associated with 0.5% lower rates of annual economic growth” (WHO, 2014:3).

South African data does indicate, though, that obesity levels are not completely static for individuals, even though we know the national rate is on the rise. Ardington and Gasealahwe (2012) note that there are considerable transitions into and out of obesity when comparing wave 1 and wave 2 of the National Income Dynamics datasets (a period of approximately two years). For example, over half of the men who were classified as obese in wave 1, were no longer obese two years later. This might be due to increased height during normal growth (transitioning individuals were mainly younger), but also could indicate the possibilities of movement out of obesity for young people. There is unfortunately very limited data on transitions into and out of obesity for children.

Related to overconsumption of starch or food low in nutritional value is a phenomenon known as ‘Hidden Hunger’, or micronutrient deficiency. This term is used to describe children who seem to be well fed or do not experience severe hunger, but are nonetheless not receiving adequate intake of the right micronutrients for optimal growth and development. There are distinctive clinical features of hidden hunger that can present in normal-weight, overweight and obese children (Vorster, 2010). A common micronutrient deficiency that is often found in children from poor backgrounds is iron - which can lead to anaemia; a well-known cause of poor cognitive functioning (Richter *et al.*, 1997: 93).



As “nutrition is foundational to both individual and national development”, under and over nutrition in children causes poor child development which ultimately affects the globe’s human capital formation (MCNSG, 2013: 2, Broca & Stamoulis, 2003; Jomaa *et al.*, 2011). Globally obesity amongst children and adolescents is increasing alarmingly,

and data suggests this trajectory is set to continue in the medium-term (Ng *et al.*, 2014) with the concomitant growth in health risks for individuals and public health costs for states. Overall, therefore, poor nutrition leads to poorer social development outcomes for individuals, their families, and their communities.

## 2.2. Determining poor nutrition

As discussed above, poor nutrition is not simply the result of lack of sufficient food, but is also related to intake of poor quality foods that are nutritionally deficient. For this reason a range of indicators should be used to assess poor nutrition. Definitions of key indicators of poor nutrition are provided below.

**Underweight:** Children who experience medium to long-term under-nutrition weigh too little for their age and height. Underweight children and severely underweight children are at the greatest risk of mortality. Weight-for-age is used to assess whether children are underweight. Children who are two to three standard deviations below the median weight-for-age are classified as underweight and those who are more than three standard deviations below the median are severely underweight. Weight-for-age only applies to children up to the age of 10 years, after which puberty skews weight-for-age results.

**Wasting:** Acute under-nutrition in children is indicated by wasting. Wasting can be the result of insufficient nutrient intake or if a child is experiencing some form of illness like diarrhoea. It is also common in times of famine or other food security crises. Impaired immune system function is a common symptom of wasting, which can lead to increased susceptibility to illness, infectious disease and ultimately increased risk for death. South African children are generally not at risk for wasting except in cases of serious illness. Wasting is measured by the BMI-for-age indicator. Children who are two to three standard deviations below the median

BMI for their age are classified as wasted and those who are three or more standard deviations below are severely wasted (WHO, 2007).

**Stunting:** When a child has been subjected to sustained dietary inadequacy, stunting can result. Stunting usually occurs in situations of economic deprivation and exposes children to higher rates of recurrent infection, illness and death. In addition, children who are stunted often present delayed mental development, poor school performance and reduced intellectual capacity. Stunting is assessed using the height-for-age indicator. Children who are two to three standard deviations below the median height for their age are classified as stunted and those who are three or more standard deviations below are classified as severely stunted (WHO, 2007).

**Overweight or obese:** A child who weighs too much for his or her age and height is classified as either overweight or obese. Being overweight or obese is measured by Body Mass Index (BMI)-for-age. Children who are between one and two standard deviations above the median BMI-for-age are classified as overweight and those who are two or more standard deviations above the median are classified as obese (WHO, 2007). BMI-for-age has been critiqued for not being an accurate measure of obesity, especially for children who have reached puberty, as other anthropometric features such as muscular-skeletal make-up are not taken into account. For this reason BMI-for-age measurements can be complemented with body fat percentage indices and the maturity index.

## 2.3. Nutritional deficits in South African children

Data on the nutritional status of children in South Africa reveals the combined problems of underweight and levels of obesity. The South African National Health and Nutrition Examination Survey (SANHANES-1) reported that in 2012, for children aged 2 – 14 years, “the prevalence of stunting was 15.4%, of severe stunting, 3.8%, of wasting and severe wasting 2.9% and 0.8% respectively, and of underweight and severe underweight 5.8% and 1.1%” (Shisana *et al.*, 2014:207). The prevalence of children being overweight or obese was the highest at 28.10 %.

Four national studies have been conducted since democratisation which highlights the nutritional status of children in South Africa: the nationwide South African Vitamin A Consultative Group (SAVACG) survey which was conducted in 1994; the 1999 National Food Consumption Survey (NFC); the National Food Consumption Survey-Fortification Baseline (NFCS-FB) in 2005; and the SANHANES -1 of

2012. Findings across all four studies spanning the last 20 years reveal:

- There is disparity between children living in rural and urban areas in terms of nutrient deficiency, with children in rural areas being more deprived than those in urban areas.
- Rates of stunted and underweight children have decreased.
- Prevalence of children being overweight or obese is of concern.

Under-nutrition and stunting in children was found to be most persistent in rural farming, tribal and urban informal areas (Shisana *et al.*, 2014). According to Ruel and Alderman (2013), South Africa has unacceptably high rates of stunting based on the country’s relatively high income level. In addition, the coexistence of under-nutrition and obesity is also identified as being a particular problem in South Africa,

affecting especially the black population and those living in poor urban areas (Iverson *et al.*, 2011: 74). Stunted children experience obesity at twice the rate of children who are of the appropriate height for their age. (Iverson *et al.*, 2011:73). This phenomenon points to the dual challenge of managing under-nutrition and obesity in the same contexts. The “Double burden of disease” (Vorster, 2010: 2) refers to this dual challenge in which governments must respond to managing diseases and outcomes related both to under-nutrition and obesity.

According to Bradshaw *et al.* (2006 in Vorster, 2010: 2), “South Africa has high prevalence of both infectious diseases related to under-nutrition and of non-communicable diseases (NCDs) related to obesity and over-nutrition”. In South Africa obesity related diseases began to emerge before disease associated with under-nutrition was eradicated. This phenomenon is in part caused by “foetal malnutrition and low quality of staple-food diets (sufficient energy but not enough micronutrients) in poor households” (Vorster, 2010:2). It is well documented that micronutrient deficiency in poor South African households is caused by the shift from traditional diets rich in whole grains to more ‘Western’ diets characterised by starch and refined sugars (Iverson *et al.*, 2011).

A study published in 2010 revealed that a high percentage of the rural population source their food from large supermarket chains that are predominantly stocked with processed foods (Temple & Steyn, 2011: 507). This study also revealed that in order for an average family of five in the Western Cape to purchase healthier foods, they would need to spend an extra R1090 per month. This amount is simply not affordable for most families. In this context it becomes necessary not only for nutrition programmes to provide learners with a meal, but to provide nutrient rich meals.

Micronutrient deficiency in South African children is directly linked to the quality of food made available to them. The growth patterns of a child are disrupted when the value and amount of food consumed is poor (Oosthuizen, Oldewage-Theron & Napier, 2011). The average South African consumes a predominantly cereal based diet with limited amounts of animal protein and Vitamin A enriched fruits and vegetables. Under-nutrition and over-nutrition are also a consequence of diets that lack diversity (Labadarios, Steyn & Maunder, 2000; Faber, Laurie, Maduna, Magudulela & Muehlhoff, 2013; Labadarios, Steyn & Nel, 2011; Temple & Steyn, 2011). As

## 2.4. The role of school feeding

In 2013 it was estimated that the global annual investment in school feeding was between US\$47 billion and US\$75 billion – most of which is from government budgets. This investment makes school feeding the biggest social safety net worldwide (WFP, 2013: 14). School feeding has a long history in the developed world. In Europe school feeding initiatives extend as far back as the 1890s (Gunderson, 1971). In the developing world India has what is regarded as the biggest and most successful school feeding programme worldwide. By 2003 most states in India were providing children with a cooked meal daily. Known as the Midday Meal Scheme (MDMS), this programme had managed to feed 120 million school children by 2006 (Singh *et al.*, 2013).



such the nutrient density of the diet consumed by South African children does not meet their nutrient requirements. According to Shisana *et al.* (2014:240), fortification programmes have been introduced to try and curb micronutrient deficiency; however these programmes have not significantly improved dietary diversity or macronutrient intake. Hence, stunting continues to affect a proportion of South African children.

The policy implications of these four studies highlight the need for interventions aimed at promoting nutrient diversity to address the dual problem of under-nutrition and obesity (Ruel & Alderman, 2013; MCNSG, 2013; Shisana *et al.*, 2014:211-213). In addition, Labadarios *et al.* (2011: 3) suggest that no national survey covering all the dimensions of food insecurity in South Africa exists. Such a study could aid in dealing with this new landscape of underweight and overweight children.

Within the Southern Africa Development Community (SADC), there are a number of school feeding programmes, often funded in part or fully by international donors. For example, Malawi has what is regarded as an effective school feeding programme (Mueller, Downen, Richardson, Chima, & Vallet, 2014) called Food for Education (FFE). It aims to reduce short-term hunger, improve school enrolment, attendance, and learning by providing school children with an in-school snack or meal daily (Tomlinson, 2007).

School meals have various positive effects. Aside from reducing short-term hunger, one of the key objectives is to incentivise children to go to school. One daily meal has the





potential to help children perform better academically as well as complete the primary phase of school (Mueller *et al.*, 2014).

## 2.5. School feeding in South Africa

The NSNP has potentially highlighted public awareness about the importance of nutrition in a growing child's life (Budlender & Lund, 2008). In addition, there are anecdotal accounts of improved school attendance and classroom attendance thanks to the NSNP (Iverson *et al.*, 2011: 75). The NSNP has also been said to play a role in ensuring gender equality in access to education. It has been argued that school nutrition programmes encourage adolescent girls to remain in school, delay first pregnancy, address HIV risk factors and improve adolescent girls' nutrition knowledge and micronutrient status to prepare them for motherhood (Ruel & Alderman, 2013). Adolescence has been identified as the second most important growth phase after early childhood. Therefore including secondary schools in the programme has the potential to be more effective and long lasting – extending into adulthood – preventing adult obesity and ensuring healthier offspring (Al-Almaie, 2005 in Shisana *et al.*, 2014: 239).

There is much international and local debate surrounding the efficacy of school feeding in terms of implementation, as well as the impact such programmes have on academic performance and nutritional outcomes (Singh *et al.*, 2013; Richter *et al.*, 1997; Adelman *et al.*, 2008; Labadarios *et al.*, 2011; Budlender & Lund, 2008). In a systematic review of school feeding and its impact on obesity in particular, Jaime and Lock (2008) comment that few large scale studies have been evaluated globally, and, in any event, evaluations are focused on the improvement of the food environment and dietary intake in schools rather than an evaluation of their impact on BMI.

In the spirit of programme evaluation it would be pertinent to assess whether or not initiatives like the National School Nutrition Programme do in fact impact the health and well-being of children. Budlender and Lund (2008:13) argue that the NSNP "has not yet been adequately evaluated in terms of the effects on nutritional status, on schooling, or on the

School meals may well be one of the most potent school-based interventions available to policymakers in developing countries, particularly when mitigating the nutritional effects of environmental shocks or when children need to "catch up". Singh *et al.* (2013: 15) point out that "growth deficits persist into early adulthood if children remain in the same poor conditions, however there is definitely potential for catch-up in height-for-age if circumstances improve for example, through nutritional supplementation or migration when children are still young" (Tanner, 1981; Coly *et al.*, 2006; Golden, 1994 in Singh *et al.*, 2013).

School feeding is largely uncontroversial and relatively simple to implement, and therefore it is a popular form of social security or 'safety net' acting as an income transfer for the household as a whole, helping families to educate their children, and protecting their food security in times of crisis. Across the developing world school meals help mitigate nutrient deficiencies which directly impact the health, well-being and future productivity of school-going children. School meals also have the ability to target the most vulnerable members of the population such as orphans and children from single parent or grandparent headed households (VVFP, 2013).

creation of jobs for poorer women". Despite this call, no such study using rigorous effectiveness assessments would appear to exist (Alderman & Ruel, 2013; Richter *et al.*, 1997; Singh *et al.*, 2013). This lacuna is in part due to challenges in assessing the effects of such programmes. Studies conducted in developing countries have struggled to identify the effects of school feeding programmes in relation to other factors that are socio-economic, cultural or educational in nature. Evaluators in developing countries also have to be aware of programme challenges such as inadequate administration as this factor can affect the reliability of findings (Richter *et al.*, 1997).

Despite the above challenges the NSNP has been the subject of inquiry for some time with six comprehensive studies having been conducted. It must be noted that all six of those identified are primarily concerned with NSNP implementation and policy and not on the impact it has had on the nutritional status and academic performance of South African school children. Each of the studies is described separately as follows:

*An Evaluation of South Africa's Primary School Nutrition Programme (1997)*: The purpose of the evaluation was to provide a comprehensive but rapid assessment of the main problems, weaknesses and strengths of the then named Primary School Nutrition Programme (PSNP) policy, and its management and implementation. The aim was to make recommendations to the Department of Health on how to improve the effectiveness and efficiency of the PSNP, and how the PSNP can best become part of the Department of Health's Integrated Nutrition Programme (INP). The evaluation was expected to focus on improving performance and effectiveness for the future, rather than on describing the impact of the PSNP in the past. It concluded that malnutrition amongst school children was prevalent, school feeding was logistically quite complicated and seen as expensive, and inadequate management was rife.

*External evaluation of certain aspects of primary school feeding (2001)*: This assessment was based on an evaluation of the government's programme in principle and not on the actual planning and implementation of the programme. It concluded that targeting was being 'diluted' because provinces were politically motivated to target as many schools as possible and therefore spread resources thinly. The end result was an 'under provision of meals in quantity and quality'. It was recommended that management of the programme be transferred to the Department of Education from the Department of Health.

*Food for Thought: A Review of the National School Nutrition Programme (2005)*: This review looked specifically at how the National School Nutrition Programme is targeted at schools and learners, with a specific focus on the budget for the programme, an overview of the targeting of the programme and an evaluation of the targeting mechanism. It concluded that the NSNP was regressive because 4.3 million children were being targeted and this number was in decline as the Department of Education had no intention of increasing the number of children benefitting from the scheme. Administrative and management problems continued to be a hindrance to effective implementation as well as the fact the no comprehensive nutritional surveys had been conducted detailing the nutritional status of South African children. This study also reported that one daily meal at school on its own was not enough to meet the daily nutritional needs of school-going children.

*The South African School Nutrition Programme: Formative Evaluation Report (2006)*: This study was conducted as a precursor to the much larger evaluation study that followed in 2013. This evaluation was intended to guide the planning process of the much larger, national evaluation by identifying key themes and dynamics at the local level. It stated that while the NSNP impacted positively on school-going children's lives, there were several areas that needed work. It made specific mention of the poor food quality being distributed to Eastern Cape schools in particular. Intermittent delivery of food was also noted in the Eastern Cape Province. It also recommended that the NSNP "address local economic development more systematically" (Clacherty & Associates, 2006: 15).

*Report on the Evaluation of the National School Nutrition Programme (NSNP) (2008)*: The overall purpose of the study was to evaluate the implementation of the National School Nutrition Programme provided by the Departments of Education in the Eastern Cape and Limpopo provinces. The

specific objectives were to: evaluate the effectiveness of the NSNP; identify and highlight successes of the programme, as well as problematic areas that adversely influence the optimal implementation of the programme; and provide recommendations in terms of the effective implementation of the programme. They concluded that schools in both provinces seemed to not have adequate infrastructure and facilities to implement the NSNP effectively and successfully. There were also concerns about the capacity of the local food suppliers and again several cases of non-delivery, delays in delivery and delivery of wrong or poor quality food were reported in both provinces (The Public Service Commission, 2008: xi-xiii).

*Case Study of the National School Nutrition Programme in South Africa (2013)*: This study represents the most recent operational review of the current school feeding programme in South Africa with a focus on the design and implementation of the programme, policy framework, financial arrangements and local procurement, and community participation. It concluded that first and foremost all Quintile 1 – 3 schools should be provided with adequate infrastructure such as kitchens and storage space. It also noted that local subsistence farming continued to be sidelined in the procurement of food. Due to the high budget requirements of the NSNP political support for the programme is fragile which is of concern if the programme is to remain sustainable; partnering with the private sector was one option for ensuring long-term feasibility.

*Evaluation of the Tiger Brands Foundation's Pilot In-School Breakfast Feeding Programme (2013)*: The purpose of the evaluation was to determine whether the Tiger Brands Foundation's in-school breakfast feeding programme had any effect on the nutritional status of learners, their performance at school and their attendance – three outcomes of school feeding programmes identified by studies across the globe. It also reviewed the secondary 'spin-offs' of the in-school breakfast feeding programme and the challenges associated with the programme by making recommendations based on the outcomes of and learning from the programme. The overall finding of this study was that the TBF has introduced a model of school nutrition into vulnerable schools in a way that respects the school staff, that intends to build capacity, and that is connected to rather than contrary to government programmes. There were very positive and statistically significant nutritional changes over the period of the pilot programme, most dramatically in the reduction in numbers of overweight and stunted children (Hochfeld *et al.*, 2013:34). This evaluation has direct implications for the NSNP due to the fact that the study schools were all also in receipt of the NSNP.

## 2.6. Conclusion

What is clear from the above is that despite South Africa's middle income status, under-nutrition remains a key challenge. In addition, the country needs to manage concerns related to obesity and its concomitant diseases. The implication is that while interventions such as the NSNP and TBF are vital for protecting children from under-nutrition and promoting child well-being and positive development, they must also manage the challenges of obesity, ensuring adequate intake of micronutrients and nutrient dense foods.

It is clear that in-school feeding programmes are critical components of an overall strategy to reduce the effects of poverty and inequality. However, such programmes have never been adequately assessed for the *impact* they have on the outcomes they intend to shift, including anthropometry, learner attendance and learner performance. This study aimed at addressing this gap by focusing on the impact of these interventions in one small area.



### 3. Research design and methodology

The study employed a mixed methods approach. The core component of the study took the form of a comparative research design (Langston, 2005) aimed at assessing the relative impacts of the programmes. In addition, a pre- and post-test was introduced because the control schools were due to start receiving the NSNP during the course of the study. It was therefore pertinent to assess whether these schools experienced any changes after receiving the intervention. This introduced a quasi-experimental component to the design. The comparative design was complemented by a qualitative component, the aim of which was to explore perceptions of the contribution of the programmes and the challenges that schools faced with the programmes.

A comparative research design is operationalised by selecting at least two communities that demonstrably vary with regard to some independent variable of interest to the researcher (Campbell and Stanley, 1963). This particular study involved two comparison groups and a “control” group with the independent variables being the presence or absence of the NSNP programme, and the presence or absence of the TBF in-school breakfast feeding programme.

Comparison group 1 consisted of Quintile 1 – 3 schools in receipt of the NSNP lunch but not in receipt of the TBF breakfast (NSNP only schools). Comparison group 2 consisted of Quintile 1 – 3 schools in receipt of both the TBF breakfast and the NSNP lunch (TBF+NSNP schools). While there were no Quintile 1 – 3 schools that did *not* receive the NSNP lunch, some schools in the province had been re-quantiled taking into account their level of disadvantage. Of these re-quantiled schools in the Eastern Cape, two schools in Qumbu district were fairly similar to the Lady Frere schools under study in relation to demographics and location in a rural area. These re-quantiled schools served as a “control” group against which to compare the comparison groups. Other re-quantiled schools were either in urban areas or secondary schools and therefore did not qualify as a control group for this study.

In effect the inclusion of all three types of schools allowed for the following comparisons:

- TBF+NSNP schools could be compared to NSNP-only schools to assess whether the addition of a breakfast programme had any effect.
- NSNP-only schools could be compared to the control schools to assess whether the inclusion of a lunch meal had any effect.

In addition, it should be noted that a natural pre- and post-test occurred in the course of the study as the re-quantiled schools began receiving the NSNP lunch in the second school term of 2014, which was after the first measurement and a few months before the second measurement. These two schools had not been a part of the NSNP or the TBF programme until April 2014 when they started receiving NSNP meals. This factor allowed for comparison between learners that had benefited from the feeding programmes for an extended period and those that had not, and *also* allowed us to assess changes *after* the introduction of a nutritional programme in the control schools. Assessment of nutritional impact involved comparing anthropometric data within and across the three groups which had different degrees of access to school meals. Although the introduction of the NSNP in control schools allowed for a pre- and post-comparison, it did compromise the control aspect of the experiment since there were no comparable schools not receiving the NSNP over the course of the project. This is a research limitation inherent in the nature of the NSNP which does not exclude any qualifying schools from receiving the programme.

In order to assess the impact of the NSNP and TBF feeding programmes reliably, standard anthropometric measurements were taken from the comparison and control schools. The measurements were conducted at two points in time. In addition, school records of performance and attendance were collected, and a nutritional survey was conducted with 14 year old learners. Finally, qualitative data was collected during interviews and observations at selected schools. The use of various methods allowed for triangulation of primary objectives. In addition, the qualitative part of the study also helped to determine whether there were social and school development benefits associated with the feeding programmes and these were used to identify key challenges.

#### 3.1. Data collection

Data for the quasi-experiment was collected through:

- Anthropometric measurements
- School attendance records
- School performance records
- A Nutritional Questionnaire

Data for the qualitative component was collected through observation, key informant interviews, interviews with school stakeholders, and focus groups with learners.

#### Anthropometric Measurements

A range of anthropometric measurements were taken of learners. These included:

- Weight
- Standing height (stature)
- Sitting height
- Calf skinfold
- Triceps skinfold

The stature and weight measurements allowed for an analysis of weight-for-age, height-for-age and BMI-for-age according to the WHO Child Growth Standards (WHO, 2007). In addition, we were able to assess body fat percentage using the calf and triceps skinfold measurements and a maturity age index using the stature and sitting height as well as weight measurements. The body fat percentage and maturity age index provided a more comprehensive analysis of the anthropometric data, particularly as it pertained to obesity.

Phase 1 data collection took place in April 2014 while Phase 2 took place from the end of September to early October 2014. A fieldwork team from the Department of Human Movement Science, University of Fort Hare was deployed for these two waves of data collection. All the fieldworkers were accredited Level 1 International Society for the Advancement of Kinanthropometry (ISAK) anthropometrists. All anthropometric measurements were taken according to the International Standards for Anthropometric Assessments (Stewart *et al.*, 2011). The fieldworkers worked in pairs, with one fieldworker taking the measurements while the second one recorded the data and double checked the measurement. The learners wore minimal clothing without shoes and were weighed using portable electronic scales. A stadiometer, anthropometric tape measure, and skinfold callipers were used to measure stature and the skinfold respectively. The process of measurement was carried out in a classroom with girls and boys measured separately. Female research participants were measured by a fieldworker of the same gender for dignity purposes.

#### Nutritional Questionnaire

Previous research has found that an inverse relationship exists between body mass index (BMI) and the consumption of fruits and vegetables. For example, Goss and Grubb (2005) reported that respondents with the lowest mean BMI ate fruits and vegetables more often than respondents who had the highest mean BMI. However, a large majority of South African households consume a pre-dominantly cereal-based diet with a limited intake of fruits and vegetables. Vitamin A rich vegetables and fruits are the most neglected so it was important to assess the dietary intake of the learners from poorly resourced communities, where fruit and vegetable intake is bound to be even lower (Faber, Laurie, Van Jaarsveld, 2014). The nutritional questionnaire also allowed us to assess the sugar and “junk food” intake of learners to better understand the ways in which household food patterns influenced some of the outcomes.

A nutritional questionnaire (see APPENDIX 1: Research instruments) was administered to 208 sampled learners during Phase 1 of data collection. The most commonly used instruments to estimate fruit and vegetable consumption are the food frequency questionnaire and the 24-hour dietary recall (Agudo, 2005). In this study, the 24-hour dietary recall was used where Grade 6s and 7s were required to report food consumed within the 24-hour period prior to the questionnaire being administered. It was considered the most appropriate method to use for primary school children as it requires short-term recall. The main limitation with this method is that the 24-hour recall does not provide reliable estimates of the usual food intake and it also does not provide day-to-day variations (Baranowski & Domel, 1994). However, it provides preliminary indicative data on the nature of children’s diets beyond the school feeding programmes.

The nutritional questionnaire for this study was developed based on guidelines drawn from Faber *et al.* (2014). Advice was also sought from nutritional experts, Dr. Anniza de Villiers (South African Medical Research Council) and Carina Muller (Department of Basic Education).

#### School attendance and performance records

School attendance and school performance records for measured learners were collected between December 2014 and March 2015, in the form of average grades for Terms 1 and 4 of 2014 and number of days absent from school for the same Terms. The same data was also collected for 2013 from control schools in order to assess the average improvement in performance without any intervention.

To facilitate the process, school principals were provided with a memory stick which had an excel spreadsheet and Word document with the names of sampled learners from their school, for them to fill in the end-of-term marks and the number of days absent from school. They were also provided with a hardcopy of the same document in case they had no access to working computers or they preferred writing down the required information and then faxing the data. These items were distributed to the principals at a CSDA hosted lunch; hosted to thank them for their participation.

#### Qualitative research

Qualitative research was carried out during Phase 2 of the anthropometric data collection. The aim of the qualitative component was to ascertain what key stakeholders thought and felt about the feeding programmes. Although the main aim was to address the secondary objectives in relation to social and school benefits, opportunities created and challenges experienced, it also covered their perceptions in relation to the primary objectives of nutrition, school attendance and performance. In-depth interviews were held with school principals, educators and food handlers. A total of 34 interviews were carried out and each interview lasted between 30 minutes to one hour. Interview questions sought to find out about the general school environment, operational issues, food preferences and how the feeding programmes impacted upon the learners and the community from their perspective as insiders. Key informant Interviews were also carried out with NSNP and TBF officials eliciting information regarding their experiences as providers and facilitators of the feeding programmes. Questions asked centered around the purpose, objectives, functionality and impact of the TBF In-school breakfast feeding programme and the NSNP lunch and how they managed the public-private partnership.

Focus group discussions were held with Grade 6 learners and each focus group lasted for approximately 30 minutes to avoid taking up too much class time. Learners were asked about the type of food they received under the feeding programme, if it was enough, if their lives had changed compared to before the implementation of the programme, how it impacted upon their nutrition outside school, and their general well-being. A list of interview questions and the focus group guide is found in APPENDIX 1: Research instruments.



### 3.2. Description of research site

This study took place in the Lady Frere and Qumbu districts in the Eastern Cape Province, which is one of the most rural and poorest provinces of South Africa. Locals here primarily speak isiXhosa as a home language.

The people living in the Lady Frere and Qumbu districts are mostly poor. Village and farm homes are very modest, ranging from small brick homes, to mud huts, to many shacks and dilapidated structures. Educators and principals reported that children were looked after mainly by grandmothers and came from very deprived circumstances. One school reported that none of their learners was cared for by a biological parent; all caregivers were grandmothers and in one case an elderly aunt. Principals were well aware of the difficulties children faced at home, especially in the very small communities. Interestingly, in the smaller communities it was reported that learners seldom actually went hungry, because if there was no food in their own home it was acceptable practice to go to a neighbour to eat. This practice was not necessarily applicable in the larger villages and towns.

Some of the schools are relatively near to Queenstown, the largest town in the district, or Lady Frere, a small town; thus the amenities, infrastructure and services of an urban centre are not too difficult to access. This includes supermarkets to buy in bulk for the NSNP and banks to manage NSNP finances. However, many of the schools are situated in remote locations accessed only via long drives over very poor roads. Larger villages such as Ithuthe and Qumbu are poor and have few services and amenities. The schools located in smaller villages also draw learners from the surrounding areas, which means many children travel long distances to school. Some schools are especially remote and are not near any community at all; children coming to these schools live on farms or isolated settlements and are either served by school transport or walk very long distances to attend.

Roads and pathways in the Lady Frere district are poor and often crossed by streams and rivers. Therefore in wet weather some roads are impassable and schools are regularly closed in order to ensure children are able to get home safely. This extract from fieldworker notes and the photo of a school access road are illustrative:



Other factors can contribute to the poor quality of infrastructure, for example, some schools were located in water catchment areas, making them very wet and muddy in the rain, or on hillsides, making them very windy with uneven and steep playing areas for the children.

School infrastructure varied in quality. Some schools had recently had new buildings constructed, and these were in good condition and school staff were very proud of the improvements. Other schools had to make do with mud, tin, or prefabricated classrooms, often in poor condition. This description is drawn from fieldworker notes, and the accompanying photo shows some of the poor buildings:

*School Y was a very small school and the poorest of all schools Team A visited. There were insufficient classrooms and the kitchen was based in a tin shack with gaps and holes that let in the wind and rain. Grades 1-3 were also being taught in an inadequate tin shack classroom. Dogs and sheep were roaming about on the premises although they had just built a new gate to keep livestock out in order to grow a vegetable garden. All children were on the Child Support Grant, walked to school and there were many rivers in the area.*



*School X is located in a small village but draws its 150 children from the surrounding farms as well. On the day we visited it had been raining hard and the principal was closing the school at 11:30. He was concerned about children's safety getting home as they would have to cross rising rivers. The buildings were old prefabs in poor condition, although the roof seemed intact. The classroom concrete floors were crumbling, the walls had holes, and there were not enough desks for all the learners. The grounds were muddy with huge puddles of water, and there were no playground facilities. The classrooms were untidy and littered with papers and desks and chairs were awry.*

All the schools used pit latrine toilet facilities, kept clean in most but not all cases. Some schools had electricity and also laptops and WiFi. However, theft of computer equipment and the consistent lack of internet reception undermined their usefulness.

Schools varied enormously in the cleanliness of the grounds. Some were untidy and littered, others were extremely well cared for despite the poor facilities. School gardens were mostly utilised, although we visited at the beginning of the growing season so not much vegetation could be seen in the gardens. The photograph on the right shows a school food garden at the start of the growing season.



### 3.3. Sampling

#### Selection of schools

In total there are approximately 5196 government secondary, combined and primary schools in the Eastern Cape, of which 158 are located in Lady Frere and a further 243 are in the Qumbu district. Twenty-seven of the Lady Frere schools are recipients of the Tiger Brands breakfast (TBF Annual Report, 2014). While some of these schools are located in the town of Lady Frere, many are sprawled across mountainous countryside with minimal infrastructure. Plumbing, electricity and well maintained roads are rare in this region of the Eastern Cape.

NSNP and TBF provided a list of all the schools at which their programmes are run in the Lady Frere and Qumbu education districts. The Eastern Cape Department of Basic Education assisted the research team to identify schools that were providing school breakfasts on their own initiatives, from the savings they have made on the NSNP budgets they are given. These schools were excluded from the sample as any effects seen would have confounded the results. Stratified random sampling was used to select schools for the study to ensure that there was adequate representation of schools at the 95% confidence level with a 5% margin of error. This sampling process resulted in 20% of schools from each group being selected.

Therefore 31 schools in comparison group 1, eight schools in comparison group 2, and two schools in the control group were selected. Between the two measurement points the number of comparison group 1 schools dropped marginally from 31 to 25 due to a range of reasons, including inaccessibility, lack of access on the part of the school, and school mergers. Details of the reasons for each school that dropped out of the study are provided in APPENDIX 2: Report on schools that dropped out of the study. Two potential control group schools were excluded due to the fact that they were high schools and did not therefore have learners that were of the age of interest for the study.

#### Selection of learners

Within each school, stratified sampling by grade and gender was used to determine which students would participate in the study. Learners in the control schools were over-sampled to account for the reduced number of schools. Learners were also over-sampled in Wave 1 to account for possible attrition by Wave 2. The sample for the total number of learners measured per group is shown in Table 2 below. Once data was cleaned the final sample was 1390. This sample provided a 2.57% margin of error at the 95% confidence level. However, there were fewer learners than anticipated in the control group. For the control group there was a 20% margin of error at the 95% confidence level.

Table 2: Number of sampled schools and learners

Group	No of schools	Required sample of learners	Sample at first measurement point	Sample at second measurement point	Final sample after data cleaning <sup>2</sup>
Comparison Group 1 (NSNP only)	31	505	705	595	570
Comparison Group 2 (TBF and NSNP)	8	518	575	572	541
Control Group	2	466	282	278	276
TOTAL	41	1489	1562	1445	1390

<sup>2</sup> Some participants were excluded due to inaccuracies in the date of birth data or when sex at wave 1 and wave 2 were inconsistent.





### Selection of nutritional questionnaire participants

Prior evidence suggests that younger learners' recall of nutritional intake is questionable (Livingstone, Robson, Wallace, 2004; Baranowski & Domel 1994). For this reason only the oldest learners in the sample (14 year olds) were asked to complete the nutritional intake questionnaire.

## 3.4. Data Analysis

### Anthropometric data

For this study, anthropometric data was analysed using the WHO Child Growth Standards. Weight-for-age, height-for-age and BMI-for-age were calculated using the WHO Stata macros developed to assess data against Child Growth Standards. The data was analysed first to understand the percentage of learners in each school type who fell within the normal weight, height and BMI-for-age ranges and to understand whether there were (a) any differences between the schools and (b) whether there was a change over the time period for the control schools, which started receiving the NSNP during the course of the study. For those learners who fell outside the normal ranges, further analysis was conducted to understand the extent of:

- Stunting – Between two and three standard deviations below the median range for height-for-age
- Severe stunting – More than three standard deviations below the median range for height-for-age
- Underweight – Between two and three standard deviations below the median weight-for-age
- Severely underweight – More than three standard deviations below the median weight-for-age
- Wasting – Between two and three standard deviations below the median BMI-for-age
- Severe wasting – More than three standard deviations below the median BMI-for-age
- Overweight – Between one and two standard deviations above the median BMI-for-age
- Obese – More than two standard deviations above the median BMI-for-age.

### Selection of interview and focus group participants

Purposive sampling was used to select the 10 schools to participate in the qualitative component of the study. Both control schools were selected. Of the comparison schools we aimed to select schools across the region to ensure geographical representation. Once schools were grouped convenience sampling was used. We selected schools that were most likely to be reachable without a 4X4 and where principals agreed to host us for the interviews and focus groups.

Within each school the principal, an educator, and a food handler were interviewed. In addition, one focus group was conducted with Grade 6 learners in each school. The number of learners per focus group ranged from eight to 15 learners.

In addition, key informant interviews were conducted with the following stakeholders:

- The Director of the Tiger Brands Foundation.
- Three Eastern Cape Department of Basic Education officials.
- The TBF provincial coordinator for the Eastern Cape.
- The Director of Feed, Uplift, Educate, Love (FUEL) – an organisation working with the Eastern Cape Department of Basic Education to monitor and enhance service delivery of the NSNP.

The use of universal BMI cut-off points is debatable as some researchers argue that lower cut-off points than recommended should be used for some groups such as the Asian population (Mascie-Taylor and Goto, 2007). BMI also does not take into account skeletal structure and the effects of puberty. For this reason body fat percentage was assessed using the calf and triceps skinfold measurements in order to assess whether the BMI-for-age results for obesity could be corroborated with the body fat percentage. Body fat percentages were analysed against body fat percentage charts for boys and girls (Lohman, 1987).

Furthermore, a maturity index was developed to analyse whether some of the obesity results could not rather be explained by early maturation and the effects of puberty. The maturity age was calculated by subtracting the age at peak height velocity (PHV) from the chronological age at the time of measurement (Thompson *et al.*, 2002). The PHV equation consisted of chronological age, leg length (stature minus sitting height), and weight and trunk length (sitting height) (Sherar *et al.*, 2005). Children with positive PHVs are regarded as early maturers. Their BMI-for-age may be higher than normal but this finding may be explained by their earlier maturation rather than obesity.

The statistical analysis package Stata 13 was used for quantitative analysis purposes. The analysis code developed by the WHO for the purposes of assessing anthropometric data against Child Growth Standards was used (WHO, 2007). The data was analysed for variance in the number of learners falling within the normal category for each indicator between school types as well as over time.



### Nutritional data

The questionnaire generated data on fruit and vegetable intake. Learners were asked if they had eaten fruits and/or vegetables the previous day, if so what they had eaten, the time of the day and how much for that day. As Faber *et al.* (2013) discuss, school children's preference for unhealthy food and the fact that poverty makes it a challenge to access healthier food which is generally more expensive, the questionnaire also assessed the intake of unhealthy foods such as sweets and chips among the learners. Questions asked also assessed if they had enough to eat and what they had for breakfast, lunch and supper. These questions allowed us to assess dietary diversity and the extent of Vitamin A consumed. The data was quantified as far as possible according to the Food and Nutrition Technical Assistance (FANTA) project guidelines for dietary diversity and Vitamin A scores for children (Swindale & Bilinsky, 2006) and according to the recommended five portions of fruit and vegetables a day. The following scores were developed to analyse the data:

- A sugar score – A count of the number of times the previous day the learner could have consumed sugar.
- A junk food score – A count of the number of times the previous day the learner ate either sweets or chips.
- A fruit and vegetable score – A count of the units of fruit and vegetables eaten the previous day. The fruit and vegetable score was assessed against the recommended five portions of fruit and vegetables a day.
- A dietary diversity score – The dietary diversity score was developed according to the Children's Dietary Diversity Score (CDDS) (Swindale & Bilinsky, 2006). The questionnaire did not include all possible food types recommended by Swindale and Bilinsky. Thus instead of a nine point dietary diversity score as recommended, a seven point score was developed.

- A Vitamin A score – A count of the number of times Vitamin A-rich foods were consumed the previous day. Vitamin A-rich foods included milk, carrots, spinach and pumpkin.

All of the scores were assessed by school type, by sex and finally for differences between learners who were overweight/obese and those who were not.

It should be noted that the sample of children that completed the questionnaire was small and therefore it is not possible to use the results to make claims that are statistically significant. The results are rather used to give an indication of dietary habits that include but go beyond the school nutrition programmes, and to point to possible reasons for some of the differences in anthropometric measurements.

### School performance and attendance data

School performance and attendance data was analysed using Stata 13. For the learner performance and attendance data, analysis of variance of the mean performance in each term as well as average days missed between schools and over time was conducted. Any observed differences between school types were assessed for statistical significance.

### Qualitative data

The qualitative data was analysed thematically according to a set of codes that was developed by three members of the research team who read through the transcriptions and developed themes. The team approach allowed for discussion of interpretation and the corroboration of emerging themes. Transcripts were then coded thematically using Atlas ti®. A process of constant comparison allowed us to identify common and differing themes across the school types.

## 3.5. Ethical considerations

The study was granted ethical clearance from the University of Johannesburg's Faculty of Humanities Ethics Committee, implying that the research was assessed for potential ethical risks to participants. Permission for the research was also formally secured from the national Department of Basic

Education as well as the Eastern Cape Department of Basic Education with support from the Lady Frere district.

Because the research involved children who were largely from resource poor backgrounds the following particular





ethical considerations were taken into account in addition to the standard ethical principles of voluntary participation, informed consent, confidentiality and beneficence:

- Schools were guaranteed that their participation or non-participation and the outcomes of the research would not in any way affect the continuation of the feeding programme at the school.
- For child participants, parental consent was sought with the assistance of the schools. Parental consent forms were provided in English and isiXhosa. Only learners who returned signed parental consent forms for their participation in the survey were allowed to participate in the measuring process and the focus groups.
- To maintain dignity female learners were only measured by fieldworkers of the same gender. Research was

conducted in a child-friendly manner and the identities of the participants have been protected.

- Adult participants were briefed on the nature and purpose of the research and were given an opportunity to ask questions and give informed consent to qualitative interviews. While confidentiality was promised to most of the research participants, respondents who hold formal public positions were made aware before they agreed to take part that complete confidentiality might not be possible as they could conceivably be identified by some of their comments.
- All participants were told that they could withdraw from the research at any time.
- Quality checks also took place where a senior team member visited the schools during the data collection process to check procedures, accuracy and ethical practices.

## 3.6. Limitations

A comparative design with random sampling allows for comparison while controlling for additional factors that influence outcomes such as food eaten at home, the distance walked to school, and type of fat distribution. Nevertheless, it is important that such additional factors are considered when interpreting results. This is particularly the case with learner performance and attendance data which is likely to be influenced far more by a range of factors such as school resources and teacher quality than by nutrition. As noted by Hochfeld *et al.* (2013), access to educational resources and teachers' competency are some of the factors that can be more directly linked to achievement in school. This phenomenon is known as "School Effects" (Raudenbush & Willms, 1995).

It must also be noted that there are limitations in the comparability of the control schools. Because the NSNP feeds children at all Quintile 1 – 3 schools there is no naturally existing control school that would be of the same socio-economic and geographic status but not receiving the NSNP. The closest possible comparison was the schools that had been re-quintiled from Quintile 4 to Quintile 3 schools. Their comparability is questionable for two reasons:

- 1) They are in a different geographic area to the comparison group schools. Although this area is also rural the effects of geographic location have not been taken into account in the analysis.
- 2) Because they have been reclassified they are likely to be slightly wealthier schools having originally been classified as Quintile 4 schools. These schools are not likely to be

as close a comparison for Quintile 1 schools as they are for Quintile 3 schools. The Tiger Brands Foundation endeavours to target the poorest schools in the areas in which it works.

Furthermore, the Tiger Brands Foundation schools are predominantly Quintile 1 schools while the NSNP schools represent schools across the three lower quintiles, meaning that comparisons between these two school types are also not ideal. The control group schools had just begun to participate in the NSNP when the first wave of data was collected. It was not possible to obtain a measurement prior to them receiving the NSNP as it would have been unethical to delay the roll-out of the programme for the purposes of research. Nevertheless, the programme was unlikely to have had an immediate effect and the change in results presented below should therefore still be reliable.

In this study the pre- and post-measurements were done within a fairly short period. Significant escalations in indicators like height-for-age and BMI may only be seen in the longer-term. The pre-test measurement of the study was due to be collected in February 2014, but due to delays in securing permission and access from departments, it was only possible to collect data in April 2014. The second data collection point, originally scheduled for September – October 2014, could not be changed as this would have interfered with examination time for learners. This meant that the time lapse between waves was very short, possibly too short to be able to see any significant differences over time.

## 3.7. Reliability and validity

The reliability of the anthropometric measurements was enhanced by ensuring that two people were present to take and check measurements. In addition, standardised, calibrated equipment was used throughout the data collection. As discussed above, those collecting the data were fully trained and qualified to use the equipment as intended. The second data measurement point in the two comparison groups also enhanced the reliability. We would not expect to see much change in the anthropometric outcomes over this period of time for comparison schools since they did not experience any major changes in their nutritional inputs over this time. The second data collection point for the comparison schools therefore serves to enhance the reliability of the measurements.

There are concerns about the learner performance data. In certain instances schools submitted performance data that was unrealistic – either where all learners had incredibly high marks or where all learners had the same or very similar marks. Where these were identified this pattern was reported to principals and they were asked to check and resubmit data. In certain instances data was corrected and



resubmitted. In certain instances schools claimed that the data was correct. Where this was the case, despite our concerns, we included the data.

## 3.8. Capacity building

Anthropometric measurements for this study were taken by a group of third year, honours and master's students from the Department of Human Movement Science, University of Fort Hare. This research provided these students with the opportunity to be involved in the practical aspects of a research project. They gained hands-on experience with regard to data collection, ensuring that all ethical guidelines were adhered to and also gained much valuable experience in organisational and planning aspects of field research projects.

For purposes of student learning beyond the scope of this study, sitting height, girths (hip and waist) measurements were also taken. A Master's student who was a National Research Foundation (NRF) intern student also had an opportunity to be involved by conducting several interviews during the qualitative phase and assisting with various data cleaning tasks.

## 3.9. Conclusion

The research design used for this study allowed for a situation in which the schools receiving the TBF in-school breakfast feeding programme could be compared to a control situation – schools receiving only the NSNP. In addition, the inclusion of control schools that had only just started receiving the NSNP allowed for a comparison with a control situation for the NSNP only schools. While the control schools were not true controls, they were the closest to control schools that could be identified given the nature of the NSNP. In addition, the research design was strengthened by using random selection of schools and participants. Randomisation ensures that systematic bias in the sample is eliminated (Moore & McCabe, 2006) by ensuring that all schools and participants in the area had an equal chance of participating. For instance, if schools were invited to participate, it is likely that only those with positive experiences would have volunteered to participate. Random sampling protects against such systematic bias in the sample. Randomised studies are considered to be the gold standard

of evidence primarily because by eliminating systematic bias, it reduces the plausibility of alternative explanations for observed effects (Shadish, Cook, & Campbell, 2002). Furthermore, the design was strengthened by the inclusion of a nutritional questionnaire, which does not control for household effects on nutrition but does allow for a greater understanding of household eating patterns and how they might influence outcomes.

The qualitative component provided an opportunity to extend our understanding of the effects of the programmes beyond the impact to include perceptions of effects and what the programmes meant to key stakeholders. Perhaps the major limitation of the study is the length of time that lapsed between anthropometric data collection points. Ideally a longitudinal study allowing for a longer period and for further follow-ups would strengthen our understanding of the long-term effects of the programmes. This approach should be considered for future research.



4. Results

In this section we report on the three key indicators that were assessed to determine the impact of the programmes – anthropometry, learner performance, and learner attendance. The results from the nutritional questionnaire, the interviews and the focus groups are used to interpret these findings

4.1. Anthropometric results

As discussed above, the anthropometric data was analysed by the three key indicators used in the WHO Child Growth Standards – height-for-age, weight-for-age, and BMI-for-age (WHO, 2007). BMI-for-age data is complemented by the maturity age index and body fat percentage data. Data is compared over time and between the school types. Data was also assessed by sex.

further. In addition, qualitative data is presented as it pertains to learner and stakeholder perceptions of impact. Thereafter the perceptions of the programmes, including key successes and challenges are presented.

Height-for-age

Height-for-age measurements provide information about the rates of stunting in children within a population. Stunting occurs early on in a child's life and is very resistant to change with the window for opportunity commonly being accepted to be the first 1000 days of a child's life (Leroy, Ruel & Habicht, 2013). Thus, even when nutrition interventions at school level are introduced, we would not expect to see significant shifts in stunting levels.

Table 3: Percentage of learners within normal height-for-age range by school type (both sexes)

Control			NSNP only			TBF + NSNP			TOTAL		
Stunted (%)	Not stunted (%)	n	Stunted (%)	Not stunted (%)	n	Stunted (%)	Not stunted (%)	n	Stunted (%)	Not stunted (%)	n
6.5 ¶	93.5	276	14.5*¶	85.5	570	8.7*	91.3	541	10.6	89.4	1387

\* Difference is significant at the p=0.05 level  
¶ Difference is significant at the p=0.005 level

However, when comparing the height-for-age results between schools, there are significant differences as is shown in Table 3 above. Schools receiving only the NSNP are more likely to have children who are stunted than the schools receiving both interventions and the control schools. The Table above shows that 6.5% of control school learners were stunted, whilst around 9% of learners at schools receiving both interventions were stunted. This is as compared to 14.5% of learners in the NSNP only schools. The remainder of learners in these schools fell within the normal height-for-age range or were taller than average.

There are two key findings that the Table above raises. The first is that children receiving only the NSNP had stunting rates that are lower than the average stunting rate of 23% for children living in the Eastern Cape aged 0 – 15 years (Shisana et al., 2014). Although we have seen a reduction in stunting levels over the past 20 years in the country, it is still concerning that so many children are stunted, particularly given the negative effects of stunting on cognitive development and learning outcomes. The second finding is that learners receiving two meals, despite being from arguably poorer backgrounds, have lower stunting levels than children receiving only one meal.

There is debate as to whether children can “catch-up” on height-for-age in their life course. Prentice et al., (2013a and



2013b) present evidence which suggests that children can catch up between two years and mid-childhood and again in the puberty years. Research thus suggests that there remains some debate as to the intractability of stunting over the life course of a child. The data presented here seems to suggest that children who are exposed to an additional meal at school have lower stunting rates than those receiving only the NSNP.

Evidence from the study conducted in Alexandra shows that levels of severe stunting were reduced by 4.7% over a 10 month period (Hochfeld et al., 2013). The data from both the Lady Frere and the Alexandra studies therefore suggest that the introduction of nutrition programmes may in fact be able to shift stunting levels. It is possible that it is the combined impact of the TBF and NSNP that has some impact on severe stunting levels. However, without conducting a study that accounts for stunting levels prior to and after the introduction of the breakfast programme we cannot state with certainty that the breakfast programme has contributed to the reduced stunting levels in these schools. Given the debates, it would be worth pursuing this question in further research since the current data seems to suggest that nutrition interventions in the school years can shift stunting to some extent.

In the interim, it should be noted that higher rates of stunting places such children at risk for being overweight or obese later in life. This factor needs to be taken into consideration when assessing the nutritional content of the meals that are planned for such schools.

Weight-for-age

Weight-for-age measurements provide information about the rates of children underweight or severely underweight. Children being underweight is an important measure that can indicate malnutrition. A core aim of both the NSNP and the TBF in-school breakfast feeding programme is to combat undernourishment and malnutrition. Weight-for-age is therefore a key indicator of progress. Growth standards for weight-for-age are only available for children between the ages of five and 10 years as thereafter puberty skews weight-for-age results.

It is pleasing to note, as indicated in Table 4 below, that across the school types there were very low rates of children who were underweight. The rates were slightly higher at schools receiving the TBF in-school breakfast feeding programme, however these differences were not statistically significant.

Table 4: Percentage of learners within normal weight-for-age range by school type (both sexes)

WAVE	Control			NSNP only			TBF + NSNP			TOTAL		
	Under-weight (%)	Not under-weight (%)	n	Under-weight (%)	Not under-weight (%)	N	Under-weight (%)	Not under-weight (%)	n	Under-weight (%)	Not under-weight (%)	n
Pre-test	1.7	98.3	120	3.7	96.3	190	2	98	253	2.5	97.5	563

The weight-for-age analysis was also conducted for boys and girls separately but no significant differences in the number of boys and girls who were underweight were shown.

Principals, educators and food handlers felt that learners appeared healthier and happier since receiving the TBF breakfast.

Yes because at least the kids like I said are very happy. You see even their bodies- there is a change at least. They are healthy. (Principal from a TBF school)

Two food handlers noticed that some learners appeared healthier after receiving breakfast in the morning.

“I like it because the kids eat pap and fill up, I’ve seen others that when I got here I could see they were very thin, there’s two of them that I’ve notice, now they’re nice and fresh” (Food Handler from a TBF school)

What I’ve noticed is that there are some children that you see that they are not okay in the morning, so now that has changed because now the child will come to the kitchen and ask for water [to drink, not food], these days the children never go hungry.(Food Handler from a TBF school)

Educators in schools receiving the NSNP meal only also commented on how learners looked healthier since the start of the NSNP programme at their school, and a few specifically

mentioned that some learners had noticeably gained weight, as follows:

Learners, they are bright! They have also gained some weight- yes weight gain. (Educator from a Control school)

BMI-for-age

Perhaps one of the most important anthropometric indicators is BMI-for-age. Given that underweight rates in the sample were relatively low, under-nutrition was less of a concern than malnutrition and the potential for obesity outcomes related to eating too much food that was nutritionally deficient. Furthermore, given relatively higher levels of stunting in the schools receiving the NSNP, protecting children against obesity becomes an important consideration.

BMI-for-age provides an indication of both wasting and obesity rates in the sample. Table 5 below indicates that learners within the control schools were significantly more likely to be overweight or obese than those at the schools receiving the nutritional interventions (p=0.005). Across all of the schools overweight and obesity is not associated with stunting. Only six of the overweight learners in the sample were also stunted. This confirms findings by Jinabhai et al. (2003) and Mukkudem-Petersen & Kruger (2004) that amongst South African children there is no association between stunting and childhood overweight and obesity.



The Tables below also demonstrate that those falling outside of the normal BMI-for-age range were likely to be overweight or obese rather than wasted. As with stunting, wasting levels were marginally higher in schools that received only the

NSNP intervention than in either the control schools or schools receiving both interventions. However, these differences were not statistically significant.

Table 5: Percentage of learners within and outside of normal BMI-for-age range by school type (both sexes)

School type	% Severely wasted (<-3SD)	% Wasted (<-2SD)	% Within normal BMI-for-age	% Overweight (>+1SD)	% Obese (>+2SD)	TOTAL N
Control	0	0.7	64.6 <sup>¶</sup>	26.1 <sup>*∞</sup>	8.6 <sup>¶</sup>	276
NSNP only	0.4	3.9	78.8 <sup>°</sup>	13.9 <sup>∞</sup>	3 <sup>¶</sup>	569
TBF+NSNP	0.2	1.9	86.4 <sup>¶</sup>	10.2 <sup>*</sup>	1.3 <sup>°</sup>	540
TOTAL	0.2	2.5	78.9	14.9	3.5	1385

\* Difference is significant at the p=0.005 level  
∞ Difference is significant at the p=0.005 level  
¶ Difference is significant at the p=0.005 level  
° Difference is significant at the p=0.005 level  
° Difference is significant at the p=0.005 level  
¶ Difference is significant at the p=0.005 level

What is significant is that learners at the schools receiving the Tiger Brands breakfast were significantly less likely to be either overweight or obese. In other words, when the percentage of learners who were overweight or obese was combined and

the differences tested for statistical significance, it was evident that the breakfast had additional effects in protecting learners from becoming overweight or obese.

Table 6: Percentage of learners who were overweight by school type (both sexes)

School type	% Not overweight	% Overweight/obese	TOTAL N
NSNP only	83.1	16.9 <sup>*</sup>	569
TBF+NSNP	88.5	11.5 <sup>*</sup>	540
TOTAL	85.8	14.2	1109

\* Difference is significant at the p=0.05 level

Worth noting was the increase in the percentage of learners falling into the normal BMI-for-age range in the control schools and a corresponding decrease in the number of learners in the overweight category by the second data collection point as is

demonstrated in Table 7 below. The seven percentage point decrease in learners in the overweight category translates to 21 learners of the 276 learners in the control schools.

Table 7: BMI-for-age results over time (control schools only)

Wave	% Severely wasted (<-3SD)	% Wasted (<-2SD)	% Within normal BMI-for-age	% Overweight (>+1SD)	% Obese (>+2SD)	TOTAL N
Pre-test	0	0.7	64.6 <sup>*</sup>	26.1 <sup>∞</sup>	8.6	276
Post-test	0	1.8	71.4 <sup>*</sup>	19.2 <sup>∞</sup>	7.6	276

\* Difference significant at the p = 0.05 level  
∞ Differences significant at the p=0.05 level

These shifts are quite substantial, particularly given the short period of time between the pre- and post-tests. The reduction in the number of children in the overweight category is not explained by sudden growth spurts. Increases in height across this sample that transitioned out of overweight were minimal (in the range of 1.5cm) over the period.

Unfortunately there is limited evidence in other studies which focuses on weight-loss or transitions out of overweight and

obesity in children, particularly in the context of nutrition interventions. It is therefore difficult to interpret these results against published studies, which might explain these shifts. One study in the North West province conducted over a three-year period showed that children in Quintile 1 – 3 schools were less likely to become obese over time. In addition, although the numbers of children transitioning out of overweight and obesity were low, children in Quintile 1 – 3 schools were more likely than their Quintile 4 and



5 counterparts to transition out of overweight and obesity (Pienaar, 2015). Although this study was not conducted in the context of the introduction of a nutrition intervention it does point to the potential protective effects of the NSNP. It is possible that in poor contexts, where obesity is likely due to low quality nutrient intake rather than to overconsumption of nutrient dense foods, the introduction of a high nutrient quality meal could produce such substantial changes. However, it is difficult to corroborate this suggestion in the absence of any literature on such changes. This points to an area of further research.

It should also be noted, as indicated above, because the control schools began receiving the intervention during the course of the study, there were no true control schools (i.e. comparable schools not receiving the intervention at all) with

which to compare these schools. This factor limits our ability to attribute this change to the introduction of the programme. However, the qualitative research did not reveal any other significant changes at the schools. We may therefore be able to state, with some caution, that the introduction of a nutrition intervention does contribute to ensuring that children fall within the normal BMI-for-age range and that such a programme could therefore be protecting against childhood obesity.

Boys in the control schools were significantly more likely to be overweight or obese than boys at either the NSNP only schools or the schools receiving both interventions. Boys at the schools receiving both interventions were somewhat less likely to be overweight or obese than those at NSNP only schools but these differences were not significant as is shown in Table 8.

Table 8: Percentage of learners within and outside of normal BMI-for-age range by school type (boys, pre-test)

School type	% Severely wasted (<-3SD)	% Wasted (<-2SD)	% Within normal BMI-for-age	% Overweight (>+1SD)	% Obese (>+2SD)	TOTAL N
Control	0	0 <sup>°</sup>	74.9 <sup>*</sup>	18 <sup>∞¶</sup>	7.1 <sup>°¶</sup>	128
NSNP only	0.3	3.7 <sup>°</sup>	82.7 <sup>µ</sup>	10.7 <sup>¶</sup>	2.6 <sup>¶</sup>	298
TBF+NSNP	0	1.8	89.5 <sup>*µ</sup>	7.9 <sup>∞</sup>	0.8 <sup>°</sup>	280
TOTAL	0.1	2.3	84.4	10.9	2.7	706

\* Difference is significant at the p=0.005 level  
∞ Difference is significant at the p=0.005 level  
¶ Difference is significant at the p=0.05 level  
° Difference is significant at the p=0.05 level  
° Difference is significant at the p=0.005 level  
¶ Difference is significant at the p=0.05 level  
µ Difference is significant at the p=0.05 level

Again we see the trend of a significant reduction in the number of boys who were overweight between the pre-test (25.1%) and post-test (17.2%) in the control schools. This reduction means that by the post-test boys in the control schools were

as likely as boys in the interventions schools to be overweight. Boys in the schools receiving both interventions were less likely than boys at the control schools and the NSNP only schools to be obese by the post-test.





Table 9: Percentage of boys within and outside of normal BMI-for-age range over time (control schools only)

School type	% Severely wasted (<-3SD)	% Wasted (<-2SD)	% Within normal BMI-for-age	% Overweight (>+1SD)	% Obese (>+2SD)	TOTAL N
Pre-test	0	0 <sup>∞</sup>	74.9*	18 <sup>∞</sup>	7.1	128
Post-test	0	0 <sup>‡</sup>	82.8*	12.5 <sup>∞</sup>	4.7	128

\* Difference is significant at the p=0.05 level  
<sup>∞</sup> Difference is significant at the p=0.05 level

Higher BMI-for-age was far more of a challenge amongst girls than boys. As shown in Table 10 and Table 11, it is clear that girls were far more likely to fall outside of the BMI-for-age range than boys. It is striking that in the control schools girls were significantly more likely to be overweight or obese than girls at either the NSNP schools or those receiving both interventions at the first data collection point. Rates of female

learners being overweight or obese in the pre-test in control schools were exceptionally high (43.3% of female learners). By the post-test there was a reduction in the number of girls who were overweight. This finding is promising and although it cannot be attributed directly to the intervention, barring any other significant changes in the schools, the introduction of the NSNP could have contributed to this shift.

Table 10: Percentage of learners within and outside of normal BMI-for-age range by school type (girls, pre-test only)

School type	% Severely wasted (<-3SD)	% Wasted (<-2SD)	% Within normal BMI-for-age	% Overweight (>+1SD)	% Obese (>+2SD)	TOTAL N
Control	0	1.4	55.3 <sup>‡∞</sup>	33.1 <sup>*∞</sup>	10.2 <sup>∞‡</sup>	148
NSNP only	0.4	4.1	74.9 <sup>∞</sup>	17.3 <sup>∞</sup>	3.3 <sup>‡</sup>	271
TBF+NSNP	0.4	1.9	83.1 <sup>‡</sup>	12.7*	1.9 <sup>∞</sup>	260
TOTAL	0.3	2.7	73.8	19	4.2	679

\* Difference is significant at the p=0.005 level  
<sup>∞</sup> Difference is significant at the p=0.005 level  
<sup>‡</sup> Difference is significant at the p=0.005 level  
<sup>∞</sup> Difference is significant at the p=0.005 level  
<sup>∞</sup> Difference is significant at the p=0.005 level  
<sup>‡</sup> Difference is significant at the p=0.05 level

Table 11: Percentage of girls within and outside of normal BMI-for-age range over time (control schools only)

School type	% Severely wasted (<-3SD)	% Wasted (<-2SD)	% Within normal BMI-for-age	% Overweight (>+1SD)	% Obese (>+2SD)	TOTAL N
Pre-test	0	1.4	55.3* <sup>‡∞</sup>	33.1 <sup>∞</sup>	10.2	148
Post-test	0	3.4	61.4 <sup>*∞</sup>	25 <sup>∞</sup>	10.2	148

\* Difference is significant at the p=0.05 level  
<sup>∞</sup> Difference is significant at the p=0.05 level

Furthermore, the gap between boys and girls was far more marked in the control schools than in the two comparison schools. This finding may suggest that over time nutrition interventions may have a greater impact on girls who are generally more vulnerable to obesity. However, this assumption can only be confirmed with further follow-up assessments.

In order to assess whether BMI-for-age was a reliable measure to indicate whether children were overweight or

obese, a body fat percentage analysis was also conducted. A comparison between the schools shows that children at the control schools on average had a slightly higher body fat percentage than those at either the NSNP only or the NSNP and TBF schools as shown in Table 12 below. This likely confirms the findings above, as the higher average body fat percentage is explained by the higher rates of obesity at control schools.

Table 12: Mean body fat percentage by school type (Pre-test only)

School type	Body fat percentage	N
Control	16.89* <sup>∞</sup>	276
NSNP only	15.59 <sup>∞</sup>	572
TBF+NSNP	14.80*	542
TOTAL	15.54	1390

\*\* Difference is significant at the p=0.005 level  
<sup>∞</sup> Difference is significant at the p=0.05 level

A more comprehensive analysis of body fat percentage is shown in Table 13 below. This Table provides a categorical breakdown of body fat percentage as per cut-off points provided by Lohman (1987). It is clear that children at the control schools and NSNP only schools were more likely

to have a moderate to very high body fat percentage than children at schools receiving both interventions. This is a very positive finding indicating the potential effects of the breakfast programme on protecting learners from obesity.

Table 13: Percentage of learners in body fat percentage categories by school type (Pre-test only)

School type	Low	Optimal	Mod high - Very high	TOTAL (N)
Control	27.54 <sup>‡</sup>	57.25	15.21*	276
NSNP only	26.19 <sup>∞</sup>	51.57	12.24 <sup>∞</sup>	572
TBF and NSNP	35.42 <sup>‡∞</sup>	57.75	6.82 <sup>*∞</sup>	542
TOTAL	34.17	55.11	10.72	1390

\* Difference is significant at the p=0.005 level  
<sup>∞</sup> Difference is significant at the p=0.005 level  
<sup>‡</sup> Difference is significant at the p=0.05 level  
<sup>∞</sup> Difference is significant at the p=0.005 level

When considering body fat percentage differences between girls and boys, girls in control schools and those in schools receiving only the NSNP were significantly more likely than boys to have a body fat percentage that fell within the

moderately high, high or very high category as shown in Table 14. Interestingly girls in the schools receiving both interventions were as likely as boys to have a high body fat percentage.



Table 14: Percentage of learners in body fat percentage categories by gender and school type (Pre-test only)

School type	Gender	Low	Optimal	Mod high -Very high	TOTAL (N)
Control	Male	25	65.63 *	9.38*	128
	Female	29.73	50 *	20.27*	148
NSNP only	Male	41.47 °	50.5	8.02 ∞	299
	Female	30.4 °	52.75	16.85 ∞	273
TBF and NSNP	Male	30.5 ¶	63.48 °	6.03	282
	Female	40.77 ¶	51.54 °	7.69	260
TOTAL	Male	34.13	58.39	7.48	709
	Female	34.21	51.69	14.1	681

\* Difference is significant at the p=0.05 level  
 ∞ Difference is significant at the p=0.005 level  
 ¶ Difference is significant at the p=0.05 level  
 ° Difference is significant at the p=0.005 level  
 ¥ Difference is significant at the p=0.05 level  
 ∂ Difference is significant at the p=0.005 level

When considering differences across the school types it is evident that boys at schools receiving only the NSNP were more likely to have a low body fat percentage and less likely than those at the other school types to have an optimal body fat percentage.

Table 15: Percentage of learners in body fat percentage categories by school type (boys, pre-test only)

School type	Low	Optimal	Mod high -Very high	TOTAL (N)
Control	25*	65.63 °	9.38	128
NSNP only	41.47*∞	50.5 ¶°	8.02	299
TBF and NSNP	30.5 ∞	63.48 ¶	6.03	282
TOTAL	34.13	58.39	7.48	709

\* Difference is significant at the p=0.005 level  
 ∞ Difference is significant at the p=0.005 level  
 ¶ Difference is significant at the p=0.005 level  
 ° Difference is significant at the p=0.005 level

Girls in the schools receiving both interventions were significantly less likely than girls at either of the other school types to have a high body fat percentage but more likely to have a low body fat percentage as shown in Table 16 below.

Table 16: Percentage of learners in body fat percentage categories by school type (girls, pre-test only)

School type	Low	Optimal	Mod high -Very high	TOTAL (N)
Control	29.73 ¶	50	20.27*	148
NSNP only	30.4 °	52.75	16.85 ∞	273
TBF and NSNP	40.77 ¶°	51.54	7.69*∞	260
TOTAL	34.21	51.69	14.1	681

\* Difference is significant at the p=0.005 level  
 ∞ Difference is significant at the p=0.005 level  
 ¶ Difference is significant at the p=0.005 level  
 ° Difference is significant at the p=0.05 level

When the analysis was conducted only for learners who were overweight or obese on the BMI-for-age measurements the results are indicated in Table 17.

Table 17: Number of learners in body fat percentage categories by school type (Pre-test only)

School type	Low	Optimal	Mod high	High	Very high	TOTAL (N)
Control	2	39	8	13	10	72
NSNP only	7	27	19	14	12	79
TBF and NSNP	2	29	11	9	5	56
TOTAL	11	95	38	36	27	207

This Table demonstrates that while the numbers of learners with moderate to very high body fat percentages was high, there were also a significant number of learners with high BMI-for-age range results who had optimal body fat percentage. This finding suggests that maturity might be an explanatory factor in the BMI-for-age results. Across all of the schools the maturity age (as calculated using PHV) was higher than the age at the point of measurement indicating that across all schools there was a large proportion of early maturers. This might account for some of the high levels of obesity and high body fat percentage, especially amongst the girls. However, this applied across all of the schools and therefore does not explain the differences in obesity levels between the school types. This suggests that other home and school factors could explain the differences, including level of physical activity and what foods children were eating.

In order to better understand the differences in the rates of obesity and how to account for the changes, data from

the nutritional questionnaire is presented, which reflects all food intake over the previous 24 hours as recalled by the learner, including nutrition programme interventions. It should be noted that there were limitations with the questionnaire, particularly with regard to the small sample of learners who completed the questionnaire (only Grade 6 and 7 learners). This means that we could not test for the significance of any differences seen in the analysis. The data presented below should therefore be seen as indicative of possible trends that could be investigated further.

The nutritional questionnaire data demonstrates that there were no major differences in the quality of foods eaten across the school types. Most children ate none or one portion of fruit or vegetables the previous day and none ate the recommended five portions of fruit and vegetables a day as shown in Table 18 below.

Table 18: Units of fruit and vegetables eaten the previous day by school type

Units of fruit and veg eaten yesterday	Control		NSNP only		NSNP+TBF		TOTAL	
	N	%	N	%	N	%	N	%
0	5	20	37	34.26	17	22.67	59	28.37
1	11	44	41	37.96	33	44	85	40.87
2	5	20	20	18.52	21	28	46	22.12
3	3	12	6	5.56	3	4	12	5.77
4	1	4	4	3.7	1	1.33	6	2.88
TOTAL	25	100	108	100	75	100	208	100

Furthermore, dietary diversity was generally quite poor with none of the children eating the maximum seven different types of food. There were no major differences in dietary diversity between the school types.

Table 20: Dietary diversity score by school type

Dietary diversity count	Control		NSNP only		NSNP+TBF		TOTAL	
	N	%	n	%	n	%	n	%
0	1	4	1	0.93	0	0.00	2	0.96
1	2	8	11	10.19	6	8.00	19	9.13
2	3	12	30	27.78	23	30.67	56	26.92
3	8	32	42	38.89	17	22.67	67	32.21
4	10	40	19	17.59	17	22.67	46	22.12
5	1	4	5	4.63	12	16	18	8.65
TOTAL	25	100	108	100	75	100	208	100

The nutrition analysis also demonstrates that children were eating a fair amount of sugar. Although the nutritional questionnaire did not allow us to assess total sugar intake as a percentage of total diet, it did allow us to assess the number

of times that children had consumed sugar the previous day. Almost 75% of learners indicated having eaten sugar at least twice in the previous day, and 79% indicated having eaten junk food such as chips at least once the previous day. While





we do not know enough about the total dietary intake of the learners, the nutritional questionnaire does seem to point to relatively high levels of sugar consumption. The analysis also shows that girls were more likely to consume more sugar and

junk food than boys. This may in part explain the higher rates of obesity amongst girls in the sample. However girls are also biologically more vulnerable to being overweight or obese than boys.

Table 19: Number of times junk food was eaten by school type

No of times junk food was eaten yesterday	Control		NSNP only		NSNP+TBF		TOTAL	
	n	%	n	%	n	%	n	%
0	2	8	29	26.85	14	18.67	45	21.63
1	7	28	36	33.33	36	48	79	37.98
2	16	64	43	39.81	25	33.33	84	40.38
TOTAL	25	100	108	100	75	100	208	100

Children at control schools were somewhat more likely than children at other schools to have eaten junk food the previous day. However, the small number of participants from control schools means that this finding should be treated with caution.

A key intervention that both the NSNP and the TBF in-school breakfast feeding programme delivers in addition to meals is lessons on healthy eating habits. Interestingly children at NSNP schools and those at schools receiving both interventions were less likely to have eaten sugar or junk food the previous day, and if they indicated that they had had sugar or junk food they were more likely to have consumed less than their control group counterparts. The study did not assess whether the control schools incorporated any lessons on healthy nutrition so it is unclear whether the healthy eating lessons delivered by NSNP and TBF were shaping these outcomes.

### Conclusion

What is clear from the above analysis is that levels of wasting were low across the study population. Stunting levels at schools receiving the TBF in-school breakfast feeding programme were lower than for those receiving only the NSNP, despite TBF targeting the most vulnerable schools in the area. It is not clear why this was the case since stunting is very resistant to change. However, the introduction of a breakfast programme

in the Alexandra area also showed a reduction in stunting (Hochfeld *et al.*, 2013). It will be important to track progress on stunting over time as this phenomenon is likely to only change over a long period of time.

The data shows that control schools had higher rates of obesity than those receiving the interventions and that after the introduction of the NSNP in control schools obesity levels reduced. This is a positive but surprising finding, particularly given the relatively short time period between the pre- and post-tests. There is minimal literature focusing on transitions out of overweight and obesity in developing contexts and particularly in the context of school-based nutritional interventions and it is therefore difficult to assess the reasons for this decline. While we cannot attribute this change to the NSNP without data from true control schools, barring any other major developments at such schools, it is likely that the introduction of the programme had some influence on these changes. This may point to the potentially protective effects of the NSNP. It is also promising to note that obesity levels for girls in the schools receiving both interventions were far lower than for girls in either of the other two types of schools. This finding suggests that breakfast may be protecting girls from being overweight or obese. This finding was corroborated with the body fat percentage data.

## 4.2. Learner performance results

A central goal of both nutritional programmes is to impact positively on learners' educational performance. Previous research has shown that nutritional inputs improve their short-term (such as improved concentration in class) as well as their long-term educational performance, of malnourished children (Napier *et al.*, 2009; Levitsky, 2005).

In this study we compared school performance, in the form of Term marks or grades, of learners in Term 1, 2014, with the same learners' performance in Term 4, 2014. These results

were then compared across groups 1, 2 and 3. In addition, performance from Term 1 to Term 4 in 2013 was assessed for control group schools in order to gauge what performance improvements could be expected in a situation where no intervention existed.

Data was provided using the Curriculum Assessment Policy Statement (CAPS) system. According to this system marks are given to learners as follows:

Table 20: CAPS Assessment system codes

RATING CODE	ACHIEVEMENT DESCRIPTION	MARKS %
7	Outstanding Achievement	80 – 100
6	Meritorious Achievement	70 – 79
5	Substantial Achievement	60 – 69
4	Adequate Achievement	50 – 59
3	Moderate Achievement	40 – 49
2	Elementary Achievement	30 – 39
1	Not Achieved	0 – 29

(Source: Department of Basic Education, 2012)

Because the variance of these values (1 to 7) is so small, a change that appears very small – for example, from a first Term average of 2.00 to a fourth Term average of 2.50 – in reality is a substantial change in performance over a year.

The data presented in Table 21 below demonstrates that before the introduction of the NSNP at control schools, learners in such schools had lower Term 1 averages than those at both NSNP only schools and schools receiving both interventions. The difference between control schools and the schools receiving the breakfast was statistically significant. The control group began receiving NSNP meals in April 2014, directly after the Term 1 assessments were released.

Therefore comparing the control group to the other groups in Term 1 represented a genuine comparison of learners receiving no nutritional input at school at all, with those getting school meals, and a significant difference was found. This shows that those receiving two meals were doing better than those receiving none or one meal.

Overall, learners in all school groups improved their performance from Term 1 to Term 4. However, the differences in performance when the Term 4 data from the three groups was compared was not significant. This result is reflected in Table 21 below.

Table 21: Average school performance from Term 1 to Term 4 in 2014 by school type

	Average performance in Term 1	Average performance in Term 4
Control schools (2013)	3.27	4.08
Control schools (2014)	3.39*	4.04
NSNP only schools	3.58	4.21
NSNP and TBF schools	3.65*	4.28

\* Difference significant at the p=0.05 level

These results are also demonstrated in Figure 4. It is clear that both comparison groups showed enhanced performance over the course of the year and followed much the same trajectory, although those receiving the breakfast started out and ended up with slightly better results than those at NSNP only and control schools. Learners at the control schools achieved lower marks across the period. However, these marks were similar to what was seen in 2013 when these schools did not receive any intervention.



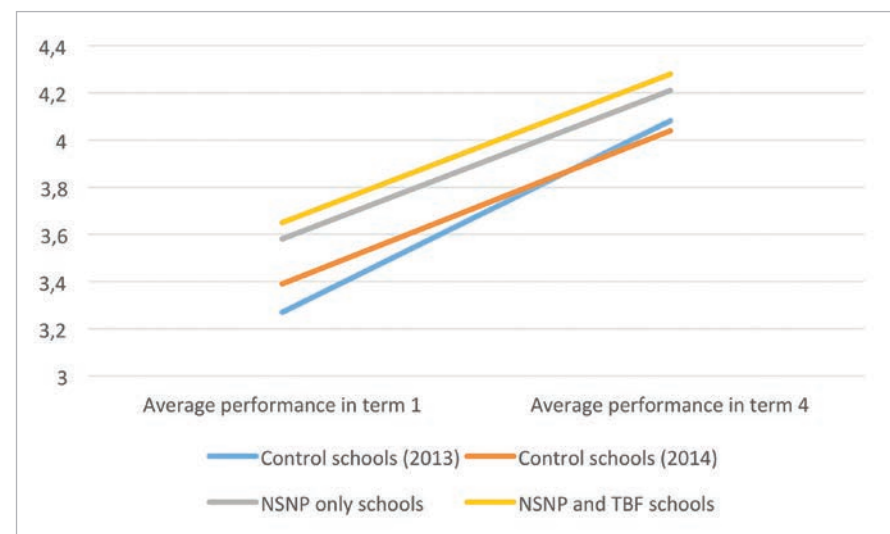
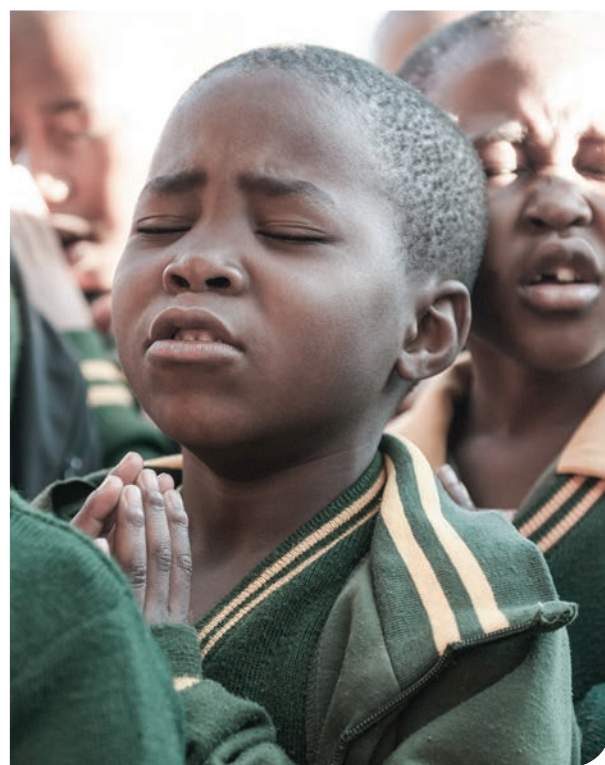


Figure 1: Average school performance over time by school type



It should be noted that learner performance is shaped by many variables, some of which are far more directly related to performance than nutrition is. These include teacher performance and access to learning materials. By considering the 2013 results in comparison to the 2014 results it is clear that the changes we did see in the learner performance results were attributable to a range of factors aside from the nutrition interventions.

However, principals, learners and educators felt strongly that the nutrition programmes improved learner performance. Interviews with principals and educators indicated that the impact of school feeding on the education of learners extended beyond school performance results at assessment time.

Learners who received the NSNP lunch reported that they felt much better after eating a meal at school, indicating that they had more energy. This theme was reflected in the qualitative quotes.

*I: Do you like the food at school?*

*R: Yes, because it gives me energy. (Learner Focus Group at a NSNP school)*

They felt highly positive about receiving the NSNP lunch, particularly as it helped them participate more effectively.

*R: Because sometimes we don't get food and get hungry we were not able to participate in class so that is why we like it. (Learner Focus group at a Control school)*

A number of educators noticed that learners had more energy to engage in activities like play during break time after eating the NSNP meal. Various educators pointed out that since receiving the TBF breakfast learners were more energised and refreshed during morning lessons, which are key components to successful curriculum delivery.

When the control schools' 2014 results are compared to the same learners' 2013 results (i.e. when the schools were receiving no interventions) it is clear that there was also a marked increase over the course of one year. In fact, the rate of change in 2013 was faster than for 2014 as shown in Figure 4 above. This demonstrates that the rate of change over time was what could be expected over the course of an academic year regardless of any intervention. Nevertheless, the differences between the school types seem to suggest that those receiving some kind of intervention were doing better than those receiving none and that those receiving the breakfast programme were doing better than those that were not. However, the differences between learners in NSNP only schools and those receiving both breakfast and lunch was not statistically significant.



Comments such as the following were common:

*"Now they [are] always fresh." (Principal from a TBF school)*

*They seem happier, they are always happy and they are physically fit, so you will see the fitness of the child when they are playing outside. (Educator from a Control school)*

In schools receiving both TBF and NSNP meals, learners often remarked that they no longer felt hungry in the mornings.

*We don't get hungry like before.*

*We don't sleep in class when we've eaten.*

*We like breakfast. It makes me excited. (Learner Focus Group at a TBF school)*

School performance is affected by many variables, including quality teaching, the availability of learning support materials, the functionality of the infrastructure, and many other variables in the school and home environment. In addition, improvements in performance due to improved nutrition, is a relatively slow process. Better concentration and participation in class, on the other hand, are usually gains that can be observed in the short-term and have a direct link to nutritional health. As these are difficult to measure quantitatively, we gathered data on this aspect in the qualitative interviews. Similar to the results from the previous TBF evaluation study (Hochfeld et al., 2013), many educators and principals noticed an improvement in learner concentration and participation.

This observation was true of NSNP-only schools, indicating that they were positively fulfilling a key objective of the programme which is "to contribute to enhancing learning capacity through school feeding" (Rendall- Mkosi, Wenhold & Sibanda, 2013: v). Some comments from our interviews capture this view:

*They are concentrating the whole blessed day. They are bright now. (Educator from a Control school)*

*They are performing better as I have already indicated we have enough time to teach them. There is a difference, now the work we can do it thoroughly. (Principal from a TBF school)*

This finding emerged as an even stronger theme in interviews with educators and principals from schools receiving both NSNP and TBF nutritional input. They commented that the TBF breakfast ensured that learners were able to concentrate better during the first half of the day, whereas prior to the implementation of the breakfast intervention learners were struggling to perform before receiving the NSNP meal. Many schools cover a majority of the day's curriculum before lunch - so it is vitally important that learners have sufficient energy to concentrate during this period. The following comments illustrate this theme:

*Yes, [the breakfast means]... that the learners are keeping up and have stomachs full all the time. (Lady Frere District Official)*

*[Since the TBF breakfast began] they can manage to stay those long hours listening to you while you teaching. Because the reason for that breakfast of ours was to keep them at school so that we finish the syllabus. (Principal from a TBF school)*

*Before it seemed like there is a lot of work for them but now you can see that it is so easy. They can manage because there is nothing that is too heavy for them now. (Principal from a TBF school)*

*The way they behave in class, I see now there is a lot [more] concentration and they are happy. Most of the learners come from poor backgrounds, and when they are in class you see that they are not feeling well but now you see that they are active. And in the books there is progress, I see they are working hard, there is no laziness that is happening (Educator from a TBF school)*



Interestingly, the school officials also attributed a positive change in the learners' peer interactions to the addition of breakfast to the school food offering. Several educators noted:

*There is a change at least they are playing [not fighting]. They play right. (Educator from a TBF school)*

*They are interacting very well. There is no fighting; they used to fight a lot. (Educator from a TBF school)*

Results indicated positive outcomes for school performance in the initial year of a school nutrition programme. Changes in school performance after this initial phase appeared to be less significant. In addition, the nature of the nutritional input (one meal versus two meals per day) did not appear to have a significant impact on performance outcome. However, the qualitative data indicates that the perception of educators and principals was that school feeding exerted an important and positive impact on behavior that is integral to school performance, especially concentration in class.

### 4.3. School attendance results

In general, low absenteeism rates were recorded in 2014 in schools across all groups, with slightly higher average absenteeism in Term 1 than in Term 4. The differences

between the school groups were minor and were not statistically significant.

Table 22: Average days absent in Term 1 and Term 4 (2014) by school type

	Average days absent in Term 1	Average days absent in Term 4
<b>Control schools (2013)</b>	1.1	1.35
<b>Control schools (2014)</b>	1	0.96
<b>NSNP only schools</b>	1.13	0.85
<b>NSNP and TBF schools</b>	1.2	0.87

When looking at the absenteeism data in terms of the percentage of learners who were absent for a number of days it is clear that in the control schools there are no major changes between Term 1 and Term 4. In the NSNP only

schools and those receiving the Tiger Brands breakfast absenteeism decreases over time: by Term 4 more children are not absent at all and fewer children were absent for two or three days in the Term.

Table 24: Percentage of learners absent by number of days absent and school type

School type	Term	0 days	1 day	2 days	3 days	> 3 days
<b>Control</b>	T1	55%	12%	17%	11%	5%
	T4	56%	13%	16%	8%	6%
<b>NSNP only</b>	T1	50%	16%	11%	8%	14%
	T4	58%	14%	9%	5%	14%
<b>NSNP+TBF</b>	T1	54%	16%	13%	8%	9%
	T4	67%	15%	9%	3%	6%

While many schools felt that they did not struggle with absenteeism, it was widely acknowledged by principals and educators alike, that receiving a meal at school was a strong incentive for learners to attend school on a regular basis, and moreover, that the introduction of a breakfast programme encouraged learners to arrive at school on time.

As the Eastern Cape is home to a large poor elderly population who have heavy childcare and domestic responsibilities, children are required to help with household chores and in the care of younger siblings and/or grandparents. Therefore, according to principals and educators interviewed, when children are absent from school, sickness, household obligations and inhospitable weather are the main reasons cited for missing school.

Interviewees felt that households that were vulnerable or headed by a grandparent were incentivised to encourage their children or grandchildren to attend school. These comments were from educators at NSNP-only schools:

*They are mostly encouraged by the food. The food that they get it makes us to get few absentees. (Principal from a control school)*

*The numbers [of children coming to school regularly] have increased since the introduction of the food programme. (Principal from a NSNP school)*

One of the educators from a control school that had only recently started receiving lunch from the NSNP specifically commented on an improvement in learner attendance since receiving the programme:



*Yes there has been a change, there has been a change, learners are keen to come to school almost every day and they enjoy this programme of eating, they enjoy it too much. (Educator from a Control school)*

In addition, the TBF breakfast has been a strong motivator for learners to come to school on time in the mornings. As breakfast is usually dished up between 07:30 and 07:50 learners arrive well before 08:00. School is then able to start on time with most learners present. This arrangement ensures learners cover the full curriculum.

*People come on time now [since the start of the TBF breakfast]. At least there is no absenteeism, (Principal from a TBF school)*

*Yes they come at half past seven to have breakfast, because we are feeding from half past seven to ten to eight and if you not there you not going to get the breakfast. They run like anything to get the breakfast. (Principal from a TBF school)*

No direct link can be made between school attendance and the provision of school nutrition. Overall absenteeism was low at all of these schools and comparing rates between school groups revealed no significant differences. However, qualitative reporting by educators and principals indicated a strong perception that meals at school incentivise children to attend regularly. In addition, TBF schools reported that breakfast encouraged children to get to school on time and late-coming had decreased. While the quantitative results were inconclusive, the qualitative results were very encouraging.

### 4.4. Other benefits, monitoring, and functionality

While the NSNP and the TBF's primary objective is to provide nourishment to learners in Quintile 1-3 schools, there are other benefits that schools experience as a result of these programmes. These are referred to as secondary benefits and are discussed in the first part of this section. The process of monitoring the nutrition programmes as well as their functionality is then addressed.

#### School benefits

Principals and educators felt generally positive about the NSNP nutrition programme, and felt that it was a key motivator for children to attend school. Comments were made that the food was the primary incentive for school attendance, to the extent that even sick children would arrive at school in order to eat, and they would go home again after the meal. One educator commented:

*Since there is this nutrition programme running at schools they only come to school for food. (Principal from a NSNP school)*

In addition, the TBF programme enjoys the support of many of the educators because enough food is delivered to include the teachers in the breakfast programme. Moreover, it is easy to administer the dishing up of porridge - and therefore requires minimal effort from the teaching staff. As breakfast is served before 08:00 it also encourages educators to arrive on time every morning, which benefits the school as a whole. Educators commented as follows:

*We do really enjoy this programme. (Educator from a TBF school)*

*TBF doesn't exclude the teachers. And it is always regular in providing the food, you can't say that this week we don't have TBF. (Principal from a TBF school)*

The TBF programme has an additional benefit, too: six schools have been equipped with kitchens in the Lady Frere area. The benefits of having a fully equipped and functioning kitchen cannot be overstated. A fully equipped kitchen allows food handlers to cook food properly and hygienically. Food handlers in schools with poor or no kitchen facilities regularly commented on how the environment had a negative impact on food quality, as wind blew dust into the food cooked outside or in inadequate shelters, or wet or windy conditions put out cooking fires so food was not cooked properly.

In addition, the TBF mobile kitchen also provides some extra storage space. One principal said:

*Because at least there is that kitchen, neh? So we can store food [well] with that kitchen, it's huge. (Educator from a TBF school)*

A specific benefit of the NSNP is the sustainable food production initiatives in schools that they promote as a secondary objective of the programme. Many school



principals and educators reported that the NSNP had helped them understand the importance of creating self-sustaining food gardens on their school premises and within the surrounding community. An example of a food garden appears below, although this photograph was taken at the very start of the growing season.



### Social and community benefits

According to the national census conducted by StatsSA in 2011, the unemployment rate in the Lady Frere area of the Eastern Cape was at 46.3% which is nearly double the national average. Therefore initiatives which create employment in this area are of the utmost importance. The NSNP allocates a monthly stipend of R900 to food handlers, which provides a source of much needed income to community members. Depending on the size of the school, between one and four community members, parents of children at the school, can be employed at a school as food handlers for the year. This is a rotational position which means other members of the community can benefit from this initiative; food handlers are changed annually. Key stakeholders such as principals, educators and caregivers are part of the process of selecting which parent is given the position, and the decision is often made on the basis of the household's neediness. One food handler expressed her gratitude for the work as follows:

*What make me like it a lot, is because jobs are scarce in our area. (Food Handler from a TBF school)*

At the schools that are part of the TBF programme in Lady Frere, food handlers have been given the opportunity to earn some extra money over and above the stipend they receive from the DBE. TBF funds this additional stipend (of R120 monthly) to cover the work involved in cooking breakfast daily. TBF pays the money to the school which disperses it with the DBE stipend. One food handler reported:

*I am happy with the money... For the food right now it's nine hundred (R900) and a tip from Tiger Brands for one hundred and twenty (R120), so all in all it's One Thousand and Eighty Rand (R1080). (Food Handler from a TBF school)*

In addition to the earning, food handlers learn invaluable skills which can stand them in good stead for future employment or small businesses, such as food hygiene and cooking in bulk, which is required for weddings or other catering events.

In some communities, locally grown vegetables were being sourced by schools for their lunches. Stimulating local production has been a positive gain offset by the nutrition programme, and it offers livelihoods to small scale farmers.

Poverty in the area means that caregivers are appreciative of the daily lunch that the NSNP provides to their children. Food Insecurity in the broader District Municipality is the second highest in the Eastern Cape at 83% (StatsSA, 2011). Therefore, having at least one nutritious meal a day provided to these vulnerable households goes a long way to reducing this unacceptably high rate of food insecurity. Educators commented as follows:

*They know that their children are eating at school and they are so impressed by that (Principal from a Control school)*

*Yes there are learners who are benefitting. Especially those learners who are staying with their grandmothers. Because sometimes they are not able to give enough care to them. When they were carrying those lunch boxes- their meals were so little. But now you can see that they are happy because of this nutrition programme. (Educator from a Control school)*

School holidays can be quite daunting for many families who have come to depend on the school meals, and are especially difficult where children are also getting a daily breakfast from TBF during Term time. One principal voiced this situation as follows:

*They love it very much and as a result they don't like when the school is being closed (Principal from a TBF school)*

A popular element of the TBF programme is that it allows schools to send surplus food home either on weekends or at the end of Term. This practice has the added bonus of being able to feed families and younger siblings who do not attend school and therefore do not benefit from the in-school feeding. The following are examples of the remarks made in this regard:

*I would say when we saw the happiness from the community was when the TBF was giving the food parcels. They were giving the food parcel in a way that the parent had to be at school when collecting the food parcel in a form of a bucket. So if the mother has five kids at school, then she would have five buckets. (Babalwa Gcali, TBF Eastern Cape Coordinator)*

*And also there is a nice thing that Tiger Brands is doing is when they are going for Christmas holidays they giving them hampers, Christmas presents. So [the families and caregivers] appreciate it a lot, really a lot (Principal from a TBF school)*

An interesting consequence of the TBF programme is the development of brand loyalty towards Tiger Brands. The following comments illustrate this loyalty:

*As TBF introduced this, we did call parents and said this company is having this product and because of your support -is doing a great work. So we have to continue to support it (Principal from a NSNP school)*

*When visiting the school in those days, you would see the parents singing, ululating "there is TBF, the Good Samaritan". Those are some of the things, and even if you would go to the meeting at school, they would be embracing TBF... "we wish you would stay here for a long time because here we are used to the supper only and at school they are giving breakfast, they are giving lunch, then if they can be given supper". Then they are so positive about the programme. (Babalwa Gcali, TBF Eastern Cape Coordinator)*

### Improved nutrition literacy

A key objective of the NSNP and TBF is to strengthen nutrition education in schools. Through this objective, learners are encouraged to make better decisions about their food choices by improving their nutrition literacy. Better nutrition literacy is not only about communicating information but also about giving learners the agency to take action when deciding what to eat. In addition, secondary skills like good eating etiquette have been attributed to the NSNP and especially the TBF programme. An educator and an official commented:

*The learners ....since we are teaching them life skills so we used to give them the examples of healthy eating habits. (Educator from a Control school)*

*They teach them about table manners. Even at lunch time they know exactly what to do (Babalwa Gcali, TBF Eastern Cape Coordinator)*

All learners interviewed knew the basics of healthy eating. They were able to list healthy food groups such as vegetables and unhealthy food groups such as fats and sugars. Although this does not mean that all learners at the schools had good nutrition knowledge or that their knowledge was attributable to the programmes, it is pleasing to note that those in the focus groups were confident in their knowledge of good nutrition. These examples are excerpts from focus groups held with Grade six learners:

*Interviewer: And give me an example of healthy foods, what's a healthy good food?*

*Learner 1: Spinach!*

*Learner 2: Cabbage!*

*(Learner Focus Group at a TBF school)*

*Interviewer: Why are vegetables healthy? Why are they good for you?*

*Learner 3: Because they don't make you sick. They make you strong.*

*Learner 4: It gives us vitamins and minerals.*

*(Learner Focus Group at a NSNP school)*



*Interviewer: Okay, what is not good for you?*  
*Learner 1: Sweets.*  
*(Learner Focus Group at a Control school)*

*Interviewer: Why are sweets bad for you... tell me?*  
*Learner 1: When you're in the classroom and you eat a sweet you become dizzy and drowsy...*  
*(Learner Focus Group at a TBF school)*

*Interviewer: Tell me what food is unhealthy?*  
*Learner 1: Pizza, and fast food. Because it only makes calories, it has too much oil. It is just junk food and they build pores and they even make you vomit.*  
*(Learner Focus Group at a Control school)*

### Programme monitoring

From the schools' point of view, the major distinction between the two programmes in relation to managing the meals is that on the one hand they are responsible for procurement for the NSNP, meaning they have to budget, manage money, source, buy, transport and store food themselves. On the other hand, TBF manages all ordering, procurement and delivery themselves, and the schools merely need to store the food prior to preparing it for consumption. The oversight and monitoring processes are therefore substantially different.

Four provinces in South Africa are using the decentralised procurement model of the NSNP; the Eastern Cape is one of them. Procurement of services is directly handled by schools from the funds that are transferred to them by the provincial office. Based on the 1996 Schools' Act, for schools to be able to handle their own procurement, they are required to have a "Section 21" status which "indicates that they have enough skills and expertise to handle the school finances and procurement" (Rendall-Mkosi, Wenhold & Sibanda, 2013: 20).

As a result the Department of Education Eastern Cape has in place various reporting strategies. These are essential in ensuring that money allocated to the school for lunch is





*So we are tapping on this non-governmental organisation called FUEL to redesign and assist our monitoring strategy. They have come up with a concept called MRR, monitor, respond and report. So it has shifted the whole view of monitoring as now it makes sure that schools understand what is expected of them. Understand what amount they must spend per meal per day, per week per month. So all is designed according to the specifics of the school, and it is helping us a lot this new aspect of monitoring (Lady Frere District Official)*

Although clearly the system is improving, gathering the kind of information required monthly can be problematic, especially as there is only one monitor permanently employed who relies on contract workers to meet monthly targets.

*...we compile a monthly report to send to our provincial office. And we do this before the 3rd of each month. [Conti] ....They are not submitting as we wish... They are very slow and it's hard to get 100% in the first three days of the month. And as the month is going we get them and we reach 100% (Lady Frere District Official)*

In contrast, TBF has a clearly defined reporting structure that is easy to use and requires very little administrative input from schools, largely because the schools have far less responsibility in ensuring the breakfast is served versus the NSNP lunch. This approach enables an already over-worked teaching complement the freedom to focus on curriculum delivery.

Thanks to Mobenzi technology (a data capturing and reporting hardware and software package), TBF schools are in constant contact with their Tiger Brands assigned Field Monitor. Schools are able to communicate regularly with TBF, which means any breakfast related problem can be dealt with immediately. The Mobenzi headset provides schools with a direct line to Tiger Brands, reinforcing the supportive role that Tiger Brands plays in the lives of the principals, educators, food handlers and learners. The TBF project coordinator explained the process:

*I am the project coordinator and I visit the schools every day. I have 27 schools and I can't do 27 schools in one day, I do two or three schools but for breakfast we are using...we have got a phone; a headset that is called Mobenzi for reporting, each and every school has that Mobenzi headset and I have that Mobenzi headset. It has been downloaded with the template that is asking everything that is happening in the school, like if whether they have water, gas and the challenges that they are facing and they are taking photo of the breakfast. So that is our monitoring tool, even if I do not reach each and every school, the report is always going to the office (Babalwa Gcali, TBF Eastern Cape Coordinator).*

Overall, therefore, the TBF monitoring works smoothly, while there are challenges with the NSNP monitoring and reporting process. This is, however, to be expected as the scale and



complexity of the programmes are very different. No specific suggestions were made to improve the NSNP monitoring.

### Functionality

In order to ensure the long-term success of the food programmes, it is important to evaluate the functionality of the scheme. We first look at what stakeholders believed worked well.

Overall there was enthusiastic support for both feeding programmes in all the schools visited. While there were some concerns raised specifically about the NSNP (dealt with later in this section), the general consensus was that the DBE programme was working well, achieving its aims of improved nutrition to deprived children, and was well-received by the learners and the community. It was seen as an important poverty alleviation strategy for a remote and needy area of the country. Secondary benefits were raised, such as the school and community benefits outlined above. Two specific areas that have not yet been mentioned are discussed below: the compatibility of the NSNP and TBF programmes, and the benefits of partnerships with other government departments.

Many stakeholders felt that schools that received both the NSNP and TBF nutrition programmes were better equipped to provide better learning environments for their learners, particularly in light of the fact that NSNP schools feed children an early lunch at 10:00 which needs to sustain them through breakfast and lunch. This issue was reflected in the comments below:

*And then on the other hand on our programme the schools sometimes are not punctual at feeding the learners at ten o'clock you see. You see on a windy day it takes a long time to cook. But they are trying most of them. But they cannot have a full stomach for the whole day as compared to the schools that are having two meals. Ja so its Tiger Brands together with School Nutrition they are serving a purpose of one which is poverty alleviation for school children. (Lady Frere District Official)*

*Both meals are important for them because when they were eating only lunch it was too late (Principal from a TBF school)*

*Yes it's too little, like if the kids could start with having breakfast then lunch it would be better (Food Handler from a Control school).*

The DBE has fostered partnerships with other government departments which enhance the spin-offs of the NSNP for the learners, schools, and communities. For example, the Department of Agriculture, Forestry and Fisheries has been a primary partner in the development of school vegetable gardens. This has been a key initiative in helping schools become self-sustainable, through programmes like Junior Land Care and others. One official commented:

*We are having a good partnership with the Department of Agriculture. To such an extent that they were having a programme that they were giving out gardening tools to the schools so that they must improve their gardens. They call it the "Four Ace Programme". Forty eight schools have received two rakes, three spades and three forks together with a hosepipe and seedlings (Lady Frere District Official)*

This partnership assists not only the school itself, but also community members who are encouraged to grow and sell vegetables. It was felt that the spin-off benefits of growing and selling vegetables to the community and to schools to serve the NSNP programme was an important achievement of the programme. Officials recognised this benefit, as in the first quote below, and this view was reinforced by a comment from a community member who is also a food handler at the school:

*Actually the School Nutrition Programme is also helping the communities because some them they do have gardens you see so they are able to sell their vegetables to the schools. (Lady Frere District Official)*

*Even I myself I am given a plot in the school, where we plough whatever we want, especially for the nutrition programme whereby learners are supposed to eat vegetables. So if my harvest is good then I can sell to the school my products (Principal from a NSNP school).*

In some cases the Department of Health also plays a role in quality control of food preparation, which ties in with the NSNP's focus on good hygiene and healthy eating habits. Other departments, such as Water Affairs and Forestry, also play a role. These partnerships are described below by an NSNP official:

*There is also Department of Health from whom we tap expertise of environmental health specialist... And sometimes they help a lot when it comes to food poisoning. We call upon them to attend to that. So we make sure that they look at the food and the quantities and the hygiene and so on (Lady Frere District Official)*

*We make sure that through the Department of Water Affairs there are partnerships where they provide water tanks to schools that have a shortage of water (Lady Frere District Official).*

Feedback regarding the implementation of the TBF nutrition programme was generally favourable. Stakeholders across the board had very few complaints. The fact that TBF always



delivered on time, and that this process required very little administration from the school was highlighted by both educators and principals.

*Tiger Brands everything is going fine (Principal from a TBF school)*

*They deliver on time, they deliver enough to cover even for instance this is the end of term but we still have supplies (Principal from a TBF school).*

While there were problems reported in the running of the NSNP, it was heartening to note that these were often school specific or had already been brought to the attention of the DBE. There were some problems that were a consistent theme across the majority of schools, and in most cases the DBE was not only aware of the problem but already attending to it. These issues are highlighted below.

One key concern was facilities and infrastructure. Almost all schools expressed a desire for an equipped kitchen to be provided. This facility helps food handlers prepare food timeously, to capacity and ensures that the food is cooked properly. Meals such as samp take a long time to cook and this time factor is compounded when schools run out of gas. In instances like this most food handlers resort to using wood burning fires outside - which can be problematic, especially when it rains or is windy. With longer cooking times many food handlers end up leaving work later than required. Some can arrive at work as early as 05:00 and only leave after 14:00. Some also mentioned needing storage space in order to store dry goods for each month. While these concerns were expressed in relation to the feeding programmes as indicated in the quote below, poor general infrastructure was a concern in schools nationwide.

*I mean there is no real facility for cooking, no real facility for storing food, no real facility as a kitchen where you would have the gas cylinders outside. As it is now it's dangerous. If anything happens there the Aunties will ....In fact they are risking their lives, because the gas cylinder is inside where they are cooking, which is not supposed to be, because that corner was never meant to be a kitchen. (Principal from a Control school)*

*Um....our storage is very small. We need to expand that place. (Principal from a NSNP school)*

A functioning and fully equipped kitchen ensures that food is cooked properly. Some learners commented that they would eat the school lunch more often if it was cooked properly.

*"Sometimes the food is not properly cooked (Learner Focus Group at a Control school).*

*I don't like the food here at school and I don't eat it, I eat my lunch box because they don't cook it nice mam. (Learner Focus Group at a Control school).*

Many schools also expressed a need for one extra gas canister a month. Another principal pointed out that the DBE allocated to them only one gas canister per month due to the



number of children they had enrolled in the school. This was problematic as the DBE only budgets for lunches in terms of gas, not taking into account that some schools also provide breakfast on their NSNP budget.

There were complaints about the quantity of food served and the quality on offer. Learners, educators, food handlers and principals felt that the Department needed to provide more food in order to increase the portion size for learners. Some learners and educators remarked on this aspect as follows:

*They don't give us enough (Learner Focus Group at a Control school).*

*They say one spoon per child and that is too small especially if they have no food at home (Educator from a NSNP school).*

Furthermore, one principal commented that in addition to increasing the quantity of food provided to learners, the quality of food needed to be improved, as reflected in the quote below. This links directly to managing the increasing rate of obesity and other weight related health issues prevalent in poor, rural communities across South Africa. One of the NSNP monitors also commented on quality, this time blaming the school for not following guidelines.

*It's not about saying learners should not be eating at our schools but we need to improve the quality so that they eat more vegetables. That's why we mentioned that more funds are needed. (Principal from a NSNP school)*

*The only problem is that at some schools they don't stick to balanced meals they we have to chase them and check them all the time. (Lady Frere District Official)*

Food handlers complained that they were not being paid enough. While this position only pays a stipend, many food handlers end up spending more than just a half day at the school.



*Yes, the problem is money (Food Handler from a Control school)*

*The job is too big. We struggle with water and with winter because we travel a distance (Food Handler from a Control school).*

Various stakeholders felt that some schools were unable to adequately manage their three month budget for food. In some instances schools would run out of money before the next deposit was received from the DBE. This resulted in schools either being unable to feed their learners or only being able to provide their learners with meals lacking the required food groups. An official commented on this issue:

*That one is not a budget problem it is a management problem. Just because the school has to divide the money into three months and to make sure that they don't run out of it. And also they must be strict in terms of getting the correct measures of serving food.... [cont] You know the problem is that they don't budget I must say that. Let say July has got so many feeding days and August has got so many feeding days, and so they must the money for July is this amount and August is that amount and so on. And then one cannot spend beyond that (Lady Frere District Official).*

In addition, banks were trying to move away from using cheques. This practice was problematic for the Department as money was transferred to schools via cheques.

Another challenge the Department faced was the misappropriation of funds intended to be used for the NSNP. This is a common theme in many government departments in South Africa, which is why there is so much reporting involved in NSNP.

*And also our biggest challenge is the misappropriation and mismanagements of funds by principals. When they find nutrition money in the bank account because there is one bank account and the money they find first because it has no name they use the money. Though they know from the paper budget they know so much is for nutrition (Lady Frere District Official).*

With the need for so much reporting, various principals and educators felt that the NSNP cuts into valuable teaching time. Teachers had to take time off to procure food, fill out numerous forms for the DBE as well as take time to dish up food every day for the Learners. This was compounded by the fact that most schools in the area were understaffed to begin with.

*Even this nutrition we have to do it ourselves. Even go as far as to buy the food for the learners, and we are running short of teachers. If two people are doing this here, there are no teachers in the classrooms (Principal from a NSNP school).*

*To count the kids, how many kids are eating? I am supposed to check every day. And also to give the food handler the register to sign. But truly speaking- I did not manage (Educator from a TBF school).*

Principals and teachers who were interviewed perceived that an unintended consequence specific to the TBF programme was that it has increased enrolment in schools which received breakfast. They claimed that parents were now choosing to enrol their children in schools which received breakfast as opposed to neighbouring schools that did not.

*Other schools that are around they are not having this programme of breakfast. And they didn't have this programme of the breakfast in their schools. They didn't get the food parcels in their schools and some of the parents decided to take their children here at my school. Like there is a village up there, their learners and there is this school, they usually take their learners there. Last year, there were two learners from that school and this year is five so the programme boosted our enrollment (Principal from a NSNP school).*

Increased enrolment brings concurrent pressure on school infrastructure, facilities and teaching staff. Whether these perceptions are borne out by enrolment data is something that needs to be assessed in future monitoring.



## 5. Conclusion and recommendations

This study assessed the impact of two school nutrition programmes in South Africa: the government's National School Nutrition Programme (NSNP) and the Tiger Brands Foundation in-school breakfast feeding programme (TBF). The NSNP delivers a cooked lunch to all Quintile 1 – 3 schools nationally (reaching approximately 8,8 million children daily), while the TBF programme delivers breakfast in the form of fortified cooked porridge to over 40,000 children nationally, primarily in Quintile 1 and 2 schools. This study assessed schools located in the Lady Frere district of the Eastern Cape. Although the TBF programme has previously been evaluated for impact in an urban setting, this is the first study which has evaluated the impact of the NSNP programme.

The study, using a comparative research design with the addition of a naturally occurring pre and post-test in control schools, reveals that in the sampled schools both programmes have positive effects on anthropometric outcomes. In addition, learners in schools receiving the interventions have higher school marks than those not receiving the intervention, although this result cannot be directly attributed to the nutrition programmes.

### Nutrition

Specifically, the results demonstrate that across all of the schools the numbers of children who were underweight or wasted was low, in fact, lower than the national average of 6%. This finding seems to suggest that the nutritional interventions at the schools studied have an important effect on reducing levels of children being underweight or wasted. Children at the schools receiving breakfast (which are children at the poorest schools) were as *likely* as children from the relatively wealthier schools (control schools) to be underweight, rather than more likely. This suggests that the lunch and breakfast combined provides nutrients to protect the most vulnerable children from under-nutrition. In addition, school stakeholders perceived a significant change amongst the learners that were noticeably underweight prior to receiving the in-school breakfast, reporting positive weight changes for these individuals.

For the control schools and schools receiving the breakfast, stunting levels were lower than the national average for 4 – 14 year olds of 13% and much lower than the national average of 23% for children 0 – 15 years in the Eastern Cape (Shisana *et al.*, 2014). Interestingly though, children at schools receiving only the NSNP had significantly higher rates of stunting than children at the other school types, although these rates were still much lower than the rates for children in the Eastern Cape. Conversely, children at the relatively poorer TBF schools were less likely to be stunted than those at the NSNP only schools. Literature demonstrates that stunting is very resistant to change, particularly as children age. Ideally under-nutrition effects need to be dealt with in early childhood to avoid stunting. However, recent literature raises debates about the resistance of stunting. Prentice *et al.* (2013a) suggest that children can catch up from stunting later on in life. The data presented here may mean that the additional nutrition of the breakfast was shifting stunting levels. The same



effect was seen in the schools that participated in the previous Tiger Brands Foundation study in Alexandra. Stunting levels were reduced by almost five percentage points over a ten month period (Hochfeld *et al.*, 2013). This points to the need for further research to confirm whether or not the combined nutrition interventions, and particularly the effect of a nutritious breakfast may in fact be able to shift levels of stunting. Longer term assessments of stunting outcomes are recommended as this may confirm the changes observed across the two studies. In particular a study which allows an assessment of stunting levels *prior* to the introduction of the breakfast programme and assessed again after a period of 1-2 years will be beneficial in confirming whether the breakfast programme does enable a shift in stunting rates. While this suggests that there may be positive returns on investments in breakfast at school level, it is also important to acknowledge that stunting is best addressed during early childhood. The higher rates of stunting at NSNP only schools are a cause for concern and point to the need for earlier investments in childhood nutrition to prevent stunting. This may mean coordinated efforts between the Department of Basic Education, the Department of Health and the Department of Social Development to ensure that children in the first three years of life, and those that attend early childhood development centres are targeted to eliminate stunting.

The lower rates of under-nutrition across these schools, compared to national childhood rates of under-nutrition 20 years ago (25% in 1994, Shisana *et al.*, 2014) is testament to comprehensive national social policies, which include



access to basic services and the wide reach of the Child Support Grant, aimed at reducing the effects of childhood poverty. Nevertheless, the fact that stunting levels are still high in South Africa points to the need for further interventions. The example of the public-private partnership that is highlighted in this study might point to ways in which the gaps that state interventions are unable to fill might be addressed.

The rates of obesity (measured both by BMI-for-age and body fat percentage) in the control schools at the first data collection point were in line with the national average of 28.1% for children 2-14 years, and disconcertingly high for girls. It is pleasing to note that for both types of intervention schools rates of obesity were far lower than the national average: 17% for schools receiving only the NSNP and 11.5% for schools receiving both the NSNP and the TBF programmes. This finding demonstrates the effects of school nutrition for protecting children from being overweight or obese. It is also clear that the addition of a breakfast further reduces the risk of obesity for children. This latter finding is supported by the data from the study conducted in Alexandra which showed that levels of obesity were reduced over a ten month period after the introduction of a breakfast programme (Hochfeld *et al.*, 2013).

The protective effects of nutritional programmes is further supported by the significant reduction in levels of obesity in the control schools after the introduction of the NSNP. The control group began receiving the NSNP meals directly after the first wave of data collection. At the post-test point obesity levels in the control group had fallen by seven percentage points. This is quite a large reduction in a relatively short period of time. Literature on transitions out of overweight and obesity for children and adolescents in the context of school nutrition are largely focused on high income contexts (Affenito *et al.*, 2013; Jaime & Lock, 2008) and there is no evidence to demonstrate the transition has occurred at the same speed in other middle or low income contexts. Thus it is difficult to say with certainty what might explain such a reduction in obesity in these Eastern Cape schools. However we can cautiously state that the NSNP could have

contributed to this shift. This suggests protective effects of the NSNP for overweight and obesity and implies that a carefully managed, diverse, nutritious daily meal may be a key protective factor for managing childhood obesity. Further, an additional nutritious school meal in the form of a breakfast has added protective benefits. It also demonstrates that shifts in nutritional health are evident at the initiation of a school feeding programme and sustained over a longer period of time. These results strongly support the initiation of school feeding in re-quintiled schools. In addition, they imply that an important long-term contribution of school feeding is the consistency and stability of nutritional intake, which results in the retention of the gains made at the initial stage, rather than dramatic new changes.

The protective effects of the breakfast are particularly important for female learners in the study schools. Female learners at control schools displayed particularly high rates of obesity; and girls at schools receiving only the NSNP were more likely than their male counterparts to be overweight or obese. This was to be expected given that females are more vulnerable to being overweight than males. It is interesting to note though that girls at schools receiving the NSNP and the TBF breakfast were as likely as their male counterparts to be overweight or obese and significantly less likely than girls at the other school types to be overweight. This suggests that the breakfast programme may have particularly positive effects on female learners. Future research should also account for physical activity levels which may be contributing to the differences between learners at the various school types, as well as between boys and girls.

Investments in nutrition during school years are important as "nutrition is foundational to both individual and national development" in economic, health, and human development terms (MCNSG, 2013: 2, Broca & Stamoulis, 2003; Jomaa *et al.*, 2011). From an economic point of view, protecting children from the cognitive effects of stunting is an important investment in future economic productivity. The data presented here seems to indicate potential to shift stunting levels in the schooling years, although further research is needed to confirm





this. It is unclear though whether shifting physical stunting will result in changes in the cognitive effects of stunting, which are known to have more lasting impacts after severe stunting in childhood (IFPRI, 2014). This is again an area for further research. From a health point of view, poor nutrition in childhood has implications for the burden of disease, and a rise in childhood obesity is directly linked to a rise in non-communicable diseases of adulthood. The data presented here demonstrates the effects of the NSNP and the additional benefits of the TBF in-school breakfast feeding programme on protecting children in these schools, especially girls, from childhood obesity. This suggests that these investments will have long term benefits in protecting children from adolescent and/or adult obesity and the associated risks of diabetes and cardiovascular disease amongst others.

### Performance

With regard to the learner performance data, children at the schools receiving the NSNP only and those receiving both nutrition interventions had higher marks than those at control schools in Term 1. Children at schools receiving the NSNP and the TBF breakfast had significantly higher marks than those in the control schools. By Term 4 the children at TBF schools still had higher marks than those at the control and those at NSNP only schools.

All schools in the study observed a significant increase in their results over term 1 and term 4; this is to be expected over the course of a school year. When these results were compared with 2013 results from the control schools it was clear that the rates of improvement over the year were no different to schools that received no nutrition intervention. This means that improvements in performance cannot necessarily be attributed to the programme since learner performance is affected by a wide range of factors that are far more closely associated with education than nutrition. Factors such as school resources and teacher quality are all factors that more directly shape learner performance. However, educators and principals reported consistently that both programmes were extremely effective in assisting with short-term hunger levels at the schools, resulting in enhanced energy, increased

participation, and better concentration amongst learners, as well as improved attendance.

Stakeholders were particularly positive about the complimentary effects of the TBF in combination with the NSNP. TBF school stakeholders commented that these benefits were experienced from the start of the school day rather than mid-morning which is when their NSNP meal were served. Therefore the short term nutritional, performance and attendance benefits have been observed by the school community, even if these take longer to translate into better school performance. It might be logical for future research in this area to study concentration and participation levels in the classroom rather than end of term grades as an indicator of the nutritional impact on learners' school performance.

### Other benefits

Stakeholders identified a number of other benefits of the feeding programmes, from benefits to the school and outside community, to social benefits for the children themselves, or their siblings. These included infrastructure and skills developments at schools; the development of food gardens at school; the opportunity for food handlers to earn a stipend; community and family benefits when surplus food is given to vulnerable learners to take home; improved nutrition literacy; and knowledge of hygiene among learners. School stakeholders felt very positive about the complementarity of the TBF and NSNP programmes, and also mentioned other useful partnerships brought on board through these programmes.

None of the schools indicated dissatisfaction with either programme in principle, and they expressed enthusiasm and gratitude for both these programmes. The two programmes are very different in scale and in logistical management. TBF can be complimented on very efficient management, organisation, monitoring and delivery, as the schools had almost nothing negative to say about this programme.

Concerns or complaints about the NSNP were not surprising due to the complexity of delivering a three part meal to 8,8 million children daily. In this study, concerns mostly related

to infrastructure (especially adequate kitchen and storage facilities), additional resources (such as more gas for cooking breakfast from saved NSNP funds, and more money to buy better quality food). Also, concerns about financial management, monitoring capacity, and factors outside the control of the NSNP and TBF (such as persistent theft of food stores) were raised. Reassuringly, none of these issues were new to the NSNP officials, and in some cases they were already searching for solutions. This indicates a sensitivity to the everyday frustrations and limitations of the system.

Overall, the data suggest positive findings with regard to under-nutrition and obesity. Children at intervention schools showed far better results for wasting and obesity than the national average, and children at schools receiving the breakfast programme had additional benefits in terms of lower rates of stunting and obesity. This is pleasing given that the Eastern Cape is a province particularly affected by food insecurity. The data regarding obesity are especially encouraging as they suggest that both nutrition interventions act to protect children from being overweight or obese and that the addition of a breakfast has clear additional benefits, markedly for girls. It is important that stakeholders are aware of the higher levels of obesity in control schools and this is a key indicator to track over time. The learner performance data shows that children at NSNP and TBF schools do better than children at control schools and that those receiving breakfast have higher marks than those receiving only the NSNP. It must be noted that such differences cannot be attributed directly to the programmes. However, stakeholders held very strong perceptions that the interventions helped children concentrate

and perform better. The experience of all stakeholders involved was overwhelmingly positive. Their perceptions were that the programmes both resulted in significant and noticeable positive changes. In addition, this study indicates these programmes represent a functional and thriving public-private partnership.

Taken together these findings provide a strong case both for the continuation of the NSNP and the value of adding a breakfast programme to all schools. However, the latter suggestion should be treated with caution. Further research is required to understand what is delivering the impact. Is it the timing of the intervention, the type of nutrient intake, or the combination of the breakfast and lunch programmes? Before embarking on rolling out breakfast to all schools there is a need to understand whether the same impacts could be achieved through changes in the NSNP programme. In addition, ensuring the delivery of a second meal has significant cost and logistical implications. Taking on this additional task may impede the ability of schools to effectively deliver one meal. Where schools are not able to effectively deliver the NSNP, addressing this should be the primary focus rather than rolling out an additional programme. The study does however indicate the positive effects of the breakfast programme and these should be assessed further in order to extend the benefit to other children in the area.

The partnership between TBF and the NSNP in the Lady Frere district is clearly one that works well and has positive effects for learners. The model can inform partnership models that might be able to extend the breakfast programme further.





## 6. References

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# APPENDIX 1: Research instruments

## In-depth interview guide for officials



**CENTRE FOR SOCIAL DEVELOPMENT IN AFRICA**  
  
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**THE TIGER BRANDS FOUNDATION & NATIONAL SCHOOL NUTRITION  
PROGRAMME EVALUATION RESEARCH  
INTERVIEW GUIDE: Eastern Cape School Nutrition Programme and TBF officials**  
25 September 2014

Thank you so much for meeting with us. I am a researcher from the Centre for Social Development in Africa (CSDA), based at the University of Johannesburg. We have been asked by the Tiger Brands Foundation (TBF) to conduct an evaluation of the TBF school breakfast programme and the National School Nutrition Programme (NSNP) in the Lady Frere and Qumbu districts of the Eastern Cape. We want to know if these two feeding programmes are having a positive impact on:

- the nutritional status of learners
- learner performance
- learners' school attendance and late coming
- the school and community more generally

We will be measuring 3 kinds of schools: those that started receiving the NSNP during 2014, those that have been receiving the NSNP for longer than a year, and those that have both the NSNP and the TBF programmes.

Our partners at the University of Fort Hare have been at these schools to take body measurements of your learners. This interview is to hear about your thoughts and opinions on the programmes.

Before we start it is important to tell you that participation is voluntary so you don't have to do the interview unless you want to. Also, if there are questions you don't want to answer you don't have to. We will not be using people's names when we report on this research, so your answers will remain confidential. If we use your responses we will identify your position (official), but not your name. This information will be used in the report we deliver to the NSNP and the TBF as well as some academic journal articles that we will write on this research.

If you agree to the interview, we request to audio record our conversation. The recording is for research purposes and NOT for any form of distribution. The audio recording and interview material will be kept safely and confidentially in hard copy as transcripts in the CSDA offices at the University of Johannesburg and electronically. These materials will be destroyed by the CSDA after the usual storage length of 5 years.

DATE		SCHOOL	
POSITION		NAME	
I understand the above and have had a chance to ask questions. I agree to be interviewed.		SIGN	
I agree to be audio recorded.		SIGN	

INTERVIEWER NAME & SIGNATURE	
START AND END TIME	



## BACKGROUND INFORMATION

1. Please tell us your name, title and what role you have in the School Nutrition Programme/ TBF programme.
2. What is the overall purpose of the programme?
3. What would you say are the long term social or developmental objectives of the programme?  
Probe: Trying to establish whether the programme is underpinned by a focus on educational outcomes, social security outcomes, nutritional outcomes, etc.
4. Does the programme achieve these objectives? Please explain.
5. Do you think a time will come when we will not need the NSNP and TBF anymore in South Africa? Please explain.
6. What monitoring and evaluation processes are you aware of in the programme?

## FUNCTIONALITY OF THE PROGRAMME

7. What are the similarities and what are the difference between the NSNP and the TBF programmes?  
Probe: differences in feeding times, menus, cost.
8. What works well in the NSNP and what remains a key challenge? (Ask TBF AND NSNP officials)
9. What works well in the TBF and what remains a key challenge? (Ask TBF AND NSNP officials)
10. What reporting structures are there for your programme?
11. What impact have the feeding programmes had?  
Probe: For Learners, for the School,  
for the Community,  
for Government,  
for TBF

## COLLABORATION

12. Who are the various role-players in running this programme that are external to the NSNP? Describe these relationships.  
Probe: Other government departments (e.g. health)  
Other private / civic organisations
13. Partnerships  
**If official is from the NSNP**  
13.1. What has your experience been with working with TBF?  
Probe: Building of relationships extent of the partnership, etc.  
**If official is from TBF**  
13.2. What has your experience been with working with the NSNP?  
Probe: Building of relationships extent of the partnership, etc.
14. Do you have any further comments or questions?

## In-depth interview guide for principals



**CENTRE FOR SOCIAL DEVELOPMENT IN AFRICA**

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### THE TIGER BRANDS FOUNDATION & NATIONAL SCHOOL NUTRITION PROGRAMME EVALUATION RESEARCH INTERVIEW GUIDE: SCHOOL PRINCIPALS & EDUCATORS 25 September 2014

Thank you so much for meeting with us. I am a researcher from the Centre for Social Development in Africa (CSDA), based at the University of Johannesburg. We have been asked by the Tiger Brands Foundation (TBF) to conduct an evaluation of the TBF school breakfast programme and the National School Nutrition Programme (NSNP) in the Lady Frere and Qumbu districts of the Eastern Cape. We want to know if these two feeding programmes are having a positive impact on:

- the nutritional status of learners
- learner performance
- learners' school attendance and late coming
- the school and community more generally

We will be measuring 3 kinds of schools: those that started receiving the NSNP during 2014, those that have been receiving the NSNP for longer than a year, and those that have both the NSNP and the TBF programmes.

Our partners at the University of Fort Hare have been at your school to take body measurements of your learners. This interview is to hear about your thoughts and opinions on the programmes.

Before we start it is important to tell you that participation is voluntary so you don't have to do the interview unless you want to. Also, if there are questions you don't want to answer you don't have to. We will not be using people's names when we report on this research, so your answers will remain confidential. If we use your responses we will identify your position (principal, or educator), but not the school in which you are situated. This information will be used in the report we deliver to the NSNP and the TBF as well as some academic journal articles that we will write on this research.

If you agree to the interview, we request to audio record our conversation. The recording is for research purposes and NOT for any form of distribution. The audio recording and interview material will be kept safely and confidentially in hard copy as transcripts in the CSDA offices at the University of Johannesburg and electronically. These materials will be destroyed by the CSDA after the usual storage length of 5 years.

<b>DATE</b>		<b>SCHOOL</b>	
<b>POSITION</b>		<b>NAME</b>	
<b>I understand the above and have had a chance to ask questions. I agree to be interviewed.</b>		<b>SIGN</b>	
<b>I agree to be audio recorded.</b>		<b>SIGN</b>	

<b>INTERVIEWER NAME &amp; SIGNATURE</b>	
<b>START AND END TIME</b>	



## BACKGROUND INFORMATION

15. How long have you been a principal and/or working at this school?
16. What quintile school is this?
17. Please describe the community which your school serves.  
Probe: Poverty / unemployment amongst parents  
Levels of need  
Income sources (e.g. grants)  
Household sizes and composition  
What kind of food availability / access do children have at home  
General health and illness
18. Push-pull factors home vs school
- 18.1. What are the things that children like about school that **encourage them to attend**?  
Probe: company, motivation to learn, school feeding
- 18.2. What are the things that learners don't like about school that **make them want to stay away**?  
Probe: distance to school, difficulties with learning, clashing with educators, bullying
- 18.3. What are the things that **keep children at home** or make it difficult for them to come to school?  
Probe: household or caring responsibilities, rain, illness, child mobility between households
- 18.4. What are the things that **make them want to leave home** to come to school?  
Probe: hunger at home, abuse at home, adult responsibilities
19. How is your school similar / different to other schools in the area?  
Probe: Facilities (sports, computer, classrooms, furniture, library, toilets, food garden, playground)  
Size and demographics  
Leadership, management and staff quality
20. Have there been any big changes in your school during 2014?  
Probe: major infrastructure problems / upgrades, teacher strikes, empty / filled posts, tragedy at school, etc.
21. Existence of **breakfast** programme:  
**[If school has TBF programme]**  
21.1. Has your school participated in any breakfast feeding programmes before the TBF project?  
21.2. Why do you think your school is part of the TBF programme?  
**[If school does NOT have TBF programme]**  
21.3. Do you have a breakfast feeding programme at this school (not TBF)? Please describe, including funding, implementation and functioning.

## IMPACT OF THE FEEDING PROGRAMMES ON LEARNERS AND THE SCHOOL ENVIRONMENT

22. Have you noticed a change since the implementation of the feeding programme/s at your school?
23. How have the school feeding programmes affected the following?
  - 23.1. Late coming?
  - 23.2. Absenteeism / regular attendance?
  - 23.3. The school's enrolment figures?
  - 23.4. Class participation? (Probe participation and concentration)
  - 23.5. Learner performance at school? (Probe: grades better, children performing better in class)
  - 23.6. Social interaction between learners?
24. Which learners would you say the school feeding programmes have benefitted the most and the least? (Probe for age, gender, grade, other)
25. If this is a TBF school: Can you differentiate between the impact of the TBF and the NSNP programmes? If yes, what are the differences? Are there any NEW changes that have happened since TBF was introduced?

## FUNCTIONALITY OF THE PROGRAMME/S

26. Operational issues
  - 26.1. Describe how the programmes work
  - 26.2. How many learners are fed daily (TBF / NSNP)?
  - 26.3. How many school handlers do you use?
  - 26.4. How long did it take until the feeding programme operated smoothly after the start of the programme?
  - 26.5. What has worked well and what hasn't worked so well – what would you change?
  - 26.6. Do you have problems with getting the food for the NSNP programme?
  - 26.7. Do you have the right facilities and skills at the school for buying, transporting, storing, preparing and serving the food?
  - 26.8. Do the children wash their hands before eating? Do you think the facilities are clean enough for cooking?
27. Food preference of learners (differentiate between TBF and NSNP)
  - 27.1. What food do the learners like **most** on the programmes?
  - 27.2. What do they like **least** on the programme?
  - 27.3. What food would the learners **PREFER** to have if they could choose?
28. Is the feeding programme initiative supplemented or linked to **other initiatives**? If yes, please describe.  
Probe: Take home or weekend food for very poor learners  
Deworming of learners  
The education of learners and parents on nutrition.
29. How much has the feeding programme cost the school (money, staff time, etc.) **in addition** to what the NSNP and TBF has supplied?
30. What has been the response of different stakeholders (teachers, food handlers, parents, children and the surrounding community) to the school feeding programmes? (Differentiate between TBF and NSNP)
31. Do you have any recommendations for TBF or NSNP?
32. Any further questions or comment?



# In-depth interview guide for food handlers



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THE TIGER BRANDS FOUNDATION & NATIONAL SCHOOL NUTRITION  
PROGRAMME EVALUATION RESEARCH  
INTERVIEW GUIDE: FOOD HANDLERS

26 September 2014

Thank you so much for talking to us. We are from the University of Johannesburg and the University of Fort Hare [Introduce individual interviewers and translator]. We are interested to hear what you think about the work you do as a food handler at school and what you think of the school meals.

Before we start it is important to tell you that participation is voluntary so you don't have to take part unless you want to. Also, if there are questions you don't want to answer you don't have to. We will not be using people's names when we report on this research, so your answers will remain secret. If we use your responses we will say you are a food handler but not the school you come from. We are also not going to tell the principal or educators what you say to us.

We encourage you all to talk, please try not feel shy because we are really interested in what each and every one of you think.

If you agree to the interview, please can we audio record our conversation. The recording is for research purposes and we will NOT give it to anyone. The audio recording and interview material will be kept safely and after five years we will throw it away.

DATE		SCHOOL	
POSITION		NAME	
I understand the above and have had a chance to ask questions. I agree to be interviewed.	SIGN		
I agree to be audio recorded.	SIGN		

INTERVIEWER NAME & SIGNATURE	
START AND END TIME	

33. Please tell us your name, how long you have been a parent at this school?
34. How did you get your job as a food handler at this school?
35. How long have you worked as a food handler for the Tiger Brands/NSNP feeding scheme?
36. Do you like being a food handler? Why or why not?
37. What do you think about the feeding scheme?

37.1. Have you noticed any differences that the feeding programme has made for learners? Please explain.

37.2. Does it help some learners more than others? Why?

37.3. Have you noticed any differences that the feeding scheme has made to the school? Please explain.

37.4. Has it made any difference to the community? Why?

37.5. What do you think the learners like to eat / don't like to eat in the school meals?
38. What do you think about the food? Is it enough? Is it good quality?
39. Do the children wash their hands before eating? Do you think the facilities are clean enough for cooking?
40. Please describe in detail what you do for the feeding scheme every day.
41. What works well about the feeding program? Why?
42. What doesn't work well about the feeding program? Why?
43. Do you have any suggestions on how to make it better?
44. Who do you speak to if there are problems that you need help with?
45. Is there anything else you'd like to tell us about the feeding scheme?
46. Is there anything else you'd like to tell us about the school or the learners' health?

Focus group discussion guide



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TBF NSNP EVALUATION RESEARCH  
FOCUS GROUP DISCUSSION GUIDE: GRADE 6 LEARNERS  
25 September 2014

Thank you so much for coming to this group meeting. We are from the University of Johannesburg and the University of Fort Hare [Introduce individual interviewers and translator]. We are interested to hear what you think about the food you get at school. We will be talking about what you like and don't like about the food, what food you eat at home, and how getting this food at school makes you feel.

Before we start it is important to tell you that participation is voluntary so you don't have to take part unless you want to. Also, if there are questions you don't want to answer you don't have to. We will not be using people's names when we report on this research, so your answers will remain secret. If we use your responses we will say you are a grade 6 learner but not the school you come from. We are also not going to tell your principal or educators what you say in this group.

We encourage you all to talk, please try not feel shy because we are really interested in what each and every one of you think. We would like to hear from everyone and not just from a few of you

Do any of you have any questions?

INTERVIEWER NAME & SIGNATURE	
START AND END TIME	

47. Please tell us your names and how long you have been at this school.
48. Have there been any big changes that have happened here at school this year? Or what is the biggest thing that has happened at school this year?  
Probe: teacher changes,  
Teacher strike,  
Infrastructure collapse or improvement,  
Tragedy
49. Have there been any big changes that have happened at home or in the community this year? Or what is the biggest thing that has happened at home or in the community this year?  
Probe: destructive storm or drought  
Community protests or violence,  
Tragedies or hardship,  
Infrastructure improvement or collapse, eg new road
50. Push-pull factors home vs school
- 50.1. What are the things that make you **want to come to school**? What do you **like** about school? (Probe: company, motivation to learn, school feeding)
- 50.2. What are the things that make you **want to stay away** from school? What **DON'T you like** about school? (Probe: distance to school, difficulties with learning, clashing with educators, bullying)
- 50.3. Are there times when you want to come to school but you can't come? What are the things that **keep you at home** (away from school)? (Probe: household or caring responsibilities, rain, illness)
51. Do you think it is good to get food at school? Why?
52. What food do you like most?
53. What food don't you like?
54. During the week do you normally eat more food at school or at home? Which food do you like better, food at school or food at home? Why do you say so?
55. What food is healthy or good for you? Why do you say this food is good?
56. What food is unhealthy or bad for you? Why is this food bad for you?

57. Impact of feeding programme **[SKIP THIS QUESTION IN LADY FRERE NSNP SCHOOLS]**

ASK QUMBU SCHOOLS	ASK TBF SCHOOLS
57.1 Do you remember when the LUNCH (NSNP) feeding programme began at your school?	57.2 Do you remember when the BREAKFAST (TBF) feeding programme began at your school?

**[Ask 57.3 – 57.5 questions to only those who remember]**

- 57.3 Have you noticed changes in you physically (in your body) since the feeding programme began?  
Probe: Do you weigh more?  
Do you feel stronger?  
More awake?
- 57.4 Do you think that there is a difference in how well you do at school since the feeding scheme began? If yes, please describe the difference between before the feeding scheme began and since it started.  
Probe: Improvement in grades,  
Concentration in class  
Participation in class
- 57.5 Has the feeding scheme changed anything about how you feel at school or about going to school now?  
Probe: Are you more excited to come to school now that there is a feeding scheme?  
Do you think you come to school more often or less often because of the feeding scheme?  
Does the feeding scheme change whether you are at school on time or not?  
Do you think you get sick more often or less often?  
Do you have more energy now or the same amount of energy or less?



58. Is there anything that you think the school should change about the food you get at school?
59. Is there anything else you'd like to tell us about your health or about the food you get at school?

USING A PEN OR KOKIS (NOT PENCIL), PLEASE DRAW US A PICTURE OF WHAT YOU THINK ABOUT THE SCHOOL MEALS YOU GET.

PROBE: YOU CAN DRAW YOURSELF BEFORE AND AFTER THE MEALS STARTED AT SCHOOL  
YOU CAN DRAW YOURSELF COMPARED TO CHILDREN AT HOME WHO ARE NOT GETTING SCHOOL MEALS  
YOU CAN DRAW ANYTHING ELSE TO TELL US WHAT YOU THINK ABOUT THE SCHOOL MEALS YOU GET

Nutritional questionnaire



National School Nutritional Programme and the Tiger Brands Foundation School Feeding Research: Eastern Cape, 2014  
Dietary Questionnaire

Date		Grade / class	
Name of field worker		Male / female	
Name of school		Age	
Name of child (for tracking purposes)			

Hello. I come from the University of Fort Hare and we are visiting schools in this area to find out about the food that children eat. I would like to ask you a few short questions about WHAT YOU ATE YESTERDAY. I just want to know about yesterday, even if it is different from what you have eaten today. Please ask if there is anything you don't understand.

1. Did you eat **BREAKFAST** yesterday?  
Circle the code for the correct answer

Yes	01
No	02
Don't know	03

- 1.1. If yes, what did you eat?

CODE	FOOD Circle the <b>code</b> for the correct answer Don't prompt Mark 1 or more	DID YOU HAVE ENOUGH TO EAT? Fill in 01 for YES and 02 for NO	COMMENTS If you were confused or need to clarify anything write here
01	Cooked porridge at HOME (e.g. Mabele or Ace)		
02	Cooked porridge at SCHOOL (e.g. Mabele or Ace)		
03	Cold cereal at home (e.g. Kelloggs cornflakes)		
04	Bread or toast with Rama / butter / dry bread with no spread		
05	Bread or toast with something on top (e.g. peanut butter, cheese, jam) at HOME		
06	Bread or toast with something on top (e.g. peanut butter, cheese, jam) at SCHOOL		

07	Something to drink that is NOT water (e.g. tea, juice, cold drinks)		
08	Other (note down here)		
09	Don't know		

1.2. If you ate porridge or cereal, did you add **MILK OR MAAS** to the porridge?  
Circle the code for the correct answer

Yes	01
No	02
Don't know	03

1.3. If you ate porridge or cereal, did you add **SUGAR** to the porridge or cereal?  
Circle the code for the correct answer

Yes	01
No	02
Don't know	03

2. Did you eat **LUNCH** yesterday?  
Circle the code for the correct answer

Yes	01
No	02
Don't know	03

2.1. If yes, did you eat at **HOME**, or at **SCHOOL**, or **BOTH**?  
Circle the code for the correct answer

Home	01
School	02
Both	03
Other (note down here)	04

2.2. What did you eat for **LUNCH**?

CODE	FOOD TYPE Circle the <b>code</b> for the correct answer Don't prompt food type Mark 1 or more	DID YOU HAVE ENOUGH TO EAT? Fill in 01 for YES and 02 for NO	COMMENTS If you were confused or need to clarify anything write here
01	Starch (e.g. pap, samp, rice, potatoes, pasta, bread)		
02	Protein (e.g. meat, chicken, fish, beans, cheese)		
03	Vegetables*		
04	Something to drink that is NOT water (e.g. tea, juice, cold drinks)		
05	Other (note down here)		
06	Don't know		

\*Please note that potatoes are not being counted as a vegetable in this study.

3. Did you eat **SUPPER** yesterday?  
Circle the code for the correct answer

Yes	01
No	02
Don't know	03

3.1. If yes, what did you eat?

CODE	FOOD TYPE Circle the <b>code</b> for the correct answer Don't prompt food type	DID YOU HAVE ENOUGH TO EAT? Fill in 01 for YES and 02 for NO	COMMENTS If you were confused or need to clarify anything write here
01	Starch (e.g. pap, samp, rice, potatoes, pasta, bread)		
02	Protein (e.g. meat, chicken, fish, beans, cheese)		
03	Vegetables*		
04	Something to drink that is NOT water (e.g. tea, juice, cold drinks)		
05	Other (note down here)		
06	Don't know		

\*Please note that potatoes are not being counted as a vegetable in this study.

4. What **FRUIT** did you eat yesterday? (prompts: at breakfast, at lunch, at supper, during school, snacks in between, before bed)

4.1. How many of each of these did you eat yesterday? (prompts: did you eat the whole fruit yourself? Did you share it with someone?)

CODE	FRUIT Circle the <b>code</b> for the correct answer Don't prompt fruit type Mark 1 or more	AMOUNT Fill in a number (fill in ½ if a fruit is shared)	COMMENTS If you were confused or need to clarify anything write here
01	Apple		
02	Banana		
03	Mango		
04	Naartjie		
05	Orange		
06	Pear		
07	Pineapple		
08	Other (note down here)		
09	Don't know		

5. What **VEGETABLES** did you eat yesterday? (prompts: at breakfast, at lunch, at supper, during school, snacks in between, before bed)

5.1. Was it part of a meal or a single serving? (Explain: part of a meal e.g. spinach on pap; or beans and samp; or tomato on bread; single serving e.g. a whole carrot or tomato; tinned baked beans)



CODE	VEGETABLES Circle the <b>code</b> for the correct answer Don't prompt type. Doesn't matter if the vegetable was raw or cooked.	PART OF A MEAL Tick one or more if part of a meal	AS A SNACK Tick one or more if a snack	HOW MANY HELPINGS? Write a number (fill in ½ if a helping is shared)	COMMENTS If you were confused or need to clarify anything write here
01	Tomato				
02	Carrot				
03	Spinach (or Umfino)				
04	Pumpkin or butternut				
05	Green squash / Gem squash				
06	Cabbage				
07	Green beans				
08	Dry / Sugar Beans (or Umngqusho)				
09	Baked beans from a tin				
10	Other* (note down here)				
11	Don't know				

\*Please note that potatoes are not being counted as a vegetable in this study.

6. Did you eat any **SWEETS** yesterday?  
Circle the code for the correct answer

Yes	01
No	02
Don't know	03

7. Did you eat any **CHIPS** yesterday?  
Circle the code for the correct answer

Yes	01
No	02
Don't know	03

- 7.1. If yes to chips, how much? (Prompts: a whole packet; a shared packet; at home sharing a large packet)  
Circle the code for the correct answer

None	00
1 small packet on my own	01
2 small packets on my own	02
Shared 1 small packet	03
Shared 2 small packets	04
Shared 1 large packet	05
More than above	06
Don't know	07

8. Did you have anything to drink **BETWEEN** meals yesterday that was NOT water? (between meals means do NOT record the drinks you have already noted above for mealtimes)  
Circle the code for the correct answer

Yes	01
No	02
Don't know	03

- 8.1. If yes, what did you drink and how much?

CODE	FOOD TYPE Circle the <b>code</b> for the correct answer Don't prompt food type	With Milk?	With sugar?	How many glasses / cups?
01	Tea			
02	Coffee			
03	Milk (if flavoured milk, indicate 'yes' with sugar)	-----		
04	Fruit juice from a can or bottle or carton	-----	-----	
04	Cordial (juice you have to mix with water)	-----	-----	
05	Cold drinks (eg Fanta, Coke)	-----	-----	

# APPENDIX 2: Report on schools that dropped out of the study

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## Zote JSS

No data was collected from this school. During pre-test data collection the roads were inaccessible and we could not get to the school to conduct the research.

## KwaMhlontlo SSS

This was exclusively a high school and therefore out of the scope of this research which was to measure children between the ages of 6 and 14.

## Tsawulayo SPS

We conducted measurements at this school for Pre-test but not for post-test as they were in the midst of exams when we arrived. They said they would confirm a later time the following day but this did not happen.

## Noxolo SPS

This school merged with another school, hence we went on to measure Rietspruit, which was not in the original selection- we obtained measurements from Rietspruit for Pre-test and Post-test.

## Khanya JSS and Platkop JSS

These two last schools were closed on the 2nd October when we arrived to collect data (we did collect pre-test data but deleted this after no data was collected for post-test). We obtained signed consent from the schools to collect data on the 2 October. Given the schedule for data collection we could not return at a later date to collect data.



