



## **The Banana Project**

A qualitative study of caregivers' and teachers' experience of pre-school children participating in a free school-fruit scheme in rural Tanzania

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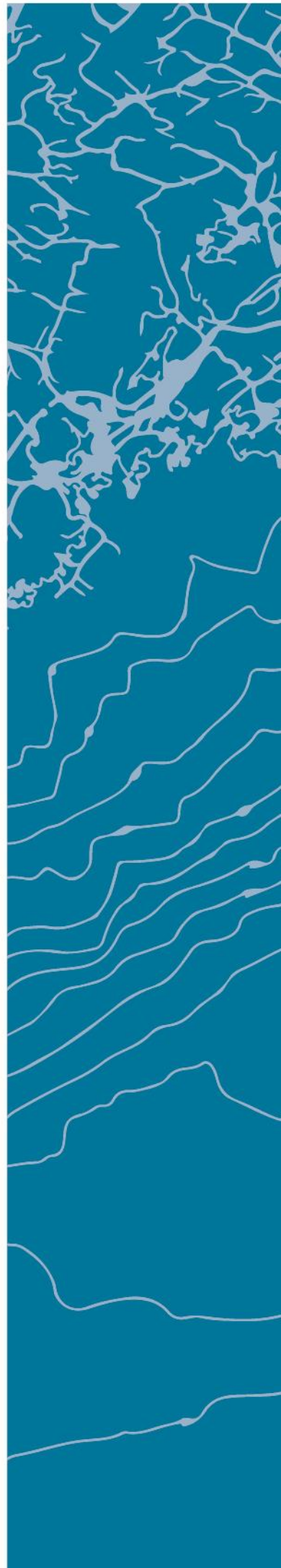
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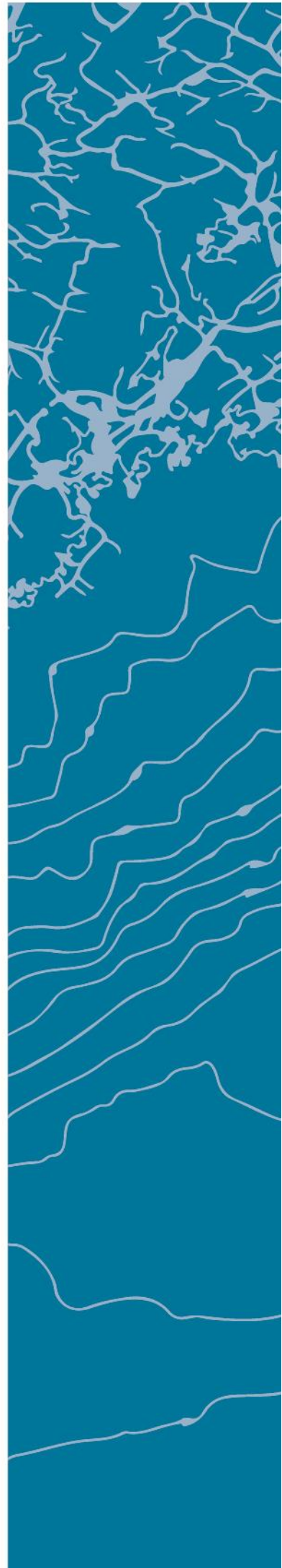
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## Abstract

**Background:** Tanzania International Competence Centre (TICC) supports projects aiming to reach the UN sustainable goals through their non-governmental organisation, “Hatua na maendeleo” (HAMA) meaning steps for development. The banana project; a free school-fruit scheme initiated by a Norwegian TICC volunteer in 2011, based on a recognised need for nutrition child support in a pre-school class, has today expanded to provide one banana daily for all the 903 children in that pre- and primary school in rural Tanzania.

This study aims to explore caregivers’ and teachers’ experiences with pre-school children participation in the free school-fruit scheme with the research question «How does caregivers and teachers of children in pre-school experience the participation in the banana intervention?»

**Method:** Semi -structured in-depth interviews with 14 caregivers and 2 teachers of pre-school children participating in the intervention were conducted in October 2017. Data were analysed according to a qualitative content analysis with a phenomenological-hermeneutic perspective.

**Results:** Caregivers and teachers experienced that the free school-fruit scheme had the following benefits for the children; reducing a recognized nutrition gap, catalysing the children’s appetite, improving the children’s physical health, supporting cognitive and socioemotional development and motivating the children for school.

**Conclusions:** Based on the results, it seems like the banana has a lot of benefits for the children in pre-school, and that the free school fruit scheme might be an approach of recommendation to strengthen the health and reduce the risk of malnutrition for children in rural Tanzania.

## Foreword

This thesis is written as a completion of the Master in Clinical Health Science at the University of Agder (UIA), Norway. The subject falls within the scope of the master related to health promotion. It was chosen as a response to a personal invitation from the University for research in Tanzania in co-operation with their partners, Tanzania International Competence Centre (TICC) and its non-governmental organisation, Hatua na Mandeleo (HAMA). For many years TICC and HAMA have worked with different health-promotion projects aiming to reach the UN sustainable goals. However, no research has been done on their projects so far.

March 2017, I went with researches from UIA on a study trip to TICC and HAMA aiming to identify a research project. Doing a master thesis, I sought to get in touch with health promoting initiatives with potential for transfer to other sub-Saharan countries. The Banana Project was relatively small but fronted as successful in helping children reducing hunger and being able to attend school. Its simplicity together with the reported cost-efficiency, motivated me to explore the involved parties' experiences. What kind of change, if any, did the caregivers and teachers experience? Since the project was primarily designed to help improve the nutrition and health of pre-school children, this naturally became the focus-area of the study.

Since March last year I have been conducting research on the topic. It has been a period of instructive and interesting learning. In the beginning I had little knowledge on caregivers' and teachers' experience with school fruit schemes for their children. However, I have been able to achieve a result I am very satisfied with.

Kristiansand, Norway, 15.05.2018

Anne Katrine Sandnes Ebitu

## Acknowledgements

I would like to thank my supervisors from the University of Agder, Kristin Haraldstad, PhD, Associate Professor, and Liv Fegran, PhD, Professor. You have been of great support constantly all through. Your valuable insights and directions gave me needful guidance to complete this thesis. I am grateful!

Also, thanks to Olav Johannes Hovland, Associate Professor, and Berit Johannesen, Associate Professor, together with my supervisors, in the research group at the University. Thank you for accepting me in the group, for your advice, inspiration and assistance. The University of Agder, through the Faculty of Health and Sports Sciences, gave me the opportunity to be part of this exciting project, and supported the travels. For this I am very grateful.

Thank you, Dr. Mercy Grace Chiduo at National Institute for Medical Research (NIMR), Tanzania, for your help through the process of approval for medical research in Tanzania and for validation of translations.

To you, Ingrid Espegren Dalsmo, my co-master-student for being of continual support and encouragement. It's been great getting to know you and spending time together in Tanzania.

Thanks to TICC and HAMA, for your welcome, co-operation and openness to this research. You have been – and are – of significant importance to the many stakeholders. Your continuous struggle to empower people to better living is incredible.

Thank you to all participants in this study, regarding the mothers, fathers, grandmothers, grandfathers, teachers, head-teacher and the HAMA workers. Thank you for taking your time and for sharing your stories and experiences. Because of you there is now new knowledge about benefits of the banana project.

Thank you also to all the pre-school children! It was a joy listening to your songs, seeing you play and observing you participate in the banana project through your class.

And last, but not least, a great thanks to my beloved husband, Samuel Ebitu and my loving children Rebekka, Rakel and Benjamin for stretching long to give me space and time to work with the thesis. My dear family, you have been of great support!

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# 1.0 Introduction

## 1.1 Background

Malnutrition is a challenge in many low- and middle-income countries (LMICs), and it pervades all aspects of children's health, growth, cognitive and social development, and can lead to irreversible and lifelong effects (M. M. Black, Pérez-Escamilla, & Rao, 2015). In Tanzania 1/3 of children under five years have signs of chronic undernutrition, 5 % of acute malnutrition and 14 % are underweight (Ministry of Health et al., 2016) Income, consumption and development indicators shows that level of poverty in Tanzania is high, and approximately 50% of the population are under the age of 15 (UNDP, 2016).

The United Nations (UN) sustainable development goals 2030 aims to strengthen children's opportunities for health and nutrition through *"...ending poverty in all its forms everywhere, ending hunger, achieving food security and improving nutrition and promoting sustainable agriculture, ensuring healthy lives and promoting well-being for all at all ages..."* (UN, 2015b).

Tanzania International Competence Centre (TICC) supports projects aiming to reach the UN sustainable goals (UN, 2015b) through their non-governmental organisation, Hatua na maendeleo (HAMA), meaning steps for development (HAMA, 2017). HAMA works closely with the local community through a holistic approach aimed at empowering people to improve their health on their own. It runs several health promotion projects, among others the banana project that is a free school-fruit intervention. The banana project was initiated by a Norwegian TICC volunteer in 2011 based on a recognised need for nutrition support in a pre-school class, and has today expanded to provide bananas for 903 children in a rural school in Tanzania (HAMA, 2017; TICC, 2014). The simple and cost-effective health promotion intervention has lasted for years and is still ongoing.

UN requests evidence based advocacy for effective health promotive interventions in low- and middle income countries especially targeting nutrition and malnutrition for sharing of guidelines and best practices and communicating key messages among relevant stakeholders (UN, 2016b). Food and Agriculture Organisation for the United Nations (FAO) rises the need for documentation on institutions, agencies and organizations in Sub-



Saharan Africa that are engaged in promoting healthy eating to build synergy, coordinate actions, facilitate successful programs and sharing of best practices (McNulty, 2013).

There has to my knowledge, so far been no study exploring the experiences of this health promotion intervention or similar school-fruit schemes in Sub-Saharan Africa. The intended value of this master thesis is therefore to explore and highlight experiences of the banana project as part of the work of TICC and HAMA, and to develop new knowledge in this field.

## 1.2 Aim of study

The aim of this master thesis study is to explore caregivers' and teachers' experiences of pre-school children participating in a free school-fruit scheme in rural Tanzania with a specific focus on the impact on nutrition and health. Research question is as follows: «How does caregivers and teachers experience the children's participation in the banana intervention?»

## 2.0 Theoretical framework

### 2.1 Health

This study explores caregivers' and teachers' experiences of the pre-school children participating in the banana project. The study specifically asks these caregivers and teachers how they experience the children's health and nutrition in relation to the participation in the project.

Health is defined by World Health Organisation (WHO) as;

*“... a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1946)*

For pre-school children in the banana intervention, health is physical, mental and social well-being as well as absence of sickness or infirmity. Though the definition is accused of being utopic and making health impossible to achieve, it fronts the well-being and not only the absence of disease or infirmity. Health includes more aspects of life as it is weaved into all sides of human life and society (Torben K. Jensen & Johnsen, 2014). Health is determined by the social and economic environment, the physical environment and the

persons individual characteristics and behaviours (WHO, 2011). This means that the determinants of the pre-school children's health are both environmental and individual. Moreover the WHO's 1986 Ottawa Charter for Health Promotion states that "*health is a positive concept emphasising social and personal resources as well as physical capacities*" (WHO, 1986). The banana school-fruit scheme seems to help the participating children to mobilise social and personal resources for everyday life by among other things giving them energy, increasing their well-being, reducing the effects of hunger, creating healthy eating and motivating them for school.

## 2.2 Health promotion

Health promotion is chosen as theoretical framework as its focus is aligned with that of the banana project, namely, the promotion of health and well-being rather than prevention of disease and infirmity. Moreover, HAMA works closely with the local community through a holistic approach aimed at empowering people to improve their health on their own. In health promotion initiatives it's the challenges in daily life, rather than the diseases that set the agenda (Torben K. Jensen & Johnsen, 2014). Through the provision of daily fruit, the banana project tackles daily health challenges for the pre-school children.

Health promotion is defined in the Ottawa Charter as;

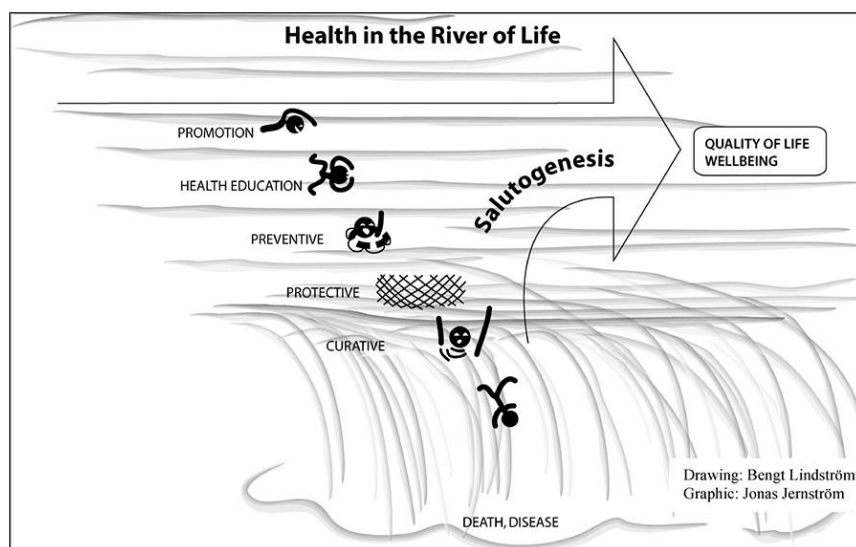
*"Health promotion is the process of enabling people to increase control over, and to improve, their health. To reach a state of complete physical, mental and social well-being, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment. Health is, therefore, seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities. Therefore, health promotion is not just the responsibility of the health sector but goes beyond healthy life-styles to well-being."* (WHO, 1986)

Health promotion is defined as a process of initiatives and interventions enabling people to increase control over and to improve their own health. The Charterer includes the empowerment thinking which emphasizes community ownership in the way that health promotion is done firstly by the people themselves and not to or for them. Health promotion is an integrated part of all activities that promotes health, and enforces health through the way we live (Torben K. Jensen & Johnsen, 2014).

Health promotion has a holistic and tailor-made approach to health, and is based on Antonowsky's theory on Salutogenesis, which describes a focus on the factors that support human health and well-being, rather than factors that causes disease or pathogenesis (Torben K. Jensen & Johnsen, 2014). The Banana Project is one such initiative that focuses on the provision of fruit in support of the health and well-being of participating children.

Antonowsky discovered through his studies that not all individuals have negative health outcomes in response to stress (Bengt Lindström & Eriksson, 2015). Instead, some people achieve health despite their exposure to potentially disabling stress factors. He described the relation between health and disease as a continuum with health-ease versus dis-ease. In salutogenetic theory, people continually battle with the effects of hardship, and whether it results in health-ease or disease depends on to which degree sense of coherence (SOC), which is comprehensibility, manageability and meaningfulness, is present or not. Health promotion initiatives must be oriented towards health, what still functions for a person, and what that person copes with, and work from there. Antonowsky used a picture described in figure 1, of people in a river towards the waterfall about to drawn to describe that the important question to ask every person wherever he is in the river is "what can make you swim" and try to help the person to gain the resources to swim. HAMA works closely with the local community through a holistic approach aimed at empowering people to improve their health on their own. Based on this picture, the banana project identifies with the top level whereby the bananas provided help the children towards health and well-being.

**Figure 1. Health in the River of Life**



Health promotion can be summarised as an initiative with the goal of health whereby the person himself is the key player and the relation to the health promotion supplier is bottom-up with the focus on one's opportunities (Torben K. Jensen & Johnsen, 2014). In respect of this, the banana project, which aims at empowering people to improve their health on their own, is a health promotion initiative. The project has a bottom-up strategy in which the pre-school children are the key players. The provision of fruit and information about healthy foods, enables the pre-school children to learn how to swim and to improve their health on their own.

### 2.2.1 Health promoting initiatives

Health promotion interventions have as their goal to increase health by enforcing the sense of coherence (SOC), which is the feeling of comprehensibility, manageability and meaningfulness, that in real life may be translated to courage, zest for life, capacity and a feeling of energy for everyday life (Torben K. Jensen & Johnsen, 2014). Health promotion initiatives are based on the ability-thinking driven by hope with a bottom-up perspective, as it is only the person him/herself knowing his/her own SOC (Torben K. Jensen & Johnsen, 2014). The banana project achieves this by having a holistic approach in empowering the pre-school children through a simple nutrition initiative that increases their energy and capacity for daily living. The project gives a sense of meaningful value and predictability.

For health promotion initiatives learning processes, experiences and the SOC is as well important as the living conditions and the stressors, like disease and other negative influences on people's lives.

### 2.2.2 Description of the banana intervention

TICC and HAMA has implemented a health promotion intervention of a free school-fruit scheme for children in a rural school in Tanzania, of whereby the pre-school teachers distributes one banana daily 5 days a week to the 159 pre-school children from their classroom. Fruits and vegetables are important components of a healthy diet and the sufficient daily consumption is recommended to be 400 g per capita per day (WHO, 2003). Despite of this, many sub-Saharan countries, including Tanzania, are shown to be low in fruit and vegetable intake (Ruel, Minot, & Smith, 2005). Banana is the most energetic fruit as it contains sucrose, fructose and glucose combined with fibre (Ware, 2017). In addition to energy, it also contains tryptophan, a protein which transforms to serotonin, vitamin A, vitamin B6, iron and calcium (Christensen, 2017). The composition of fast and slow

carbohydrates and fast and slow sugar makes it very satiating. The banana was chosen for the school-fruit scheme due to its hygiene, low price, high content of nutrients and availability all through the year. Other fruits in the area, like mango and oranges are seasonal. Types of bananas used in the project are Malindi, Korogwe, Muheza and Lushoto as they are easy-growing and common in the district.

## 2.3 Nutrition

WHO defines nutrition as follows;

*“Nutrition is the intake of food, considered in relation to the body’s dietary needs. Good nutrition – an adequate, well balanced diet combined with regular physical activity – is a cornerstone of good health. Poor nutrition can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduced productivity.” (WHO)*

Good nutrition is a foundation of healthy growth and development, but children from 0-6 years are at risk for not getting enough nutritional intake of foods (UN, 2016a). This period of early child development is critical and most faltering growth, is due to poor eating (More, 2013). Toddlers regulate their eating to their needs, as children from the age of 5-6 years tend to eat from social impacts like adults. They eat when others are eating and eat more of the foods they particularly like, like sweet, salty and energy dense foods. Food availability, accessibility and taste preferences are the most important determinants of children’s choice and consumption of foods (Blanchette & Brug, 2005; DeCosta, Møller, Olsen, & Frøst, 2017; Sedibe et al., 2014)

### 2.3.1 Malnutrition

Malnutrition is a huge world problem (UN, 2016a) and defined by WHO as:

*“Malnutrition refers to deficiencies, excesses or imbalances in a person’s intake of energy and/or nutrients. The term malnutrition covers 2 broad groups of conditions. One is ‘undernutrition’—which includes stunting (low height for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals). The other is overweight, obesity and diet-related noncommunicable diseases (such as heart disease, stroke, diabetes and cancer).” (WHO, 2016)*

Severe acute malnutrition is a significant factor in approximately one third of the nearly 8 million deaths in children under 5 years worldwide (UN, 2012) and it affects almost 19 million pre-school-age children from mostly Africa and South-East Asia (WHO, 2013).

Malnutrition is a challenge in most countries, but in the LMICs it has become a dual challenge of children within the same community suffering from both obesity and undernutrition (UN, 2016a). Recent studies also show that children in LMICs may suffer from both at the same time and that the representation of these are more than children with only obesity (Bates, Gjonça, & Leone, 2017). However, in this study malnutrition is firstly related to malnutrition due to underweight, stunting and wasting.

Malnutrition is decreasing in Tanzania, but still many children are affected and most vulnerable are children in the rural (Ministry of Health et al., 2016). Moreover, children in LMICs are at risk of getting micronutrient deficiency, which means lack of essential vitamins and minerals. This condition often shows no visible signs or symptoms, and is called *the hidden hunger* (Grebmer et al., 2014).

Children suffering from mal- and undernutrition are at risk of childhood morbidity, reduced intellectual development, reduced adult work capacity and increased risk of diseases in child- and adulthood (R. E. Black et al., 2013).

## 2.4 Previous research

Search for literature was done in MEDLINE, CINAHL, CINAHL PLUS and ERIC through Ebsco host. Mesh terms used were health, intervention, school-fruit scheme, health promotion, child preschool, child malnutrition, low and middle-income countries and Sub-Saharan Africa. Searches were done in March 2017, October 2017 and March/ April 2018.

Articles on health promotion initiatives and about health and malnutrition are many LMICs including Sub-Saharan Africa. School-fruit schemes, on the other hand, were mostly done in high-income countries and none found from in Africa.

### 2.4.1 Health promotion for children at risk of malnutrition

Studies suggest that interventions for children with or at risk of malnutrition must target a wider aspect of the children's care and development than only nutrition supplement foods alone. A literature review states that adequate dietary is critical for growth and development, but that a combination of nutrition interventions with stimulation and responsive care is necessary can work effectively together to promote protective factors and reduce risks for poor cognitive, motor, social and emotional child development (Yousafzai, Rasheed, & Bhutta, 2013). However, they found that there are gaps in the existing knowledge on how to combine nutrition and psychosocial stimulation

interventions effectively and promote these interventions at scale, and they concluded that there is need for more research in this area and suggest interventions that support and enable caregivers and families in high-risk settings to implement appropriate care for feeding and stimulation.

A study from Nepal finds associations between education level to the mothers and the risk of their children becoming malnourished (Sarki, Robertson, & Parlesak, 2016). It suggests that this factor should be taken into consideration when designing programmes to prevent chronic undernutrition.

From South-Africa, a study describes the prevalence of overweight and obesity, wasting and stunting of children in the rural and suggests the presence of a nutritional transition in these communities and emphasises the need for health promotion and education programs in schools (Tathiah, Moodley, Mubaiwa, Denny, & Taylor, 2013). The study suggests the pre-schools as a target area for strengthening children's nutrition and health.

A qualitative study that asked children in New Zealand what health meant to them, found that children themselves centred on healthy activities and food whereby energy and fun were the key motivators and availability of "unhealthy" food was the main barrier to being healthy (Mengwasser & Walton, 2013)

#### 2.4.2 Health promotion through School-fruit Schemes

School-fruit schemes have been tried out in some of the EU countries. A study in Germany looked at the school-fruit schemes' impact on children's fruit and vegetable consumption and found that the children highly appreciated the school-fruit scheme and more than 90 % evaluated the programme positively. Furthermore, the children had a significant increase of fruit and vegetable intake frequency and that the SFS did not reduce the children's fruits and vegetable consumption at home (Methner, Maschkowski, & Hartmann, 2017).

A systematic review from 2008 gives similar findings. In the review of 30 studies from Europe, USA and New-Zealand of effectiveness of interventions to promote fruit and/or vegetable consumption in children in schools, they found that school schemes are effective at increasing both intake and knowledge. Of the 30 studies included, 70% increased fruits and vegetables intake, with none decreasing intake. Twenty-three studies had follow-up

periods >1 year and provide some evidence that fruit- and vegetable schemes can have long-term impacts on consumption (de Sa & Lock, 2008).

In New-Zealand, a randomised controlled pilot study determined the uptake of a free fruit provision to low-decile primary-school children by quantitatively assessing changes in fruit intake. 20 primary schools were included in the study, which concludes that improved exposure and accessibility to fruits at school increases fruit intakes of low socio-economic group children, particularly those who do not normally eat fruit. However, some possible negative effects were shown of short-term free fruit interventions, and sustained fruit intervention programmes are recommended (Ashfield-Watt et al., 2009).

An evaluation of national free school-fruit schemes in Norway found that both the children who received free school fruit at school and their parents increased their fruit portions daily due to the scheme. However, no associations or increase were found between these scheme for children or their parents in the vegetable intake (Ovrum, Bere, & Øvrum, 2014)

## 3.0 Method

### 3.1 Design

A qualitative method with in-depth interviews and participant observations, were used (Kvale & Brinkmann, 2015; Polit & Beck, 2014) The approach was phenomenological-hermeneutic based on a holistic worldview (Gilje & Grimen, 2013; Polit & Beck, 2014). The design was chosen to gain insight into the life experiences of the participants, to interpret and to understand them (Polit & Beck, 2014). The approach clusters together related types of narrative information and builds a rich coherent description of the phenomenon studied in the belief that critical truths about reality are grounded in people's lived experiences (Polit & Beck, 2014). Heidegger stressed that to understand the meaning of the description of the experience, it must be interpreted (Gilje & Grimen, 2013; Polit & Beck, 2014). The interpretation process was described by Gadamer as a circular relationship, the hermeneutic circle, where one understand the whole of a text in terms of the parts, and the parts in terms of the whole (Austgard, 2012; Debesay, Nåden, & Slettebø, 2008; Gilje & Grimen, 2013; Polit & Beck, 2014). Components like language, concepts, beliefs, worldviews, individual experiences and many others are factors for understanding a



phenomenon studied, as well as concepts we have unconsciously. The hermeneutics say we always understand something on the background of assumptions or pre-understanding (Austgard, 2012; Debesay et al., 2008; Gilje & Grimen, 2013). For a description of my pre-understanding, see chapter 3.5.

## 3.2 Procedure of conduction

For the process of data collection, Kvale's seven stadiums for interviews (Kvale & Brinkmann, 2015) were used and are described stepwise in the following;

- 1.) Thematising.** As a response to an invitation from the University of Agder in Norway, a study trip March 2017 to TICC and HAMA in Tanzania was done to achieve information and choose an area of research. Thereafter, a limited literature review was done to increase the pre-understanding and knowledge about the topic studied (Polit & Beck, 2014).
- 2.) Planning.** Planning of the study was done in consultation with the University of Agder (UIA). In April 2017 a project plan was scaled out, and ethical and medical approvals for research was applied for June 2017. A second trip to Tanzania for data-collection was, in agreement with UIA, TICC and HAMA, done in October 2017. In-depth interviews and participant observations was chosen as method. All interview guides were made in English and translated to Kiswahili by a researcher from National Institute of Medical Research (NIMR) in Tanzania.
- 3.) Interviewing.** The interviews were conducted over a period of 10 days in October 2017, with 2-4 interviews a day. Participants were recruited a minimum of two days in advance. All participants were carefully explained the procedure of study orally before signing consent letters, and in advance of interviews (Polit & Beck, 2014). A semi-structured interview guide, with topics about their experiences with the children's participation in the banana project in relation to nutrition and health, was used to ensure theoretical and dynamical dimension (Kvale & Brinkmann, 2015; Torben K. Jensen & Johnsen, 2014) Open questions were carefully thought through, spoken language was simple and the interviews started with an introduction about themselves and their relation to the child (Torben K. Jensen & Johnsen, 2014). Through the interviews, I met theoretical, emotional and ethical dilemmas (Torben K. Jensen & Johnsen, 2014) like of being open minded and theoretically focused at the same time, being professional in the unsymmetrical

relation of the interview, and not becoming emotionally engaged in their moving stories. However, my cultural understanding, life experience and profession, helped me to navigate in this landscape (Kvale & Brinkmann, 2015). Moreover, it seemed like the participants found it helpful to share their stories with an objective and listening person.

The interviews were conducted under a mango-tree at the outskirts of the school compound. The teachers facilitated with chairs, a table and tea. All the interviews were audiotaped on an iPhone 7 and took on average 45 minutes each, including the interpretation from English to Kiswahili and vice versa. Log, field notes and conversations with the head-teacher of school and two of the HAMA workers involved in the project were additionally achieved to enrich the understanding of the topic under study.

Participant observations were carried out before and after the interviews, on 4 different days in October 2017 and lasted from 3 to 4 hours. Focus in the observations were practicalities of the intervention, distribution of the banana and the participating children. Signs of children's nutrition status, children's eating habits, participation in class and interaction in free play and class were areas of interest. All observations were carried out in the class-room or outside its building and were included in the analyses to enrich the understanding and interpretation of the participants experiences.

**4.) Transcription.** Transcriptions of the interviews started right after the interviews were conducted (Kvale & Brinkmann, 2015). All transcriptions were done verbatim and personally for not losing out any information as the transcription is the first face of interpretation (Kvale & Brinkmann, 2015; Torben K. Jensen & Johnsen, 2014). The transcription process became a bottleneck in the study process and were not completed before January 2018. In all transcriptions oral language was used, but citations for presentation in the article were made written language and corrected grammatically to avoid stigmatisation as some of the participants were illiterate (Kvale & Brinkmann, 2015). For example, were the un-consistence use of he and she corrected. However, all the citations are authentic to what the participants said.

**5.) Analysing.** The interview transcripts and observations were transferred into the data analysing program NVivo Pro 11 software for coding and data analysis. The

texts were analysed using Kvale and Brinkmann's qualitative analysis of meaning condensation, meaning interpretation and hermeneutic interpretation of meaning (Kvale & Brinkmann, 2015).

**6.) Verification.** Verification of the research process was done through the above described methods (Kvale & Brinkmann, 2015; Polit & Beck, 2014; Torben K. Jensen & Johnsen, 2014). All the interviews were transcribed personally and read through several times to get the correct data. Moreover, the first interviews and transcriptions were validated by a Tanzanian researcher. The study's trustworthiness and integrity regarding credibility, dependability and transferability is discussed in 5.0. Further verification of the results will be done as the results will be presented for the participants in Tanzania in June 2018.

**7.) Reporting.** The experience from the participants has been lent to this study to be processed and given back in a hopefully enriched form to the society (Torben K. Jensen & Johnsen, 2014) and the NGO that runs the project. The results will be presented for TICC and HAMA at the International Conference in Tanzania in June 2018. After submission of the master thesis, submission of the research article to "BMC Public Health" will follow.

### 3.3 Sampling and recruitment

For qualitative method, it's important to find the best and most information with less informants (Polit & Beck, 2014). To ensure this, strategic and targeted (purposive) sampling with maximum variation was used. Children were excluded from participation due to ethical considerations. Therefore, caregivers of pre-school children and the two pre-school class teachers were therefore chosen as sample. All participants had to be  $\leq 18$  years and be able to answer in English or Kiswahili. Inclusion criteria for the caregivers, where that they should be the primary caregiver for the child, and the child should have been  $\leq 6$  months in the pre-school.

The desired number of caregivers in the sample would have been 10, but 12 were chosen due to the risk of drop-outs. The relatively high number was to secure saturation of data sampled and ensure enough data when not knowing who would be able to articulate their experiences (Polit & Beck, 2014). The risk of drop-outs was considered relatively high due to the local culture and the risk of other things happening, like burials, weddings etc. Two of the participants came 2 hours late for their interviews due to funeral arrangements.

Another factor that again added 2 more participants, was that 2 of the grandparents sent their daughter/son instead of themselves as the pre-school child had moved back to its original parents. This made the sampling to be unbalanced between the biological parents and other caregivers, with the distribution 9 to 3. Since other caregivers represented a more vulnerable group, I decided to call in 2 more grandparents to secure enough data from their point of view.

To explore diversity of individual experiences both teachers and caregivers were included in the study, and among the caregivers a high as possible diversity of diversity was desired. This to illuminates the scope of the phenomenon involved and to identify important patterns that cut across variations (Polit & Beck, 2014). Desired variation for the caregivers was 25 years between the youngest and eldest, equally divided gender, diversity in family relation (biological parents, grandparents, other caregivers), diversity in socio-economic background, and all religions and ethnicity in the area included.

### 3.4 Data analysis

The data was analysed with a hermeneutic approach for interpretation through self-understanding, critical common-sense understanding and theoretical understanding described by Kvale and Brinkmann (Kvale & Brinkmann, 2015). Meaning condensation, meaning interpretation and hermeneutic interpretation of meaning were used (Kvale & Brinkmann, 2015). To get a preliminary understanding, all the interview transcripts were read through several times. Then the text was condensed into natural meaning units, as close as possible to their own words used, that were coded and categorised in the software (Kvale & Brinkmann, 2015). By adding hermeneutic layers to understand the meaning (Austgard, 2012; Debesay et al., 2008; Kvale & Brinkmann, 2015), the codes of natural meaning units developed into themes, that again were undergone due to the purpose of the study. Finally, the themes were abstracted to essences in wider themes and descriptive statements (Kvale & Brinkmann, 2015). Table 1 gives an example of the analyses process. The 7 canons of hermeneutic interpretations (Kvale & Brinkmann, 2015) were followed; 1.) continuous process between the units and the whole through the hermeneutic spiral, 2.) interpreting till unity without contradictions, 3.) testing of interpretations against global meaning, 4.) the autonomy of the text; it should be understood from its own frame of reference 5.) knowledge about the theme of the text, 6.) interpretation of a text is not without conditions and cannot “jump outside” the tradition of understanding he/ she lives

in and 7.) every interpretation involves innovation and creativity (Kvale & Brinkmann, 2015).

The analysis process moved between the units and the whole, being the first step condensing their phrases and trying to capture their self-understanding. After that, I went beyond the reformulated phrases, looking for the themes that dominated, but still within the context of a common-sense understanding. Then all the analysis so far were reviewed for the purpose of the study and with a critical view (Kvale & Brinkmann, 2015). Some of the codes were found redundant or of less importance, as a participant’s story from her own childhood experience with the banana. Such codes were removed from the analysis. By continually adding new layers of understanding, the codes were redefined and made into sub-themes, which again was tied together and at last gathered in five major groups of essential themes. After increasing my theoretical understanding, the themes were again abstracted into more theoretical terms and essences in descriptive statements. Table 1 gives a comprised example of this interpretive analysis from natural meaning units to themes.

**Table 1: example of data analyses**

Natural unit	Condensing	Coding	Sub-theme	Theme
<p>“So, it’s the top story for my child when he goes home. When he goes back home it’s the top story and whenever he takes the banana.”</p> <p>“My child now says that because of the banana, since he came to this school, he is more knowledgeable. And he could think and think more than before, even before the time that he was not taken the bananas at school.”</p>	<p>The top story for the child, talks about it at home</p> <p>Child says he is more knowledgeable and could think more than before he started taking bananas</p>	<p>child talks about it</p> <p>More knowledgeable</p>	<p>Enhancing story-telling</p> <p>Improved performance</p>	<p>Supporting cognitive and socioemotional development</p>

### 3.5 Pre-understanding

In qualitative researches the researcher is the tool to gather the data needed for the research (Kvale & Brinkmann, 2015; Polit & Beck, 2014) and to be aware of this is important for the result of the study.

My pre-understanding has been coloured by my professional and cultural background. Knowledge on health, health promotion and international health has been gained through the bachelor's degree in nursing, with the final assignment on the topic of preventing transmission of HIV from mother-to-child in Uganda, International studies of Tropical Health (Copenhagen) and the master's degree in Clinical Health Science. Moreover, 12 years of working experience, both as nurse and leader, has given experience and valuable insight related to health, disease and health services. This background has also been helpful in understanding the link between the banana project initiative and its health benefits.

Though Norwegian, my background of living in diverse cultures (e.g. Uganda, Mali, France and Norway) and being married to a Ugandan, has made me open, respectful and curious of other cultures, and contributed to the achievement of doing a research outside my home country and enabled me to have good rapport with participants in this study. Lived cultural experience together with studies in cross-culture communication, became tools for managing and coping with the realities in the study field and helped me understand the participants.

For this study, it has been a strength to have East-African cultural insight through all the processes, from planning to reporting. Knowledge about worldviews and cultural dynamics as well as minor details like gestures, language, dress code, food etc. has been important as to be able to get in-depth information from people and to understand and interpret their experience correctly (Polit & Beck, 2014).

My Christian worldview may have influenced the study unconsciously. However, studies in Islam and experience from living in a Muslim country has been an additional valuable knowledge for doing a research in a Muslim area.

Lastly, the conversations with TICC and HAMA in advance of the interviews, also influenced my pre-understanding of the banana project.

## 4.0 Discussion of method

The aim of the study was to provide descriptions of caregivers' and teachers' experiences of pre-school children participating in the banana project and interpret their experiences into new knowledge using qualitative method inspired by a phenomenological hermeneutic design. The use of this design has reached in the purpose of providing the information needed to understand the phenomenon under research.

The use of a qualitative method, where the design has evolved during the project and the decisions been made as the study has unfolded, has been challenging but also an advantage to me as a new and unexperienced researcher. Its flexibility and capability of adjustments has made it possible to flow in line with the direction of the study (Polit & Beck, 2014).

Regarding the scope of this study and available time, the sample size of 16 participants became high, and later saw that it would have been more reasonable to have had 10 participants also being a phenomenological study (Polit & Beck, 2014). However, the risk of withdrawing was a reality in the context and the decision of adding 2 more grandparents was important due to variety as each participant added a valuable perspective and saturation was not met before the last two interviews. On the other side, the relatively high number of caregivers being unison on the main experiences strengthens the validity of this study.

In qualitative studies, the researcher is the tool for the data collection (Kvale & Brinkmann, 2015; Polit & Beck, 2014). Being a researcher, one also brings one's background, values, social and professional identity into the research. However, I have tried my best not making it influence the trustworthiness of the research but rather enriching my position to grasp the experience from the participants point of view (Polit & Beck, 2014). As my knowledge and lived experience influence the way I think and act, my pre-understanding has influenced this master thesis. However, I have strived to be transparent, detailed and consistent all through the distinct phases.

Triangulation of data collection through in-depth interviews, observations and conversations with informants gave various and rich data of the banana project. It has also been of importance to cross-check that the information from the in-depth interviews with the participants, correspond with observations and what picture the informants gave. However, this was very simultaneous, something that became a strength to the validation

of the study. Moreover, the triangulation has unfolded at wider picture and details of the context of the caregivers' and teachers' experiences (Polit & Beck, 2014).

My cultural competence helped to get close to the participants, obtain rich and useful in-depth information and ensure an in-depth understanding of their views (Kvale & Brinkmann, 2015; Polit & Beck, 2014). However, it would have been a strength knowing Kiswahili and being able to collect the data in the same language as the participants, as translation is also an interpretation (Austgard, 2012) and there is an inherent risk of losing some data. However, validation of the interpretations and transcripts were done by the research contact person in Tanzania. Disinformation and distortions have carefully been checked out for, but the study still has possibility for minor mistakes.

The observations are detailed and rich descriptions of the children and the context and has been included in the analysis and indirectly shaped the outcome of the results. However, as mentioned initially, they were conducted to enrich my understanding of the topic and has therefore not been widely referred to since the aim of the study was to grasp the experience of caregivers and teachers, who were the main data source.

The use of interpreter in the interviews gave some challenges such as subjective translation, less spontaneity for the participants, short narratives rather than long descriptions in addition to some language barriers both-ways. However, experience was gained and corrections done after the pilot (Kvale & Brinkmann, 2015). A study on interpreter facilitated cross-language interviews suggests that with adequate preparations, validity checks and clear strategies, the interpretations can generate valid data and may be used in cross-language studies (Williamson et al., 2011)

Though the participants responses were of shorter character rather than long descriptions, the responses had a character of being direct, specific, concise and relevant, something that was of a help being an unexperienced researcher in the interpretation and understanding of the data.

All through the study, I have strived to keep simple and understandable language, both during the interviews, in the analysis and in the reporting of the findings (Torben K. Jensen & Johnsen, 2014). However, the text still reflects that its part of a discipline and is characterised by professional expressions.



There were no knowing of other researches that had been done on either the TICC/ HAMA projects or other similar banana or school-fruit schemes in the area or in the sub-Saharan context when I planned for this study, so this became a pioneer-study in a new field. A qualitative study is resource demanding, and even more in a pioneer context. For instance, the application for medical research approval was a more time-consuming process than expected. However, the support of doing a research in this context together with a co-master student, though doing different studies, was of immense help and comfort.

## 5.0 Ethical considerations

### 5.1 Risk/benefit assessments

There were no known risks for the participants in this research as it is not targeting a vulnerable group or involves medical interventions (Polit & Beck, 2014). Participation in the interviews had minimal social, physical, emotional or economical risks. During the interviews, none of the informants shared sensitive or vulnerable information. One participant was recommended for further help to TICC for one of the children. All data was treated professionally, anonymously and with respect, and all information given has been processed and used without names or personal identification number, or any other information that was directly identifiable.

Despite of anonymity, the two teachers in this study may be recognised as there are no other known pre-schools with a banana project in Tanzania. However, the data shared is not expected to give any negative impact on their relations or lead stigmatisation of any kind, unless it will be interpreted as criticism to national or local government.

One negative side of participation was loss of time spent on the interview and loss of economy due to travel to and from. However, as advised from the research contact person in Tanzania, all the participants were given a payment of 10.000 Tsh after the interview as a compensation.

The advantages of participation in the project may be an increased understanding of and reflection on children's health and nutrition and the influence of fruit intake in relation to this. Contribution of valuable information may have given meaning to the individual participants. Participation may also have been a positive break from daily life, and a

positive experience of shearing their own situations and to be seen and listened to by a friendly and objective person.

Hopefully, this study may give a greater understanding and knowledge of the banana project in relation to children's health and nutrition and may open for implementation in other schools. The study may be of interest to health workers, community workers, teachers, pre-school teachers and others working with children, but also leaders in projects, NGO's, government on distinct levels or organisations working towards increasing the health and nutrition of children in rural areas in LMICs.

## 5.2 Informed consent

Participation in the study was voluntary and based on written and orally informed consent. To ensure adequate information and comprehension about the research, the participants were explained to in Kiswahili the study purpose, procedures and its voluntary nature both at the time of recruitment and before the interview. Written consent letters were signed before the interviews took place and it was possible to withdraw from the research at any time until the start of the analysing process, but none opted for that.

## 5.3 Confidentiality procedures

All information given has been kept in strict confidence and stored on a password-protected pc. This will all be deleted when the master project is done, and latest by June 2019.

The informants have been made anonymous and all their data treated confidentially and will not be published in way that will make the informants recognisable and known to others. However, the teachers' responses as well as the head-teacher have an absence of anonymity in the name of being teachers in the pre-school and head-teacher at school. Even though the school and area are not named in the study, the NGO and the banana project is available with contact info on the internet. However, they are aware of and have agreed to the risk and benefit due to that. Other participants in the study will most likely not be recognised due to the relative high number of participants and their labels only describing their caregiver status.

## 5.4 Respect & referrals

The study was done in respect of all involved parties, retained objectivity and took into consideration culture, ethnicity, lifestyle and language. Furthermore, the results of the study will be presented for the head-teacher, participants and interpreter at their school and for HAMA and TICC at “First International Conference 2018” in Tanzania in June 2018.

## 5.5 Ethical approvals

Before undertaking the study, research plans were submitted to external reviews for ethical approval. The study was approved by Norwegian Centre for Research Data (NSD), Faculty of Health and Sports Sciences Ethical Research Committee, University of Agder (FEK) and National Institute for Medical Research, Dar Es Salaam, Tanzania (NIMR). Ethical approval from Regional Ethical Committee Norway was obtained, but not required.

## 6.0 Trustworthiness & integrity

Trustworthiness and integrity in a qualitative study is critical though complex and challenging (Polit & Beck, 2014). However, this study has attempted to keep the standards of credibility all through the study process, and in line with international guidelines (Polit & Beck, 2014).

The study depends on the participants candour in sharing of their data and experience. A risk of them not sharing of their negative experiences about the banana intervention has been taken to account. In advance of all interviews, the participants were assured that their participation or their answers to it would not implicate or affect the continuing of the project or putting them in risk of losing support from this or other projects in any ways.

Another factor taken to account, was the risk of participants feeling inferior or distant to me in aspects of education level, culture or language. To avoid these, simple language and cultural norms and local language for greetings were applied through the interviews and helped facilitate a relaxed setting.

The study depends on authentic translation of the participants responses. Before the interviews, procedures and roles were explained to the interpreter. Interpreter had valuable experience of interpretation and was a trustworthy person known within the area

but had no experience with cross-language interviews for research. In the pilot interview, we experienced some mistakes like summarising of participants narratives and some few times even answering himself instead of translating due to his engagement in the topic. However, this was discussed, and failure eliminated for the next interviews. Moreover, samples of the first audio-recordings and their verbatim transcriptions were validated by the research contact person in Tanzania.

All research has a risk of bias, and this study is not an exception to that. However, I have done my best at reducing and eliminating that risk and worked consistently and intentionally to grasp the participants experience. Observations and interviews with the head-teacher and HAMA workers confirms the revealed experiences from the participants. Moreover, I have strived to reflect the participants voice and the conditions of the inquiry. The study has been conducted in deep respect to the participants, their lives and the value of their given data. However, I am not an experienced researcher, and weaknesses due to this might appear.

Evidence based practise is assuming that study findings are not unique to the people, places or circumstances of the original research, but may be transferable and applied to other groups and settings (Bjørndal, Flottorp, & Klovning, 2013; Grimen & Terum, 2009) Though qualitative studies do not specifically aim for generalisability, its wanted to generate knowledge that might be useful in other situations. The amount of rich descriptive information provided may promote transferability to similar contexts (Polit & Beck, 2014). Effort was made to ensure that the sample was as representative as possible. However, the intention of variation in religion and socio-economic background was not obtained due to the area being dominated by Muslims and people of lower socio-economic status. Variation of caregivers were limited to biological parents and grandparents as uncles, aunties or neighbours as caregivers were not possible to obtain at time of data sampling.

Regarding authenticity, the data sampling consists of both audiotaping and verbatim transcriptions. Observations were persistent, but the interviews lasted rather shorter than expected - from 35 to 50 minutes. On the other hand, participants' responses were precise and straight-to-the-point rather than long descriptions and narratives. On the other hand, my pre-understanding and cultural knowledge helped me in knowing how to ask and what to ask for to get information needed for the study.

## 7.0 Conclusion

This qualitative study with a phenomenological hermeneutic design has through its processes from planning, sampling, transcribing, analysing and interpreting the data brought to life a deeper understanding of the caregivers' and teachers' experience of children's participation in the health promotion intervention, the banana project. The study has given new knowledge on pre-school children's participation in the banana school fruit scheme. The results of this study may be representative for these groups on the given experience. However, there is need for more studies in this area regarding the use of banana in school-fruit schemes for pre-school children in Tanzania, other Sub-Saharan countries and other low- and middle-income communities at large.

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## 9.0. Attachments

Attachment 1: Research Article

Attachment 2: Informed consent letter – Caregivers – English

Attachment 3: Informed consent letter – Caregivers – Kiswahili

Attachment 4: Informed consent letter – Teachers – English

Attachment 5: Informed consent letter – Teachers – Kiswahili

Attachment 6: Informed consent letter – Informants – English

Attachment 7: Interview guide – Caregivers – English

Attachment 8: Interview guide – Caregivers – Kiswahili

Attachment 9: Interview guide – Teachers – English

Attachment 10: Interview guide – Teachers – Kiswahili

Attachment 11: Interview guide – Informants – English

Attachment 12: Approval-letter Tanzania National Institute of Medical Research (NIMR)

Attachment 13: Approval-letter Norwegian Centre for Research Data (NSD)\_Norwegian

Attachment 14: Approval letter from Norwegian Centre for Research Data (NSD) \_English

Attachment 15: Approval-letter Faculty of Health and Sport Sciences' Ethical Committee, University of Agder (FEK)

Attachment 16: Letter from The Regional Committee for Medical and Health Research Ethics, Section B, South East Norway (REK)

Attachment 17: Submission guidelines BMC Public Health

# The Banana Project: A qualitative study of caregivers' and teachers' experience of pre-school children participating in a free banana school-fruit intervention in rural Tanzania

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## **Abstract**

**Background:** Tanzania International Competence Centre (TICC) supports projects aiming to reach the UN sustainable goals through their non-governmental organisation, "Hatua na maendeleo" (HAMA) meaning steps for development. The banana project; a free school-fruit intervention initiated by a Norwegian TICC volunteer in 2011, based on a recognised need for nutrition child support in a pre-school class, has today expanded to provide one banana daily for all the 903 children in that pre- and primary school in rural Tanzania.

The aim of this study is to explore caregivers and teachers experiences with the pre-school children's participation in the free school-fruit project with a specific focus on nutrition and health, with the research question: "How does caregivers and teachers experience the pre-school children's participation in the banana intervention?"

**Methods:** The qualitative study took place in 2017, where semi -structured in-depth interviews with 14 caregivers and 2 teachers of pre-school children participating in the intervention and observations in the pre-school class where the intervention took place, were conducted. Data were analysed according to a qualitative analysis with a phenomenological- hermeneutic perspective.

**Results:** Caregivers' and teachers' experiences with the pre-school children's participation in the banana intervention was that the banana (i) fills the children's stomachs and reduces the nutrition gap, (ii) increases the children's fruit intake and catalyses their appetite for

other foods, (iii) improves the children's physical health and provides energy, (iv) supports the children's cognitive and socioemotional development and (v) motivates the children for school.

**Conclusions:** Based on the results, it seems like the banana school-fruit intervention has a lot of benefits for the children in pre-school, and that the free school fruit intervention might be an approach of recommendation to strengthen the health and reduce the risk of malnutrition for children in rural Tanzania.

**Keywords:** health, health promotion, nutrition, pre-school children, school-fruit scheme, banana, low- and middle-income, countries qualitative study, undernutrition, malnutrition

## **Background**

Globally, 160 million children below the age of 5 have an unsatisfying weight increase and 16.000 children die daily of reasons that could have been prevented (UN, 2015a). Healthy nutrition is a foundation of sustainable growth and development, but under- and malnutrition is a huge world problem (UN, 2016a) and a challenge in many low- and middle-income countries (LMICs) as it pervades all aspects of children's health, growth, cognitive and social development, and can lead to irreversible and lifelong effects (M. M. Black et al., 2015).

In Tanzania, 1/3 of the children under five years have signs of chronic undernutrition (stunting), 5 % signs of acute malnutrition (wasting) and 14 % are underweight (Ministry of Health et al., 2016; Tzioumis, Kay, Bentley, & Adair, 2016; UNICEF). Income, consumption and development indicators shows that level of poverty in Tanzania is high, and approximately 50% of the population are under the age of 15 (UNDP, 2016). Poverty together with minor variation of foods, are risk factors for developing malnutrition (R. E. Black et al., 2013; Prentice, 2018). Food availability, accessibility and taste preferences are the most important determinants of children's choice and consumption of foods (Blanchette & Brug, 2005; DeCosta et al., 2017).

United Nations (UN) sustainable development goals 2030 aims to strengthen children's opportunities for nutrition and health (UN, 2015b) and highlights the needs for global efforts to overcome the challenges.

Tanzania International Competence Centre (TICC) supports projects aiming to reach the UN sustainable goals through their non-governmental organisation, Hatua na maendeleo (HAMA), meaning steps for development (HAMA, 2017). HAMA works closely with the local community through a holistic approach aimed at empowering people to improve their health on their own. It runs several health promotion projects, among others the banana project that is a free school-fruit intervention. The banana project was initiated by a Norwegian TICC volunteer in 2011 based on a recognised need for nutrition support in a pre-school class, and today it has expanded to providing one banana daily to all the children in both the pre- and primary school (TICC, 2014).

Fruits and vegetables are important components of a healthy diet. The sufficient daily consumption recommended by World Health Organisation (WHO) is 400 g per capita per day (WHO, 2003), but many sub-Saharan countries are shown to be low in fruit and vegetable intake (Ruel et al., 2005). The banana is nutritious, easy-growing and found in most sub-Saharan countries. It contains sucrose, fructose and glucose, fibre, vitamin A, vitamin B6, iron, calcium, and tryptophan, a protein which transforms to serotonin (Ware, 2017) The banana has a perfect composition of fast and slow carbohydrates, and fast and slow sugar, which makes it very saturating (Christensen, 2017).

Until now, few studies have studied school-fruit schemes, a health promotion intervention that intend to improve the diet-quality and nutrition in children, in Tanzania. It is unclear how the caregivers and teachers experience the children's participation in relation to this. It is important to gain more knowledge about this. Therefore, the aim of this study is to explore caregivers and teachers experiences with the pre-school children's participation in the free school-fruit project with a specific focus on nutrition and health. Research question is as follows: "How does caregivers and teachers experience the pre-school children's participation in the banana intervention?"

## **Methods**

### **Research design**

The study was conducted using a qualitative method with in-depth interviews (Kvale & Brinkmann, 2015) and participant observations with a phenomenological-hermeneutic design (Polit & Beck, 2014). The design was chosen to describe and understand the

characteristics of the participants experiences (Austgard, 2012; Gilje & Grimen, 2013; Polit & Beck, 2014). Phenomenology clusters together related narrative information and builds a coherent description of the phenomenon studied (Polit & Beck, 2014) as the hermeneutics seeks to interpret and understand the information gathered (Austgard, 2012; Debesay et al., 2008; Gilje & Grimen, 2013; Kvale & Brinkmann, 2015) . Through interviewing and observing a few cases of caregivers and teachers, to say something general about this group of cases' experiences with the children's' participation in the banana intervention, the inductive qualitative method may open for research in new areas or bring new knowledge about children participating in this kind of school-fruit scheme (Gilje & Grimen, 2013; Polit & Beck, 2014).

### **Study setting and description of intervention**

This study was conducted at a pre-school in a coastal area in rural Tanzania where the banana project is implemented. The free school-fruit scheme provides, through HAMA, one banana 5 days a week to all the children in the pre-school (HAMA, 2017; TICC, 2014). Distribution is done by the pre-school teachers at 11:20 on school-days in their classroom. During this process, the teachers lead the children in songs with movements and tell stories about being healthy and eating healthy foods, before the children sit down to receive the bananas. The children are encouraged to eat the banana right away, and as the teachers collects the peels, they also cross-check to ensure that the child has eaten. Any left-over bananas due to absence are given additionally to the children who appear to be the most in need. The types of banana used are Malindi, Korogwe, Muheza and Lushoto, as they are easy-growing and common in the area. The banana is chosen for the intervention because of its hygiene, low price, high content of nutrients and availability all through the year.

### **Sampling**

Access to study population was gained through TICC, HAMA and the current pre-school. Purposive sampling strategy, of choosing the types of cases that contribute best to the study, was used (Polit & Beck, 2014). Participants in the study were caregivers and teachers of children in the pre-school class where the banana intervention took place.

Eligibility criteria for participation for the caregivers included the following; (i) being the primary caregiver of one or more child/children in pre-school class, (ii) being above  $\geq 18$  years old, (iii) living in the same household as the pre-school child, (iv) being able to answer in English or Kiswahili, and (v) willing to give informed consent. No gender-specific criteria were used to determine eligibility, but a most even gender distribution was wanted. Furthermore, a spread of age, socio-economic status and religion was tried carrying out. Caregivers of pre-school children that had been  $\leq 6$  months in pre-school were not eligible. Due to the knowledge of the phenomena in the area, of children growing up with their grandparents, both biological parents and non-parent caregivers were recruited to the interview pool.

Eligibility criteria for participation for the teachers included the following; (i) being teacher of the pre-school class, (ii) had been with the children for  $\geq 6$  months, (iii) being able to answer in English or Kiswahili and (iv) willing to give informed consent.

Caregivers were picked from the school register and recruited by a teacher from school, who went to their homes for invitation and used an information letter in Kiswahili to briefly inform them about the study objectives and procedures and determine eligibility. Eligible caregivers that expressed their willingness, were invited to come to the nearby school for an interview.

### **Data collection**

Data was collected qualitatively through participant observations and self-reports in form of in-depth interviews (Kvale & Brinkmann, 2015; Polit & Beck, 2014). Kvale's seven stages of an interview inquiry were followed; 1.Thematising, 2.Designing, 3.Interviewing, 4.Transcribing, 5.Analysing, 6.Verifying and 7.Reporting (Kvale & Brinkmann, 2015). October 2017, 16 participants responded to the 35-50 minutes in-depth interviews, conducted under the shade of a mango tree in the outskirts of the pre-school-compound. A semi-structured interview-guide was used (Kvale & Brinkmann, 2015; Torben K. Jensen & Johnsen, 2014), starting with open questions about the participants background and relation to the child (Torben K. Jensen & Johnsen, 2014), continuing with descriptions of the child's eating habits and their home food situation, and moving on to open questions related to experiences with the pre-school child's participation in the banana intervention

from different angles and perspectives in relation to nutrition and health. Questions included in the guide were formulated from the review of relevant literature and topics that emerged from conversations with HAMA and TICC in advance of the study (Kvale & Brinkmann, 2015; Polit & Beck, 2014). Written notes were taken during the interviews to record details about participants' characteristics, emotional expressions and body language. All interviews were conducted in English and Kiswahili, the participants' native language, and consecutively interpreted by a competent interpreter. Moreover, interviews with 2 HAMA workers and the head-teacher of the school were conducted for a broader understanding of the topic studied, but not included in the analysis.

Participant observations, a method of collecting data through participation in and observation of a group or culture (Polit & Beck, 2014), were used as a supplement to self-report data to improve the understanding of the experiences and to see the world as the participants and the children see it (Polit & Beck, 2014). The observations were carried out before and after the interviews on 4 different days in October 2017, from the class-room at the pre-school and outside its building during breaktime. The observations moved between observing, active listening, participation, reflection and reconfirmation of findings with the informants (Polit & Beck, 2014). Notes of observations were made during the process (Polit & Beck, 2014). Time of observations was from 3 to 4 hours, and questions and information gathered were based on the physical setting of the banana intervention, the participating pre-school children, the distribution of the banana in the class-room, frequency and duration of the intervention, process and outcomes.

### **Data management and analysis**

At completion of interview number 16, thematic saturation was reached as no new themes, findings, concepts or problems were evident in the data (Francis et al., 2010; Polit & Beck, 2014). Audio recordings of the translated interviews and field notes were transcribed directly to Microsoft Word in English, and from there transferred into the data analysing program NVivo 11 Pro software for coding and data analysis (Kvale & Brinkmann, 2015). The data was analysed with a hermeneutic approach for interpretation through self-understanding, critical common-sense understanding and theoretical understanding described by Kvale and Brinkmann (Kvale & Brinkmann, 2015) Meaning condensation, meaning interpretation and hermeneutic interpretation of meaning were used (Kvale &



Brinkmann, 2015). To get a preliminary understanding, all the interview transcripts were read through several times. Then the text was condensed into natural meaning units that were coded and categorised in the software (Kvale & Brinkmann, 2015). By adding hermeneutic layers to understand the meaning (Austgard, 2012; Debesay et al., 2008; Kvale & Brinkmann, 2015), the codes of natural meaning units developed into themes, that again were reviewed for the purpose of the study. Finally, the themes were abstracted to essences in wider themes and descriptive statements (Kvale & Brinkmann, 2015). Table 1 gives an example of the analyses process.

**Table 1: example of data analyses**

Natural unit	Condensing	Coding	Sub-theme	Theme
<p>“So, it’s the top story for my child when he goes home. When he goes back home it’s the top story and whenever he takes the banana.”</p>	<p>The top story for the child, talks about it at home</p>	<p>child talks about it</p>	<p>Enhancing story-telling</p>	<p>Supporting cognitive and socioemotional development</p>
<p>“My child now says that because of the banana, since he came to this school, he is more knowledgeable. And he could think and think more than before, even before the time that he was not taken the bananas at school.”</p>	<p>Child says he is more knowledgeable and could think more than before he started taking bananas</p>	<p>More knowledgeable</p>	<p>Improved performance</p>	

According to Gadamer, understanding is the mental mode of being humans and it occurs in interpreting that is only possible through preunderstanding (Austgard, 2012; Gilje & Grimen, 2013; Kvale & Brinkmann, 2015). The analysis has been influenced by the hermeneutic thinking whereby the pre-understanding of the topic and the world has contributed, through the hermeneutic circle moving between the parts and the whole, in the understanding and interpretation of the data (Austgard, 2012; Debesay et al., 2008;

Kvale & Brinkmann, 2015). The hermeneutic canons of interpretation were followed in the analysis process (Austgard, 2012; Debesay et al., 2008; Kvale & Brinkmann, 2015).

## Participant characteristics

Major characteristics of the caregivers are presented in table 2.

**Table 2: Characteristics of caregivers (n=14)**

Age	n	Relation	n	Marital status	n	Education	n	Occupation	n
21-30	5	Mother	5	Married	8	Illiterate	7	Craftwork	2
31-40	3	Father	4	Cohabitant	1	Literate*	1	Street sale	3
41-50	3	Grandmother	4	Widowed	4	Primary	4	Religious	3
51-60	3	Grandfather	1	Single	1	Secondary	2	Elementary	2
								Other**	1
								None	3

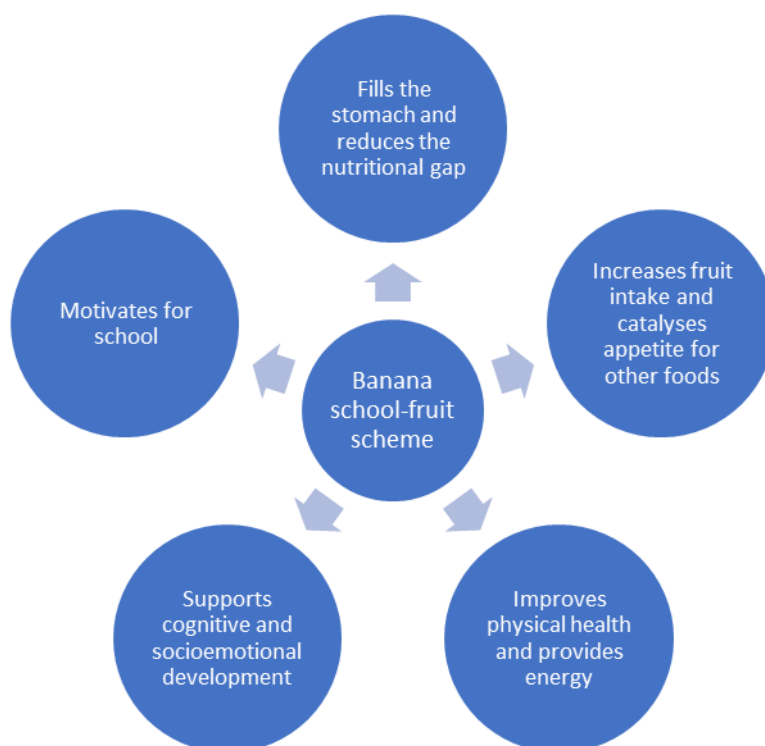
\*= Literate, but no formal education, \*\*= occupation requiring secondary or higher, but title unknown

Among the 16 interviewed, 14 were caregivers and 2 teachers, with a variation of 10 females and 6 males. The children of the caregivers were from 3 to 7 years old, with 8 children 3-5 years and 9 children 6-7 years. All participants had children that had been to the pre-school class from 6 months to 3 years, with an average of 17 months. Caregivers had from 1 to 5 children under their responsibility of care. None of the caregivers stated their marital status as divorced, but 2 had re-married. Monogamous marriages were slightly more than polygamous.

## Results

All participants have contributed to the results of this study. The analysis of the interviews and the observations, resulted in five themes of caregivers' and teachers' experiences with the pre-school children's participation in the banana intervention, and are summarised in figure 1. The participants tell that the banana has influenced the pre-school children's life and health in many ways and that their experience is that the banana (i) fills the children's stomachs and reduces the nutrition gap, (ii) increases the children's fruit intake and catalyses their appetite for other foods, (iii) improves the children's physical health and

provides energy, (iv) supports the children's cognitive and socioemotional development and (v) motivates the children for school. Significant differences between the perspectives of the biological parents and the guardians were not identified, but differences on their emphasis of themes were noticed, as for example the poorer the stronger stories.



**Figure 1. Caregivers and teachers experience of pre-school children's participation in the banana school-fruit intervention in rural Tanzania**

### **Fills the stomach and reduces the nutritional gap**

All participants described an experience of the banana intervention being a nutritional support to the children and reducing the children's hunger at school. They described children's access to variety of foods as limited and for some children, even the access to some meals. The participants experienced that the banana filled the children's stomachs and helped them through the time at school. Caregivers reported of limited household food security and challenges of providing for the children healthy and varied foods, and therefore the banana being of important additional value for children's daily needs. Children living with their grandparents seemed to be more vulnerable in this aspect due to their socio-economic status;

*“The challenge that I am facing is the hardship of life. Sometimes, if I get money the children can have tea in the morning. If they don’t have tea, they come to school and get the banana, and then they come back for another meal perhaps, for any meal that is obtainable...” (Grandmother 4)*

Most families reported a capacity of 2-3 meals per day, as the most vulnerable (1/3 of the participants) reported of a limitation of 1-2 meals per day. For the poorest families, the breakfast could be tea only, or nothing at all. All participants reported that the banana added for them nutritional value for the children. For the poorest, the banana was also reported as a relief to their pressed food situation, as one parent described;

*“The banana helps my child, because he ... doesn’t sleep because of hunger... It helps me as a mother... it helps me that I don’t have to find other ways of giving something for the boy, because he eats the banana that is given in the school.” (Parent 2)*

For many children, the banana given at school was reported, by the participants, to be the only access to fruits;

*“So even if at home... I don’t have that ability to buy fruits, but at school they get the banana, so that’s very good for his health, and of course nutritious condition.” (Grandmother 1)*

About 1/3 of the caregivers reported that they sent their children with pocket-money (100-200 shilling) to school to buy breakfast. The observations noted the children buying oily or sweetened snacks, of inferior looking nutritional quality, from the sales-women in the school compound at the 10 o’clock break, whereby ice-cream made of frozen soda looking like the most popular buy. Some few children (< 10) brought snacks like cake, biscuits, fruits or juice from home. Other caregivers reported that their children could go to school with neither breakfast or pocket-money and not having food until late midday or early evening. The teachers were concerned about these vulnerable children and suggested nutritional supplements as porridge, but as one teachers expressed it, when the situation was like it was, at least the banana gave them something to fill the stomach;

*“Sometimes in the morning, the children can take something at home, or if they don’t take something they are given money to come and buy something during break-time... Eh, but sometimes they have not been given*

*anything... When it comes to the time for banana now, you see that everybody is happy because they know that they will get something by the banana..." (Teacher 2)*

The school-fruit scheme having no costs included for the caregivers, were emphasised by some participants as a strength to especially include the most hungry and poor children.

### **Increases fruit intake and catalyses appetite for other foods**

Another experience that the caregivers reported, was that the children's participation in the banana scheme at school also increased their intake of fruits at home and gave them better appetite to eat other foods like porridge, rice, ugali, beans, vegetables etc. As a mother expressed it, that after her child had started receiving banana at school, she now liked the porridges that she didn't like before;

*"The banana has made my child to like even porridge. So, because of the banana now, my child gets porridge, and that's where the health status now comes, because the first days she didn't like even porridge because now there was no banana, but when she took banana from the school... then she likes two different porridge, yeah, so her health is good now... She didn't like porridge before even she started school, so, but after one month of coming to school and getting the banana, she liked the porridge... And even if it's the weekend now, I have to buy banana for her so that she takes the porridge." (Parent 3)*

Participants reported that the banana scheme at school had made the children to like and know about the banana, and that the children now asked for banana and other fruits at home. As a grandmother reported it, that after her grandchild had started taking banana at school, he now also asked for and wanted to eat banana in the weekends;

*"During the weekend now, he asks for money to go and buy the banana." (Grandmother 2)*

Moreover, the caregivers expressed that the banana scheme at school had increased their families general fruit intake. The situation of children talking about and asking for the banana at home made it natural for the family to provide and eat more banana and other fruits together. One father described his pre-school child as a PR educator for banana at home;

*"So, he insists, the child now who is in this class insist us to give the young child who is at home a banana a day... He is a PR educator now..." (Parent 6)*

## **Improves physical health and provides energy**

All participants reported that they experienced that the banana had given their children better physical health. A mother describes that her child's participation in the banana school-fruit scheme has improved her daughter's health as she used to be sick a lot;

*"Yes, the banana has helped my child because her health is now good. When she started the school, she was sick and weak. But when she started to get the banana, her health has improved. There is no weakness again. So, there is a very big improvement... If the banana was not there, maybe the condition of being sick would have been the same..." (Parent 4)*

Moreover, the participants reported of the banana giving the children either activeness, strength or energy for daily activities. As the teacher described;

*"So, there is a great difference, because they are taking the banana, and the banana helps them energetically to be extra cheerful, to be extra active, I could see that, but it wasn't before this system of banana. But now a lot of pupils are improving because of getting the correct fruit which has a lot of energy and other vitamins. In the past, the children of this school were very sick, and they went to the dispensary, but nowadays this has gone to the end." (Teacher 1)*

The parents and caregivers mentioned physical health changes like weight gain, smoother skin, better digestion, better sleep and stronger immune system. One mother reported of her 7-year-old daughter increasing weight during time of sickness and related it to the banana;

*"The improvement that I saw myself is that there was one time that my child was a bit sick and she was sent to hospital. And she was taken weight. At first it was 10 kilograms. But now it has improved up to 13 kilograms... In July I sent my child to hospital, and weight, she was 10 kilograms. In September, she was 13." (Parent 1)*

Some caregivers reported that there were visible and significant differences of the children's health in this school and neighbouring schools, and that parents now wanted their children to this school because of this. The teachers reported of increasingly growth of pre-school children in their class since the beginning of the project. One parent described the experience of difference like this;

*"So, you could see even from your eyes that since my child was not going to school, but now going to school and getting a banana, and those who are going to school without a banana, you could see those who are getting banana, you could see even their skin is smooth, and then of course they the way you see the children, it's quite*

*different from those who are not taking banana. So, there is good health you can recognise. Yet I haven't sent them to, sent the child to weigh, to check up the weight, or something like that, but nutritiously and healthily, just looking at the body, the skin is even... there is health" (Parent 7)*

All participants reported that the banana gave their children strength, activeness or energy, and the caregivers that they could see the children managing activities that they had struggled with before. As described by a grandmother, the banana gave her grandchild good sleep and a healthy activeness to manage daily life;

*"So, there are great changes... because of the banana the boy sleeps well..., and even if he sleeps long, in the morning he wakes up with a lot of health and activeness, and brushes his teethes, takes bath, and come to school with the good active behaviour. So, it helps a lot." (Grandmother 3)*

### **Supports cognitive and socioemotional development**

All the participants said that the banana enhanced the children's well-being and made the children happy, as here described by a father;

*"First of all, my child is always happy about the banana, because it keeps him healthy and psychological well-fit, and whenever he goes back he narrates stories about the banana to me and his friends, and even if I give him money to take things here from the business-women, yet banana, he says, is the best thing for him.... My child likes banana. When he comes back from school he is happy because... because of the banana. So, he is so happy about it." (Parent 8)*

The observations at school, also gave an impression of the banana bringing joy and happiness to the children. During distribution, the children were showing non-verbal and verbal signs of excitement, like smiles, high-fives, dancing moves and happy sayings. It seemed like the banana increased their well-being, and as one of the teachers described it from school;

*"So, really, the pupils are happy about getting the bananas... When the banana car comes, they are happy and really dancing..." (Teacher 2)*

Participants were also mentioning that the banana gave the children a certain healthy pride and that the participation in the school-fruit scheme made them proud;

*"Sometimes he comes with his banana so... and then he is boastful to others that 'see, I got a banana' from school." (Parent 5)*

Many caregivers and the teachers reported of the banana being the top-story of the day, and that it enhanced story-telling to their parents, grandparents, siblings or friends. The banana was by participants described as something positive and good in their lives, and as a grandfather describes it;

*"I think that the banana is a friend to the kids..." (Grandparent 5)*

Caregivers and teachers reported furthermore that the banana improved the children's performance and concentration – both at school and at home;

*"The banana, it makes them to be clever. They are cleverer, even at home. That's why I say that the banana gives them strength and the IQ" (Parent 9)*

The head-teacher of the school could confirm the participants experiences due to performance and concentration by linking it to the last years development of the school's academic results. The school had for an extended period been the last in the ward, but since the start of the banana project, it kept improving every year and was now the leading in their ward. From being number 32-37 of the 41 schools (37 governmental and 4 private) in the rural of their district, they now become number 8. The head-teacher acknowledged the link to the banana project; in the way that children were now more alert, had better concentration and their attendance at school had increased.

### **Motivates for school**

For all participants, the banana was mentioned as a factor of motivation for children to go to school.

*"I am very happy. Because my child could be given something very small and she could appreciate. For my child this is something that motivates her to go to school. And the others now, because she is talking with the others, the others are envying her that in her school they get a banana." (Parent 1)*

One father reported the banana to be a productive relation that made his child eager to go to school – even if he was sick;



*“The banana is really an enjoyable fruit to my child, because even if he is sick, he announces he wants to go to school because of the banana... The banana gives my child some morality to come to school, and of course, it’s a nice fruit for him. And he is always, he remembers the school because of the banana.” (Parent 6)*

## **Discussion**

The intention of the current study was to gain knowledge about caregivers and teachers experience of pre-school children participation in a free banana school-fruit scheme in rural Tanzania in relation to their health and nutrition. The main findings show that caregivers and teachers cite several perceived benefits for the children receiving the banana. The overall positive findings reflect that the banana project is succeeding in being a health promotion intervention of importance for the pre-school children due to nutrition and health. Similar findings are reported in an evaluation of a free school-fruit scheme in Mississippi, where the children receiving the fruits reported of physical and cognitive benefits, such as being physically healthy, increasing strength and energy, making it easier to focus on schoolwork and preventing the feeling of hunger if they skipped a meal (Potter et al., 2011; Schneider et al.).

Many studies have reported of school-fruit schemes providing health promoting benefits (Ashfield-Watt et al., 2009; Bere, Hilsen, & Klepp, 2010; Bere, Veierød, Bjelland, & Klepp, 2006; Ovrum et al., 2014; Ransley et al., 2007; Smith, Wells, Stluka, & McCormack, 2015; Wells & Nelson, 2005), but few with reports of as many health promotion benefits as described by the participants in this study. However, most of the school-fruit scheme researches are from high income countries, where the desired benefit is to help children with healthy diets in the combat of obesity, and whereby most of the participating children have their basic needs covered. This study, on the other hand is exploring caregivers’ and teachers’ experiences of the children participating in a school fruit scheme implemented in a rural context in a low-income country, where challenges of stunting, wasting and underweight is a reality. This might explain some of the overall positive findings.

An important finding in our study was the report of the school-fruit scheme help filling the stomachs and reduce the nutritional gap for the children. This finding might relate to the children’s poor living conditions as many of the caregivers where of lower socio-economic background and had generally little education. Many children also lived with their

grandparents, something that seemed to challenge the already pressed food situation. Though the nutritional status of children in Tanzania is improving, reports show that Tanzanian children are still at substantial risk of suffering from under- or malnutrition (Ministry of Health et al., 2016; Tzioumis et al., 2016; UNICEF), and children in rural areas and of poor families are more prone than children in the urban and of richer families (Ministry of Health et al., 2016). Observations conducted in our study indicates that children in the pre-school class have signs of both stunting, wasting and underweight. The caregivers and teachers reported of a nutrition gap due to families' scarce food household security, and limited access and availability to variation of foods and fruits. The participants experience of the banana filling the stomach may be due to the known of the banana giving saturation (Christensen, 2017), and thereby reducing the children's feeling of hunger. School-fruit schemes preventing the children from feeling hungry is reported in the studies from Mississippi (Potter et al., 2011; Schneider et al.).

The finding of the banana increasing the pre-school children's intake for fruits and catalysing their appetite for other foods is important for helping children developing healthy eating habits. This is in line with other studies showing considerable evidence for school-fruit schemes increasing children's' intake of fruits (Ashfield-Watt et al., 2009; Bere et al., 2010; Bere, Veierod, Bjelland, & Klepp, 2006; de Sa & Lock, 2008; Methner et al., 2017; Ovrum et al., 2014; Ransley et al., 2007; Smith et al., 2015; Wells & Nelson, 2005), and has also been reported as a long-term effect of fruit and vegetable distributions at schools (de Sa & Lock, 2008; Reinaerts, Crutzen, Candel, De Vries, & De Nooijer, 2008). The fact that the banana project provides fruits to the pre-school children 5 days a week, as opposed to many other schemes reporting of 2-3 times (Haß, Lischetzke, & Hartmann, 2018), increases the fruit and vegetable intake for the children involved as it is known that the more days of distribution of fruits, the higher the effect (Haß et al., 2018). The reports of pre-school children in the banana school fruit scheme asking for more fruits and seeming more willing to taste other fruits are great health promotion benefits. Moreover, the participants' reports of the banana scheme also making the families to eat more banana and fruits is an interesting finding. Comparable results are reported in other studies (Ovrum et al., 2014; Williams et al., 2015). Findings from a study evaluating the impact of nutrition supplement schemes, suggests however, that it's possible to improve dietary

habits among low-income children and their families through nutrition supplement schemes (Ashfield-Watt et al., 2009; Williams et al., 2015).

The caregivers' experience of the children getting increased appetite for other foods by participating in the banana school-fruit scheme, might have to do with accessibility and availability. Limited access and food availability are in other studies found to be strong barriers to healthy eating practices (Blanchette & Brug, 2005; DeCosta et al., 2017; Sedibe et al., 2014). The free banana school fruit scheme makes the fruit, both accessible and available to the pre-school children, and thereby benefit the children to improve their quality and variation of foods and helping them to establish healthy eating practices that includes more variation of foods in general.

The fact that the school-fruit intervention in our study was distributed at 11:20 and not during break-time, was explained by the teachers to keep the children motivated to stay till end of program, and not compete with the packed food or the snacks bought at the school-compound. However, as these snacks were of rather inferior-looking nutritional quality and most children opted to buy the ice-cream, a fruit could help the children to stay away from unhealthy snacks and preventing them from developing obesity (Tak, Te Velde, Singh, & Brug, 2010). Previous studies show that children that has suffered from underweight have an increased risk of developing obesity later in life and that this dual challenge of malnutrition is growing in LMICs (De Bock et al., 2012; Kimani-Murage, 2013; Tzioumis & Adair, 2014; Tzioumis et al., 2016; Wojcicki, 2014) The banana intervention help reducing the hunger in children, but may also on the other end help the same children preventing them from developing obesity.

Another important finding in our study is that all participants mentioned an experience of the children getting better physical health after receiving the banana, and that the banana provided energy. Considerable evidence from across many countries supports an association between stunting and general poor child development (Krishna et al., 2015; McCoy et al., 2016). This association is also stated in the UN sustainable development goal 2.2 (UN, 2015b). The health changes that the participants recognised in the pre-school children after the regular banana intake over time, might have to do with the banana stabilising nutrients in the body, as many of these children are exposed to malnutrition and

nutrient efficiency (Ministry of Health et al., 2016) and their physical health thereby might be imbalanced.

Another health-related finding, is about the school-fruit scheme having an impact on the children's cognitive and socioemotional development in form of making the children happy, increasing their well-being, enhancing story-telling etc. It's known that intake of raw fruits are associated with better mental health (Brookie, Best, & Conner, 2018). Moreover, this finding in our study is in line with previous studies where cognitive development and academic achievement are shown through nutrition and child development interventions for children from 3 year to school-age, and the earlier the children are integrated into these interventions, the stronger the benefit (M. M. Black et al., 2015). A literature review suggests that interventions for children with or at risk of malnutrition must target a wider aspect of the children's care and development than only nutrition supplement foods alone, and rather provide a combination of nutrition interventions with stimulation and responsive care. This to work effectively to promote protective factors and reduce risks for poor cognitive, motor, social and emotional child development (Yousafzai et al., 2013). HAMA's combination of having a fruit-scheme at a pre-school for children from 3 years of age, might be one suggested way to do this as an effective health promotion intervention in communities.

Furthermore, the teachers in our study emphasised the increased attendance, performance and concentration at school. It is suggested that school breakfast programmes have beneficial effects on student attendance, performance, school grades and psychosocial functions (Grantham-McGregor, 2005; Hoyland, Dye, & Lawton, 2009; Mhurchu et al., 2013). Hungry children lack energy and motivation to become involved in the class-room activities. However, this is another reason for the school considering changing the time of provision of the banana to earlier in the day to achieve even stronger cognitive effects of the intervention. Health promotion interventions that increases the cognitive and socioemotional development are important as it is stated that stunting, in addition to low wealth, is associated with low cognitive and socioemotional development scores (McCoy et al., 2016).

Another dimension of the findings, is related to the aspect of the children's motivation for school. To our knowledge, this is not found in other studies on school fruit schemes. All

participants reported an experience of the banana giving the children morale and motivation for school. The head-teacher of the school confirmed higher attendance level at school now, than before the implementation of the banana project.

Given that the banana project is a health-promotion intervention, it is a strength that, in the participants' experience of the children's participation in the project, health and nutritional benefits are apparent for them in isolation, but also in comparison to children of other neighbouring schools. This may partly explain the desire of these schools, as expressed by HAMA workers, to have similar initiatives. The visibility of these benefits should boost the projects feasibility in other schools. This is relevant to HAMAs health promotion strategy in working closely with the local community to empower people in improving their health. If one wants to reach someone with any health promotion intervention, in line with the salutogenetic perspective of health (Bengt Lindstrøm & Eriksson, 2015; Torben K. Jensen & Johnsen, 2014), or help them improving their health by behaviour change, one must reach them where they are with base in their situation and their perception of what needs to change and what they handle (Bengt Lindstrøm & Eriksson, 2015; Torben K. Jensen & Johnsen, 2014).

Findings in this current study were positively related to the banana intervention. That the banana project has run over a period of several years, may explain the many and various positive experiences. It's found in previous studies that school-based health promotion interventions over time in rural and low socioeconomic status elementary schools significantly improve children's' nutrition (King & Ling, 2015). However, the long-term effects reduce over time if the school-fruit scheme ceases (Ashfield-Watt et al., 2009; Wells & Nelson, 2005). Another aspect of long-term sustainability, might have to do with the intervention being a free nutritional support. The fact that the fruit-scheme has no costs included for the caregivers was emphasised as important by some participants. A study from Norway found that providing a free-fruit for pupils at no cost for the parents is an effective strategy to improve children's fruit and vegetable intake (Bere, Veierod, et al., 2006; Bere et al., 2005) The banana project appears effective as long as it is sponsored, but this study has, however, not looked at the implications in the absence of sponsorship.

Knowing that availability and accessibility are factors for children's eating behaviour (Blanchette & Brug, 2005; DeCosta et al., 2017; Sedibe et al., 2014), and all the above

mentioned positive health promotive benefits, the free and daily provision of bananas to the pre-school children may be a simple, but important health promotion intervention to increase the children's' nutrition and health.

The research is, to our knowledge, the first study in Tanzania to qualitatively explore caregivers and teachers experience with pre-school children's participation in a school-fruit intervention. The positive findings from this health promotion intervention may contribute to establishments of other school-fruit projects around the country, especially knowing that achievement of the Sustainable Development Goals depends on children receiving adequate nutrition, nurturant caregiving and learning opportunities (M. M. Black et al., 2015). Several international studies suggest integration of school-fruit schemes in schools (Ashfield-Watt et al., 2009; Bere, Veierod, et al., 2006; Bere, Veierød, et al., 2006; Ransley et al., 2007) and reports from Sub-Saharan Africa shows that there is need for nutritional interventions to children at this age (R. E. Black et al., 2013; Ministry of Health et al., 2016; Tathiah et al., 2013) Furthermore, it's a simple and cost-efficient intervention to implement. In addition to this, the banana intervention is a health-promotion intervention that has the potential to continue because it demands little organising.

### **Strengths and limitations**

Several factors might limit the interpretation of the findings in this study. Although there were altogether 16 interviews, which may be considered adequate, only 2 of them were teachers, making caregivers perspective dominant in the findings. However, this was expected as teachers naturally were limited by the inclusion criteria of regular contact with the children. Furthermore, there were only 6 male participants in this study, which makes the female perspective dominant. However, efforts were done in the recruitment process to equalise the balance of male and female participants, but in three of the cases the men sent their wife's in their place. This was not unexpected as the local culture emphasises the mothers and women's responsibility to look after the children.

There is, moreover, a risk of the limited number of observations being 4 sessions and might not have given the fully picture of the intervention. However, the use of observations is a strength to the study in achieving additional information to get at deeper understanding (Polit & Beck, 2014).

Another factor limiting the study is language barriers(Gilje & Grimen, 2013) and use of interpreter. There is a risk of misinterpretation and misunderstanding in the interview process, as every translation is an interpretation (Austgard, 2012). To minimise these risks, researcher at National Institute of Medical Research in Tanzania validated the audio-recordings and transcriptions of the first interviews. A study reviewing interpreter-facilitated cross-language interviews, suggests that with appropriate and adequate planning, it is still possible to successfully carry out reliable interviews (Williamson et al., 2011).

A strength to this study, is the importance of the banana project being evaluated. For many years TICC and HAMA have worked with different health-promotion projects aiming to reach the UN Millennium and the UN Sustainable Goals. However, no research has been done on their projects so far.

Additionally, the participants were recruited from the community by the know pre-school teacher, and the interviews were conducted in an informal and known setting at the pre-school compound. This was done to facilitate a relaxed setting, unlike to in their private homes where the participants might not had felt at ease and could fear negative consequences due to their vulnerable circumstances.

## **Conclusions**

This study focuses on caregivers and teachers experiences with pre-school children at the age from 3 to 7 years participating in a free school-fruit scheme in rural Tanzania. Children at substantial risk of malnutrition receives nutritional support through 1 banana daily 5 days a week, and according to the caregivers and teachers, with great health and child development benefits, in addition to giving the children motivation to come to class. Prevalence of malnutrition in rural Tanzania(Ministry of Health et al., 2016), the challenge of its slow decrease in comparing to other LMICs (Tzioumis et al., 2016), and the participants reports and observations shows that health promotion initiatives should be of high importance to promote better health and nutrition for the children in rural Tanzania and prevent more children from becoming malnourished. The banana project seems to be a working and sustainable health promotion initiative and an approach for

recommendation to strengthen the nutrition and health for pre-school children in rural Tanzania and other similar contexts.

This study could be of interest to all interested in the long-term health, nutrition and child development of Tanzanian children, and other children facing similar challenges.

### **Key messages**

- Caregivers and teachers experienced that the banana intervention had the following benefits; filling the stomachs and reducing a nutrition gap, increasing fruit intake and catalysing appetite for other foods, improving children's physical health and providing strength, supporting cognitive and socioemotional development and motivating children for school
- Based on the results, it seems like the banana school-fruit intervention has several benefits for the children in pre-school, and that the free school fruit intervention might be an approach of recommendation to strengthen the health and reduce the risk of under- or malnutrition for children of age 3-6 in rural Tanzania.
- The banana school-fruit scheme appears to be a simple, cost-efficient, innovative and easily implemented health promotion intervention.
- The positive findings may contribute to establishments of other school-fruit projects around the country, and in other countries as well.
- Further studies on school-fruit schemes to pre-school children in sub-Saharan countries are needed.

### **List of abbreviations**

TICC	Tanzania International Competence Centre
HAMA	Hatua na maendeleo (NGO)
NGO	Non-governmental organisation
UN	The United Nations
LMICs	Low- and middle-income countries
WHO	World Health Organisation



## **Declarations**

### **Ethical Approvals and consent**

The study was approved by Norwegian Centre for Research Data (NSD), Faculty of Health and Sport Sciences Ethical Research Committee, University of Agder (FEK) and National Institute for Medical Research, Dar Es Salaam, Tanzania (NIMR). Ethical approval from Regional Ethical Committee Norway was not required.

At the field of interview, the study procedures were explained in detail and all participants were given a written informed consent in Kiswahili to be signed before the interview. Permission to take written notes and digitally record the conversations were specifically obtained prior to initiating the interviews. Participants were assured that their participation would not affect their relationship with neither HAMA, the school or the banana project.

### **Consent for publication**

Consent for publication was obtained through the above-mentioned informed consent.

### **Availability of data and materials**

The authors declare that the data supporting the findings of this study are available within the article. Due to ethical restrictions and privacy protection, all the original data and material will be deleted by June 2019.

### **Competing interests**

The authors declare that they have no competing interests

### **Funding**

Apart from funding for travel from the University of Agder, no other conflicts of interests are applicable.

### **Authors' contributions**

This study was conducted by AKSE under the supervision of LF and KH.

## Acknowledgements

The authors thank the participating caregivers, teachers, pre-school children and informants for contributing to this research. Thanks to TICC and HAMA for practical support that contributed to the success of the study. We also thank dr. Mercy Grace Chiduo at the National Institute of Medical Research in Tanga for guidance through approval processes and in validation of translation.

A specially thanks to participant investigators through the research group, Berit Johannesen, associate professor, and Olav Johannes Hovland, associate professor, for valuable assistance.

## Authors information

This study is an integral part of the completion of the Master in Clinical Health Science.

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# INFORMED CONSENT FOR PARENTS AND/ OR CAREGIVERS OF CHILDREN PARTICIPATING IN THE BANANA PROJECT

## INVITATION TO PARTICIPATE IN A RESEARCH PROJECT

### AN EVALUATION OF THE BANANA PROJECT FROM PARENTS AND TEACHERS PERSPECTIVES

You are invited to participate in a research project that aims to explore parents' / caregivers' and teachers' experiences with the banana intervention in pre-school. You have been selected because you are a parent or caregiver of at least one child that participates in the banana project. The University of Agder in Norway is responsible for the research project.

#### WHAT IS THE STUDY ABOUT?

The Banana project has been an on-going project for the last 6 years, and it's known to have increased children's' attendance and performance at school. This study will explore parents' and/ or caregivers' and teachers' experiences with the intervention through in-depth interviews and participant observations. The interviews and observations will take place in October 2017 at Tanga International Competence Centre (TICC) and will last for about 1 hour. Results are expected to be ready by June 2018.

The study will collect and record personal information about you. Through the interview, questions about your experience with your child participating in the banana project will be asked, and your answers will be transcribed, anonymised and registered on a password closed computer and deleted when the research is completed.

#### POSSIBLE BENEFITS AND EXPECTED DISADVANTAGES OF TAKING PART

Participation in the study is not linked to any known risks as the research is not targeting a vulnerable group or involving any medical interventions. Disadvantages may be loss of time and expenditure on travel to the location of the interview. However, the participants will be compensated for this. Other discomforts regarding participation, may be stigma, loss of privacy and/or negative impact on relations. Advantages may be improved understanding and reflection on children's nutrition and motivation in school. Other advantages may be the positive effects of the contribution of data for research and development of new knowledge. Hopefully, the research may help children worldwide for a better health and education.

## VOLUNTARY PARTICIPATION AND THE POSSIBILITY TO WITHDRAW CONSENT (OPT-OUT)

Participation in the study is voluntary. If you wish to take part, you will need to sign the declaration of consent on the last page. You can, at any given time and without reason withdraw your consent. If you decide to withdraw your participation in the project, you can demand your personal data to be deleted, unless however, the personal data already have been analysed or used in scientific publications. If you at a later point, wish to withdraw consent or have questions regarding the project, you can contact Ruth Nesje at TICC (email: ruth.nesje@meetingpointtanga.net)

## WHAT WILL HAPPEN TO YOUR INFORMATION?

The information that is recorded about you will only be used as described in the purpose of the study. You have the right to access which information is recorded about you and the right to stipulate that any error in the information that is recorded is corrected.

All information will be processed and used without your name or personal identification number, or any other information that is directly identifiable to you.

The Project Manager has the responsibility for the daily operations/running of the Research Project and that any information about you will be handled in a secure manner. Information about you will be anonymised or deleted a maximum of 5 years after the project has ended.

## TRANSFER OF INFORMATION TO OTHERS

By agreeing to participate in the study, you are also consenting to that your information can be transferred to Norway.

## FINANCE

Participants will receive a travel allowance of 10.000 Tsh to cover for the cost of travel to TICC, where the interview will take place.

Researcher is not receiving any financial support from a sponsor, but costs due to implementing of the research (costs of travel) is covered for by the University of Agder in Norway. There are no conflicts of interest.

## APPROVAL

The Project is approved by the Regional Committee for Medical and Health Research Ethics, The Ethical Committee of the faculty, FEK, the Norwegian Centre for Research Data, NSD and the National Institute of Medical Research Tanzania

## CONSENT FOR PARTICIPATING IN THE RESEARCH PROJECT

### I AM WILLING TO PARTICIPATE IN THE RESEARCH PROJECT

---

Town and date

Participant's Signature

---

Participant's Name (in BLOCK LETTERS)

If illiterate, a witness must sign (a person selected by participant and with no connection to the research team)

I HAVE WITNESSED THE ACCURATE READING OF THE CONSENT FORM TO THE PARTICIPANT AND THE INDIVIDUAL HAS HAD THE OPPORTUNITY TO ASK QUESTIONS. I CONFIRM THAT THE INDIVIDUAL HAS GIVEN CONSENT FREELY.

---

Town and date

Witness signature

---

Witness's Name (in BLOCK LETTERS)

I CONFIRM THAT I HAVE GIVEN ACCURATE INFORMATION ABOUT THE RESEARCH PROJECT

---

Place and date

Signature

---

Role in the research project





# FOMU YA MARIDHIANO KWA AJILI YA WAZAZI NA/AU WALEZI WA WATOTO WANAOSHIRIKI KWENYE MRADI WA BANANA

## UKARIBISHO WA KUSHIRIKI KWENYE UTAFITI

### TATHIMINI YA MRADI WA BANANA, MTAZAMO WA WAZAZI NA WALIMU

Unakaribishwa kushiriki kwenye utafiti ambao unatathmini mradi wa Banana kwa kupata mtazamo wa wazazi/walezi na walimu ambao wameshiriki kwenye mradi huu katika shule ya awali. Umechaguliwa kwa sababu wewe ni mzazi au mlezi wa mtoto/watoto anayeshiriki kwenye mradi wa Banana. Mradi huu unaendeshwa na chuo kikuu cha Agder cha nchini Norway.

#### TAARIFA YA MRADI

Mradi wa Banana umekuwa ukiendelea kwa miaka sita sasa, na umeonyesha kuongeza mahudhurio na ufaulu wa watoto shuleni. Utafiti huu utatathimini mtazamo wa wazazi na/au walezi na walimu kwa kufanya mahojiano ya kina na uchunguzi. Mahojiano na uchunguzi vitafanyika mwezi Oktoba 2017 katika Kituo cha kimatatifa cha uwezeshaji Tanga (TICC) na yanatarajiwa kuchukua wastani wa saa moja. Matokeo ya utafiti huu yanategemewa kuwa tayari mwezi Juni 2018.

Utafiti huu utakusanya na kurekodi taarifa zako. Wakati wa mahojiano, utaulizwa maswali kuhusu mtoto wako anayeshiriki kwenye mradi wa Banana, majibu yako yatarekodiwa na baadaye kubadilishwa kuwa maandishi na kuhifadhiwa kwenye komputa. Uhifadhi wa taarifa utakuwa ni wa siri na hakuna mtu asiyehusika ataweza kuona taarifa zako.

#### FAIDA NA MADHARA YA USHIRIKI

Ushiriki wako hautakuwa na madhara yoyote zaidi ya muda na gharama ulizotumia kusafiri mpaka eneo la mahojiano. Hata hivyo, washiriki watarudishiwa pesa waliyotumia kwa ajilii ya usafiri. Madhara mengine madogo madogo yanaweza kuwa unyanyapaa, kukosekana kwa usiri na mtazamo hasi katika mahusiano na jamii inayokuzunguuka. Faida za ushiriki zinaweza kuwa; kuongeza uelewa na mtazamo wa afya ya watoto na motisha wakiwa shuleni. Pia, ushiriki wako utaongeza mchango katika takwimu za maendeleo na maarifa mapya. Ni matumaini yetu kwamba, matokeo ya utafiti huu yatawasaidia watoto wengine ulimwenguni kuwa na afya na elimu bora.

#### UHIYARI WA KUSHIRIKI NA KUJITOA

Ushiriki kwenye utafiti huu ni wa hiyari. Kama utapenda kushiriki, utatakiwa kuweka saine kwenye ukurasa wa mwisho wa fomu hii ya ridhaa. Unaweza, wakati wowote na bila kutoa sababu yoyote kujitoka kwenye utafiti huu. Kama ukiamua kujitoka unaweza amuru taarifa zako zifutwe na zisitumike kwenye matokeo ya utafiti huu. Kama unaswali lolote baada ya mahojiano haya unaweza wasiliana na Ruth Nesje wa TICC kwa simu namba +255784816132 au barua pepe (email: [ruth.nesje@meetingpointtanga.net](mailto:ruth.nesje@meetingpointtanga.net))

#### MATUMIZI YA TAARIFA ZAKO

Taarifa zitakazorekodiwa ni kwa matumizi ya utafiti huu tu. Una haki ya kuangalia taarifa zilizorekodiwa na kurekebisha kama kuna kosa lolote.

Taarifa zote zitafanyiwa kazi na kutumiwa bila jina lako, namba ya utambulisho au taarifa yoyote ambayo itakutambulisha wewe.

Kiongozi wa mradi atakuwa msimamzi wa kazi za kila siku/ uendeshaji wa utafiti na kwamba taarifa zozote zinazokuhusu zitahifadhiwa kwa usiri mkubwa na usalama. Taarifa zako zitafutwa miaka 5 baada ya mradi kuisha.

#### UHAMISHO WA TAARIFA KWA WENGINE

Endapo utakubali kushiriki kwenye utafiti huu, utakuwa umekubali taarifa zako kusafirishwa kwenda Norway.

#### FIDIA

Washiriki watapatiwa kiasi cha shilingi 10,000/- kama fidia ya nauli waliyotumia kwa ajili ya usafiri wa kuja kwenye mahojiano.

#### KIBALI CHA UTAFITI

Utafiti huu umepata kibali kutoka kwenye Kamati ya mkoa ya Afya, Kamati ya Maadili ya Kitivo cha Afya, FEK, Afisa Usalama wa Takwimu za Utafiti, NSD na Taasisi ya Taifa ya Utafiti wa Magonjwa ya Binaadamu ya Tanzania

## RIDHAA YA USHIRIKI KATIKA UTAFITI

### NIMEKUBALI KUSHIRIKI KWENYE UTAFITI

Mji na Tarehe

Saini ya Mshiriki

Jina la Mshiriki (kwa herufi kubwa)

Kama mshiriki hajui kusoma, shahidi atatia saini kwa niaba yake (Shahidi atachaguliwa na mshiriki na si mmoja wa watafiti)

**NIMESHUHUDIA USOMAJI WA FOMU MAELEZO NA MARIDHIANO KWA MSHIRIKI NA AMEPEWA MUDA WA KUULIZA MASWALI. NATHIBITISHA KUWA MSHIRIKI AMETOA RIDHAA YA KUSHIRIKI KWA HIARI YAKE MWENYEWWE.**

Mji na Tarehe

Saini ya Shahidi

Jina la Shahidi (kwa herufi kubwa)

### NAKIRI KUWA NIMETOA TAARIFA SAHIHI KUHUSU UTAFITI HUU

Sehemu na Tarehe

Saini

Wajibu katika utafiti



# INFORMED CONSENT FOR TEACHERS OF CHILDREN PARTICIPATING IN THE BANANA PROJECT

## INVITATION TO PARTICIPATE IN A RESEARCH PROJECT

### AN EVALUATION OF THE BANANA PROJECT FROM PARENTS AND TEACHERS PERSPECTIVES

You are invited to participate in a research project that aims to explore parents' / caregivers' and teachers' experiences with the banana intervention in pre-school. You have been selected because you are a teacher of children participating in the banana project. The University of Agder in Norway is responsible for the research project.

#### WHAT IS THE STUDY ABOUT?

The Banana project has been an on-going project for the last 6 years, and it's known to have increased children's' attendance and performance at school. This study will explore parents' and/ or caregivers' and teachers' experiences with the intervention through in-depth interviews and participant observations. The interviews and observations will take place in October 2017 at Tanga International Competence Centre (TICC) and will last for about 1 hour. Results are expected to be ready by June 2018.

The study will collect and record personal information about you. Through the interview, questions about your experience with your child participating in the banana project will be asked, and your answers will be transcribed, anonymised and registered on a password closed computer and deleted when the research is completed.

#### POSSIBLE BENEFITS AND EXPECTED DISADVANTAGES OF TAKING PART

Participation in the study is not linked to any known risks as the research is not targeting a vulnerable group or involving any medical interventions. Disadvantages may be loss of time and expenditure on travel to the location of the interview. However, the participants will be compensated for this. Other discomforts regarding participation, may be stigma, loss of privacy and/or negative impact on relations. Advantages may be improved understanding and reflection on children's nutrition and motivation in school. Other advantages may be the positive effects of the contribution of data for research and development of new knowledge. Hopefully, the research may help children worldwide for a better health and education.

## VOLUNTARY PARTICIPATION AND THE POSSIBILITY TO WITHDRAW CONSENT (OPT-OUT)

Participation in the study is voluntary. If you wish to take part, you will need to sign the declaration of consent on the last page. You can, at any given time and without reason withdraw your consent. If you decide to withdraw your participation in the project, you can demand your personal data to be deleted, unless however, the personal data already have been analysed or used in scientific publications. If you at a later point, wish to withdraw consent or have questions regarding the project, you can contact Ruth Nesje at TICC (email: [ruth.nesje@meetingpointtanga.net](mailto:ruth.nesje@meetingpointtanga.net))

## WHAT WILL HAPPEN TO YOUR INFORMATION?

The information that is recorded about you will only be used as described in the purpose of the study. You have the right to access which information is recorded about you and the right to stipulate that any error in the information that is recorded is corrected.

All information will be processed and used without your name or personal identification number, or any other information that is directly identifiable to you.

The Project Manager has the responsibility for the daily operations/running of the Research Project and that any information about you will be handled in a secure manner. Information about you will be anonymised or deleted a maximum of 5 years after the project has ended.

## TRANSFER OF INFORMATION TO OTHERS

By agreeing to participate in the study, you are also consenting to that your information can be transferred to Norway.

## FINANCE

Participants will receive a travel allowance of 10.000 Tsh to cover for the cost of travel to TICC, where the interview will take place.

Researcher is not receiving any financial support from a sponsor, but costs due to implementing of the research (costs of travel) is covered for by the University of Agder in Norway. There are no conflicts of interest.

## APPROVAL

The Project is approved by the Regional Committee for Medical and Health Research Ethics, The Ethical Committee of the faculty, FEK, the Data Protection Official for Research, NSD and the National Institute of Medical Research Tanzania

## CONSENT FOR PARTICIPATING IN THE RESEARCH PROJECT

### I AM WILLING TO PARTICIPATE IN THE RESEARCH PROJECT

---

Town and date

Participant's Signature

Participant's Name (in BLOCK LETTERS)

### I CONFIRM THAT I HAVE GIVEN ACCURATE INFORMATION ABOUT THE RESEARCH PROJECT

---

Place and date

Signature

Role in the research project



# FOMU YA MARIDHIANO YA WALIMU WA WATOTO WANAOSHIRIKI KWENYE MRADI WA BANANA

## UKARIBISHO WA KUSHIRIKI KWENYE UTAFITI

### TATHIMINI YA MRADI WA BANANA, MTAZAMO WA WAZAZI NA WALIMU

Unakaribishwa kushiriki kwenye utafiti ambao unatathmini mradi wa Banana kwa kupata mtazamo wa wazazi/walezi na walimu ambao wameshiriki kwenye mradi huu katika shule ya awali. Umechaguliwa kwa sababu wewe ni mzazi au mlezi wa mtoto/watoto anayeshiriki kwenye mradi wa Banana. Mradi huu unaendeshwa na chuo kikuu cha Agder cha nchini Norway.

## TAARIFA YA MRADI

Mradi wa Banana umekuwa ukiendelea kwa miaka sita sasa, na umeonyesha kuongeza mahudhurio na ufaulu wa watoto shuleni. Utafiti huu utatathimini mtazamo wa wazazi na/au walezi na walimu kwa kufanya mahojiano ya kina na uchunguzi. Mahojiano na uchunguzi vitafanyika mwezi Oktoba 2017 katika Kituo cha kimatatafa cha uwezeshaji Tanga (TICC) na yanatarajiwa kuchukua wastani wa saa moja. Matokeo ya utafiti huu yanategemewa kuwa tayari mwezi Juni 2018.

Utafiti huu utakusanya na kurekodi taarifa zako. Wakati wa mahojiano, utaulizwa maswali kuhusu mtoto wako anayeshiriki kwenye mradi wa Banana, majibu yako yatarekodiwa na baadaye kubadilishwa kuwa maandishi na kuhifadhiwa kwenye komputa. Uhifadhi wa taarifa utakuwa ni wa siri na hakuna mtu asiyehusika ataweza kuona taarifa zako.

#### FAIDA NA MADHARA YA USHIRIKI

Ushiriki wako hautakuwa na madhara yoyote zaidi ya muda na gharama ulizotumia kusafiri mpaka eneo la mahojiano. Hata hivyo, washiriki watarudishiwa pesa waliyotumia kwa ajili ya usafiri. Madhara mengine madogo madogo yanaweza kuwa unyanyapaa, kukosekana kwa usiri na mtazamo hasi katika mahusiano na jamii inayokuzunguuka. Faida za ushiriki zinaweza kuwa; kuongeza uelewa na mtazamo wa afya ya watoto na motisha wakiwa shuleni. Pia, ushiriki wako utaongeza mchango katika takwimu za maendeleo na maarifa mapya. Ni matumaini yetu kwamba, matokeo ya utafiti huu yatawasaidia watoto wengine ulimwenguni kuwa na afya na elimu bora.

#### UHIYARI WA KUSHIRIKI NA KUJITOA

Ushiriki kwenye utafiti huu ni wa hiyari. Kama utapenda kushiriki, utatakiwa kuweka saina kwenye ukurasa wa mwisho wa fomu hii ya ridhaa. Unaweza, wakati wowote na bila kutoa sababu yoyote kujitoka kwenye utafiti huu. Kama ukiamua kujitoka unaweza amuru taarifa zako zifutwe na zisitumike kwenye matokeo ya utafiti huu. Kama unaswali lolote baada ya mahojiano haya unaweza wasiliana na Ruth Nesje wa TICC kwa simu namba +255784816132 au barua pepe (email: [ruth.nesje@meetingpointtanga.net](mailto:ruth.nesje@meetingpointtanga.net)).

#### MATUMIZI YA TAARIFA ZAKO

Taarifa zitakazorekodiwa ni kwa matumizi ya utafiti huu tu. Una haki ya kuangalia taarifa zilizorekodiwa na kurekebisha kama kuna kosa lolote.

Taarifa zote zitafanyiwa kazi na kutumiwa bila jina lako, namba ya utambulisho au taarifa yoyote ambayo itakutambulisha wewe.

Kiongozi wa mradi atakuwa msimamzi wa kazi za kila siku/ uendeshajiwa mradi na kwamba taarifa zozote zinazokuhusu zitahifadhiwa kwa usiri mkubwa na usalama. Taarifa zako zitafutwa miaka 5 baada ya mradi kuisha.

#### UHAMISHO WA TAARIFA KWA WENGINE

Endapo utakubali kushiriki kwenye utafiti huu, utakuwa umekubali taarifa zako kusafirishwa kwenda Norway.

#### FIDIA

Washiriki watapatiwa kiasi cha shilingi 10,000/- kama fidia ya nauli waliyotumia kwa ajili ya usafiri wa kuja kwenye mahojiano.

#### KIBALI CHA UTAFITI

Utafiti huu umepata kibali kutoka kwenye Kamati ya mkoa ya Afya, Kamati ya Maadili ya Kitivo cha Afya, FEK, Afisa Usalama wa Takwimu za Utafiti, NSD na Taasisi ya Taifa ya Utafiti wa Magonjwa ya Binaadamu ya Tanzania



RIDHAA YA USHIRIKI KATIKA UTAFITI

NIMEKUBALI KUSHIRIKI KWENYE UTAFITI

Mji na Tarehe

Saini ya Mshiriki

Jina la Mshiriki (kwa herufi kubwa)

NAKIRI KUWA NIMETOA TAARIFA SAHIHI KUHUSU UTAFITI HUU

Sehemu na Tarehe

Saini

Wajibu katika utafiti



# INFORMED CONSENT FOR INFORMANTS IN THE STUDY OF THE BANANA PROJECT

## INVITATION TO PARTICIPATE IN A RESEARCH PROJECT

### AN EVALUATION OF THE BANANA PROJECT

You are invited to participate in a research project that aims to explore parents' / caregivers' and teachers' experiences with the banana intervention in pre-school: *"The Banana Project - A qualitative study of parents and teachers experience of pre-school children participating in a banana project at a pre-school in Tanzania"*.

You have been selected because you have a relation to the banana project through your position and/ or experience with the project. The University of Agder in Norway is responsible for the research project.

#### WHAT IS THE STUDY ABOUT?

The Banana project has been an on-going project for the last 6 years, and it's known to have increased children's' attendance and performance at school. This study will explore parents' and/ or caregivers' and teachers' experiences with the intervention on the children's nutrition through in-depth interviews and participant observations. Data-collection will take place in October 2017 at Tanga International Competence Centre (TICC). Results are expected to be ready by June 2018.

To obtain and gather as much useful information on the experiences of pre-school children participating in the project, it's of interest to have an interview with you as an informant with expertise on the banana project. This to secure that the study covers the overall experience for the pre-school children on this matter, and your information may be used as a supplement to the parents and teacher's information in the research.

The study will collect and record personal information about you. Through the interview, questions about your experience with the banana project, how it will be asked, and your answers will be transcribed and registered on a password closed computer and deleted when the research is completed. You will be anonymised to your title or position in the project and all your information will be treated with respect.

## VOLUNTARY PARTICIPATION AND THE POSSIBILITY TO WITHDRAW CONSENT (OPT-OUT)

Participation in the study is voluntary. If you wish to take part, you will need to sign the declaration of consent on the last page. You can, at any given time and without reason withdraw your consent. If you decide to withdraw your participation in the project, you can demand your personal data to be deleted, unless however, the personal data already have been analysed or used in scientific publications. If you at a later point, wish to withdraw consent or have questions regarding the project, you can contact Ruth Nesje at TICC (email: ruth.nesje@meetingpointtanga.net)

## WHAT WILL HAPPEN TO YOUR INFORMATION?

The information that is recorded about you will only be used as described in the purpose of the study. You have the right to access which information is recorded about you and the right to stipulate that any error in the information that is recorded is corrected.

All information will be processed and used without your name or personal identification number.

The Project Manager has the responsibility for the daily operations/running of the Research Project and that any information about you will be handled in a secure manner. Information about you will be anonymised or deleted a maximum of 5 years after the project has ended.

## TRANSFER OF INFORMATION TO OTHERS

By agreeing to participate in the study, you are also consenting to that your information can be transferred to Norway.

## FINANCE

Participants will receive a travel allowance of 10.000 Tsh to cover for the cost of travel to TICC, where the interview will take place.

Researcher is not receiving any financial support from a sponsor, but costs due to implementing of the research is covered for by the University of Agder in Norway. There are no conflicts of interest.

## APPROVAL

The Project is approved by The Ethical Committee of The Faculty of Health and Sports Science (FEK), Norwegian Centre for Research Data (NSD) and the National Institute of Medical Research Tanzania (NIMR)

## CONSENT FOR PARTICIPATING IN THE RESEARCH PROJECT

### I AM WILLING TO PARTICIPATE IN THE RESEARCH PROJECT

\_\_\_\_\_

Town and date

-----

Participant's Signature

-----

Participant's Name (in BLOCK LETTERS)

### I CONFIRM THAT I HAVE GIVEN ACCURATE INFORMATION ABOUT THE RESEARCH PROJECT

\_\_\_\_\_

Place and date

-----

Signature

-----

Role in the research project

## INTERVIEW GUIDE TO PARENTS AND/ OR CAREGIVERS

### BACKGROUND

Tell me about your relation to the child?

- Do you share the responsibility for the child with others?
- How old is your child? How long has the child been to pre-school?

Tell me about your experiences with the banana project...

- How do you find the banana project?
- How does it help your child's nutrition? Please describe

### NUTRITION AT HOME

Could you tell me about your child's food situation at home?

- What types of food do your child eat on a normal day? How often does it eat, and at what times of the day?
- Are there times when your family have less access to food? Do you receive food from elsewhere during these times? For how long may this last?
- How do you see these situations affect the child's nutrition?

### THE BANANA PROJECT

Please tell me how you experience the bananas' influence your child's nutrition...

- If you compare your child's nutrition from before starting receiving the banana and to now, has it become better in any ways? Please give details.
- How will you describe the change?
- When did you notice a difference?
- What does the banana mean for your child?
- Do you see any ways that the banana has given your child a better health, and how? Please explain indicating.
- What does the banana given to your child mean to you as a parent and/ or caregiver?
- If the banana would be taken away today, what do you think would change?

Do you have anything to add?

## MUONGOZO WA MAHOJIANO NA WAZAZI NA/AU WALEZI

### UTANGULIZI

Je una uhusiano gani na mtoto?

- Je unashirikiana na mwingine katika malezi ya huyu mtoto?
- Mtoto ana umri gani? Ni kwa muda gani mtoto yuko katika shule ya awali?

Nieleze ufahamu wako kuhusu huu mradi wa Banana...

- Nini maoni yako kuhusu mradi wa banana?
- Mradi wa banana unasaidiaje katika afya ya mtoto wako? Tafadhali eleza.

### LISHE NYUMBANI

Tafadhali eleza hali ya chakula ya nyumbani kwako?

- Ni vyakula vya aina gani mtoto huwa anakula kila siku? Kwa kawaida mtoto huwa anakula mara ngapi kwa siku, na ni wakati gani wa siku?
- Je kuna wakati familia yenu huwa inaupungufu wa chakula? Je huwa unapata msaada wa chakula toka kwa wengine wakati huo? Hali hiyo huwa inadumu kwa muda gani?
- Kwa mawazo yako hali hii ya upungufu wa chakula ina athiri vipi lishe ya mtoto?

### MRADI WA BANANA

Nini maoni yako kuhusu mradi wa banana unavyochangia kwenye lishe ya mtoto wako...

- Ukifananisha hali ya lishe ya mtoto wako kabla ya kuanza kupewa ndizi na sasa, je kuna mabadiliko yoyote? Tafadhali eleza.
- Unaweza kuelezea mabadiliko hayo?
- Je ni lini ulianza kuona tofauti?
- Je, mradi huu wa banana unamaana yoyote kwa mtoto?
- Je unaona kuna unafuu wowote katika afya ya mtoto, kama ndio ni kwa kiasi gani? Tafadhali eleza.
- Je ndizi anayopewa mtoto inamaanisha nini kwako kama mzazi na au mlezi?
- Kama ndizi zikiacha kutolewa leo, unafikiri ni kitu gani kitabadilika?

Je una lolote la kuongezea?

## INTERVIEW GUIDE TO TEACHERS

### BACKGROUND

What is your profession? What is your relation to the children in the pre-school class engaged in the banana project? How often do you see the children?

Tell me about your experience with the banana intervention and its' influence on the children in your class...

- When did you get to know about the project for the first time? Did you have any expectations? Has the project met your expectations regarding the children, and if so, in what way?
- What is the feedback on the banana intervention from the children in your class?
- What are the feedbacks from the parents and caregivers?

### CHILDRENS' NUTRITION STATUS

Tell me about your experience of the nutrition status of the children in your class...

- How often do they normally eat during a day, and what type of food?
- Do you observe any changes on the children after some time with receiving bananas?

### THE BANANA PROJECT

Tell me about your experience with the banana intervention?

- (and its influence on the children in your class...)
- Do you observe differences in the children's nutrition status from the start of the project till today, and if so, please describe.
- Do you see any changes in the children's health status? Are they less sick? Physically or psychologically stronger? Please describe.
- How will you describe the total effects of the intervention?

Do you have anything to add?

## MUNGOZO WA MAHOJIANO NA WALIMU

### UTANGULIZI

Je una taaluma gani? Je una uhusiano gani na watoto wa darasa la awali wanaoshiriki kwenye mradi wa banana? Je ni mara ngapi huwa unaonana na hao watoto?

Tafadhali eleza mtazamo wako kwa mradi wa banana na mchango wake kwa watoto wa darasa lako...

- Ni lini uliufahamu mradi wa banana kwa mara ya kwanza? Je matarajio yako ni yapi? Je mradi umefikia malengo uliyokuwa umeyategemea kwa watoto, kama ndivyo, ni kwa njia gani?
- Watoto wa darasa lako wana maoni gani kuhusu mradi wa banana?
- Wazazi na/au walezi wanamaoni gani kuhusu mradi wa banana?

### HALI YA LISHE YA WATOTO

Tafadhali toa mawazo yako juu ya hali ya lishe ya watoto wa darasa lako...

- Je watoto huwa wanakula mara ngapi kwa siku, na wanakula chakula cha aina gani?
- Je kuna mabadiliko yoyote kwa watoto baada ya kushiriki kwa muda kwenye mradi wa banana?

### MRADI WA BANANA

Tafadhali toa uzoefu wako na mradi wa banana? (na mchango wake kwa watoto wa darasa lako...)

- Kuna mabadiliko yoyote uliyoyaona katika afya ya watoto tangu kuanzishwa kwa mradi wa banana, kama yapo tafadhali eleza.
- Kuna mabadiliko yoyote ya kiafya umeyaona kwa watoto? Je magonjwa yamepungua? Je wamekuwa wakakamavu zaidi?Tafadhali eleza.
- Nini maoni yako kuhusu matokeo ya mradi wa banana kwa ujumla wake?

Je una lolote la kuongezea?



## INTERVIEW GUIDE TO INFORMANTS

### BACKGROUND

What is your position? What is your relation to the banana project?

Tell me about your experience with the project

- When did you get to know about the project for the first time?
- What was your expectations?
- How will you describe the banana project?
- What are the feedbacks you get/ hear from others in the community on the project?
- Have you heard any feedbacks from the children involved, the teachers or from the parents?

### CHILDRENS' NUTRITION STATUS

Tell me about your experience of the nutrition status of the children in this pre-school...

- How often do the children normally eat during a day, and what type of food?
- Are there any special difficulties that the children in this area are facing?
- Have you heard of or observed yourself any changes on the children after the start of project?

### THE BANANA PROJECT

Tell me about your experience with the banana project

- How will you describe the total effects of the banana intervention?
- How will you evaluate the project until now?
- What are the challenges of the project?
- Will you recommend the project to be implemented in other schools?

Do you have anything to add?

## Attachment 12: Approval-letter Tanzania National Institute of Medical Research (NIMR)



### THE UNITED REPUBLIC OF TANZANIA



National Institute for Medical Research  
3 Barack Obama Drive  
P.O. Box 9653  
11101 Dar es Salaam  
Tel: 255 22 2121400  
Fax: 255 22 2121360  
E-mail: [headquarters@nimr.or.tz](mailto:headquarters@nimr.or.tz)

Ministry of Health, Community  
Development, Gender, Elderly & Children  
6 Samora Machel Avenue  
P.O. Box 9083  
11478 Dar es Salaam  
Tel: 255 22 2120262-7  
Fax: 255 22 2110986

NIMR/HQ/R.8a/Vol. IX/2586

27<sup>th</sup> September 2017

Anne Katrine Sandnes Ebitu  
University of Agder- Norway  
C/o Dr. Mercy Grace Chiduo  
NIMR-Tanga  
P. O. Box 5004  
Tanga

#### CLEARANCE CERTIFICATE FOR CONDUCTING MEDICAL RESEARCH IN TANZANIA

This is to certify that the research entitled: A banana project - A qualitative study of parents and teachers experience of pre-school children participating in a banana project at a pre-school in Tanzania (Ebitu A. K. S. *et al*) whose local investigator is Dr. Mercy Chiduo of NIMR-Tanga has been granted ethical clearance to be conducted in Tanzania.

The Principal Investigator of the study must ensure that the following conditions are fulfilled:


1. Progress report is submitted to the Ministry of Health, Community Development, Gender, Elderly & Children and the National Institute for Medical Research, Regional and District Medical Officers after every six months.
2. Permission to publish the results is obtained from National Institute for Medical Research.
3. Copies of final publications are made available to the Ministry of Health, Community Development, Gender, Elderly & Children and the National Institute for Medical Research.
4. Any researcher, who contravenes or fails to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III Section 10(2).
5. Site: Tanga

Approval is valid for one year: 27<sup>th</sup> September 2017 to 26<sup>th</sup> September 2018.

Name: Prof. Yunus Daud Mgaya

Name: Prof. Muhammad Bakari Kambi

  
Signature  
CHAIRPERSON  
MEDICAL RESEARCH  
COORDINATING COMMITTEE

  
Signature  
CHIEF MEDICAL OFFICER  
MINISTRY OF HEALTH, COMMUNITY  
DEVELOPMENT, GENDER, ELDERLY  
& CHILDREN

CC: RMO of Tanga  
DMO/DED of selected districts

Attachment 13: Approval letter from Norwegian Centre for Research Data (NSD)  
\_Norwegian



Liv Fegran  
Postboks 422  
4604 KRISTIANSANDS

Vår dato: 11.08.2017

Vår ref.: 54747 / 3 / AMS

Deres dato:

Deres ref.:

### Tilbakemelding på melding om behandling av personopplysninger

Vi viser til melding om behandling av personopplysninger, mottatt 15.06.2017.

Meldingen gjelder prosjektet:

54747	En evaluering av banan prosjekt på en førskoleklasse - sett fra foreldres foresatte og lærernes perspektiv
Behandlingsansvarlig	Universitetet i Agder, ved institusjonens øverste leder
Daglig ansvarlig	Liv Fegran
Student	Anne Katrine Sandnes Ebitu

Personvernombudet har vurdert prosjektet, og finner at behandlingen av personopplysninger vil være regulert av § 7-27 i personopplysningsforskriften. Personvernombudet tilrår at prosjektet gjennomføres.

Personvernombudets tilråding forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, ombudets kommentarer samt personopplysningsloven og helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

*Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.*

Endringsmeldinger gis via et eget [skjema](#). Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en [offentlig database](#).

Personvernombudet vil ved prosjektets avslutning, 17.06.2019, rette en henvendelse angående status for behandlingen av personopplysninger.

Dersom noe er uklart, ta gjerne kontakt over telefon.

Vennlig hilsen

Marianne Høgetveit Myhren

Anne-Mette Somby

Kontaktperson: Anne-Mette Somby tlf.: 55 58 24 10 / [anne-mette.somby@nsd.no](mailto:anne-mette.somby@nsd.no)

Vedlegg: Prosjektvurdering

Kopi: Anne Katrine Sandnes Ebitu, [ebitufamily@yahoo.no](mailto:ebitufamily@yahoo.no)



Anne Katrine Sandnes Ebitu

[ebitufamily@yahoo.no](mailto:ebitufamily@yahoo.no)

Date: 04.09.2017

Ref: 54747 AMS/LR

#### AFFIRMATION

The Data Protection Official for Research at the NSD - Norwegian Centre for Research Data finds that the processing of personal data in relation to the project The Banana Project "from Parents', caregivers' and teachers' Perspectives (En evaluering av Bananprosjektet på en førskoleklasse - sett fra foreldre, foresatte og lærernes perspektiv) is in accordance with the Norwegian Personal Data Act, ref. our letter to student Anne Katrine Sandnes Ebitu on 14.08.2017.

Sincerely,

A handwritten signature in blue ink that reads "Anne-Mette Somby".

Anne-Mette Somby

Contact person: Anne-Mette Somby

NSD— Norsk senter for forskningsdata AS, Harald Hårfagres gate 29 NSD—  
Norwegian Centre for Research Data, NO-5007 Bergen, NORWAY  
Faks: +47-55 58 96 50 Tel: +47-55 58 21 17 nsd@nsd.no Org.nr. 985 321 884  
www.nsd.n

Attachment 15: Approval letter from Faculty of Health and Sports Sciences' Research  
Ethics Committee, University of Agder



National Ethics Review Committee  
National Institute for Medical Research  
Dar es Salaam  
Tanzania

Date: 21<sup>st</sup> of August 2017  
Your ref.:  
Our ref.:

Visiting Address: Gimlemoen 25A, Kristiansand  
Phone: +47 38 14 18 66

Case Officer: Eli Andås  
eli.andas@uia.no

**Confirmation**

We confirm that Anne Katrine Sandnes Ebitu is student at Master's Programme in Clinical Health Science, University of Agder, Norway.

Her masterproject "The banana project - A qualitative study of parents and teachers experience of pre-school children participating in a banana project at a pre-school in Tanzania", has been approved by the Faculty of Health and Sport Sciences's Research Ethics Committee, University of Agder, providing that the project is approved by National Institute of Medical Research in Tanzania (NIMR) and the Data Inspectorate of Norway.

Supervisors: Professor Liv Fegran and Associate Professor Kristin Haraldstad, University of Agder.

Yours sincerely,



Eli Andås  
Senioradviser



Tonje Holte Stea  
Associate Professor  
Chair of the Faculty of Health and Sport  
Sciences's Research Ethics Committee

Faculty of Health and Sport Sciences



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Universitetet i Agder – Fakturamottak  
Postboks 383 Alnabru  
0614 Oslo

# Attachment 16: Letter from The Regional Committee for Medical and Health Research Ethics, Section B, South East Norway (REK)



---

Region:	Adviser:	Telephone:	Date:	Our. ref.:
REC South East	Mariann Glenna	22845526	24.11.2017	2017/1831

Davidson

Kristin Haraldstad  
University of Agder

## 2017/1831 Bananprosjektet - en kvalitativ studie av foreldre og læreres erfaring med førskolebarns deltakelse i et bananprosjekt på en førskole i Tanzania

**Project title in English:** "The banana project - A qualitative study of parents and teachers experience of pre-school children participating in a banana project at a pre-school in Tanzania"

**Institution responsible for research:** University of Agder **Project Manager:** Kristin Haraldstad

We are writing in reference to your Application for Preliminary Approval for the above-mentioned Research Project. The Regional Committee for Medical and Health Research Ethics, Section B, South East Norway, reviewed your Application during its meeting on the 23rd of October 2017. The Project was assessed in accordance to the Norwegian Research Ethics Act § 4 2006, and the Health Research Act § 10 2008, for Regional Committees for Medical and Health Research Ethics

### Project description

*"Tanzania International Competence Centre (TICC) supports projects that aim to reach the UN sustainable goals through their non-governmental organisation, HAMA, that is an abbreviation for the Swahili words "Hatua na maendeleo", which means steps for development. One of HAMA's projects, the banana project, aims to help children with nutrition through a simple class-room based intervention of providing one banana daily to children in a sub-urban pre-school. Through a qualitative study with a focused ethnographic design and based on a holistic worldview, the aim is to explore parents', caregivers' and teachers experiences of the children attending the project, with the research question: "«How do parents, caregivers and teachers of children in pre-school experience the banana intervention influences the children's nutrition and health?"*

### Review

The research project aims to *explore parents', caregivers' and teachers experiences of the children attending the project (the banana project), with the research question: "How do parents, caregivers and teachers of children in pre-school experience the banana intervention influences the children's nutrition and health?"*

Paragraph 4 of the Health Research Act defines Medical and Health Research as "activity conducted using scientific methods to generate new knowledge about health and disease,"

In reference to paragraph 4, the Committee finds that the remit of the project falls outside of the scope of the Health Research Act.

Approval is therefore not required by REK in order for the research project to be implemented.

**The Committee's Decision**

The Regional Committee for Medical & Health Research Ethics, Section B, South East Norway, find the Research Project to be outside the remit of the Health Research Act 2008 and therefore can be implemented without its approval.

*Appeals process*

The decision of the Committee may be appealed to the National Committee for Research Ethics in Norway. The appeal will need to be sent to the Regional Committee for Research Ethics, Section B, South East Norway. The deadline for appeal is three weeks from the date on which you receive this letter.

With kind regards,

Ragnhild Emblem  
Chair of the Regional Committee for Medical &  
Health Research Ethics of South East Norway, Section B

Mariann Glenna Davidsen  
Adviser

**CC.:**

- *Management of Administration, University of Agder*  
- *Faculty director Veslemøy Rabe, University of Agder*



# Submission Guidelines BMC Public Health

## Research article

### Criteria

Research articles should report on original primary research, but may report on systematic reviews of published research provided they adhere to the appropriate reporting guidelines which are detailed in our [editorial policies](#). Please note that non-commissioned pooled analyses of selected published research will not be considered.

Authors who need help depositing and curating data may wish to consider uploading their data to [Springer Nature's Research Data Support](#) or contacting our [Research Data Support Helpdesk](#). Springer Nature's Research Data Support provides data deposition and curation to help authors follow good practice in sharing and archiving of research data, and can be accessed [via an online form](#). The services provide secure and private submission of data files, which are curated and managed by the Springer Nature Research Data team for public release, in agreement with the submitting author. These services are provided in partnership with figshare. Checks are carried out as part of a submission screening process to ensure that researchers who should use a specific community-endorsed repository are advised of the best option for sharing and archiving their data. Use of Research Data Support is optional and does not imply or guarantee that a manuscript will be accepted.

### Preparing your manuscript

The information below details the section headings that you should include in your manuscript and what information should be within each section.

Please note that your manuscript must include a 'Declarations' section including all of the subheadings (please see below for more information).

## Title page

The title page should:

- present a title that includes, if appropriate, the study design e.g.:
  - "A versus B in the treatment of C: a randomized controlled trial", "X is a risk factor for Y: a case control study", "What is the impact of factor X on subject Y: A systematic review"
  - or for non-clinical or non-research studies a description of what the article reports
- list the full names, institutional addresses and email addresses for all authors
  - if a collaboration group should be listed as an author, please list the Group name as an author. If you would like the names of the individual members of the Group to be searchable through their individual PubMed records, please include this information in the "Acknowledgements" section in accordance with the instructions below
- indicate the corresponding author

## Abstract

The Abstract should not exceed 350 words. Please minimize the use of abbreviations and do not cite references in the abstract. Reports of randomized controlled trials should follow the [CONSORT](#) extension for abstracts. The abstract must include the following separate sections:

- **Background:** the context and purpose of the study
- **Methods:** how the study was performed and statistical tests used
- **Results:** the main findings
- **Conclusions:** brief summary and potential implications
- **Trial registration:** If your article reports the results of a health care intervention on human participants, it must be registered in an appropriate registry and the registration number and date of registration should be stated in this section. If it was not registered prospectively (before enrollment of the first participant), you should include the words 'retrospectively registered'. See our [editorial policies](#) for more information on trial registration

## Keywords

Three to ten keywords representing the main content of the article.

## **Background**

The Background section should explain the background to the study, its aims, a summary of the existing literature and why this study was necessary or its contribution to the field.

## **Methods**

The methods section should include:

- the aim, design and setting of the study
- the characteristics of participants or description of materials
- a clear description of all processes, interventions and comparisons. Generic drug names should generally be used. When proprietary brands are used in research, include the brand names in parentheses
- the type of statistical analysis used, including a power calculation if appropriate

## **Results**

This should include the findings of the study including, if appropriate, results of statistical analysis which must be included either in the text or as tables and figures.

## **Discussion**

This section should discuss the implications of the findings in context of existing research and highlight limitations of the study.

## **Conclusions**

This should state clearly the main conclusions and provide an explanation of the importance and relevance of the study reported.

## **List of abbreviations**

If abbreviations are used in the text they should be defined in the text at first use, and a list of abbreviations should be provided.

## Declarations

All manuscripts must contain the following sections under the heading 'Declarations':

- Ethics approval and consent to participate
- Consent for publication
- Availability of data and material
- Competing interests
- Funding
- Authors' contributions
- Acknowledgements
- Authors' information (optional)

Please see below for details on the information to be included in these sections.

If any of the sections are not relevant to your manuscript, please include the heading and write 'Not applicable' for that section.

### ***Ethics approval and consent to participate***

Manuscripts reporting studies involving human participants, human data or human tissue must:

- include a statement on ethics approval and consent (even where the need for approval was waived)
- include the name of the ethics committee that approved the study and the committee's reference number if appropriate

Studies involving animals must include a statement on ethics approval.

See our [editorial policies](#) for more information.

If your manuscript does not report on or involve the use of any animal or human data or tissue, please state "Not applicable" in this section.

### ***Consent for publication***

If your manuscript contains any individual person's data in any form (including individual details, images or videos), consent for publication must be obtained from that person, or in the case of children, their parent or legal guardian. All presentations of case reports must have consent for publication.

You can use your institutional consent form or our [consent form](#) if you prefer. You should not send the form to us on submission, but we may request to see a copy at any stage (including after publication).

See our [editorial policies](#) for more information on consent for publication.

If your manuscript does not contain data from any individual person, please state “Not applicable” in this section.

### ***Availability of data and materials***

All manuscripts must include an ‘Availability of data and materials’ statement. Data availability statements should include information on where data supporting the results reported in the article can be found including, where applicable, hyperlinks to publicly archived datasets analysed or generated during the study. By data we mean the minimal dataset that would be necessary to interpret, replicate and build upon the findings reported in the article. We recognise it is not always possible to share research data publicly, for instance when individual privacy could be compromised, and in such instances data availability should still be stated in the manuscript along with any conditions for access.

Data availability statements can take one of the following forms (or a combination of more than one if required for multiple datasets):

- The datasets generated and/or analysed during the current study are available in the [NAME] repository, [PERSISTENT WEB LINK TO DATASETS]
- The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.
- All data generated or analysed during this study are included in this published article [and its supplementary information files].
- The datasets generated and/or analysed during the current study are not publicly available due [REASON WHY DATA ARE NOT PUBLIC] but are available from the corresponding author on reasonable request.
- Data sharing is not applicable to this article as no datasets were generated or analysed during the current study.
- The data that support the findings of this study are available from [third party name] but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of [third party name].

- Not applicable. If your manuscript does not contain any data, please state 'Not applicable' in this section.

More examples of template data availability statements, which include examples of openly available and restricted access datasets, are available [here](#).

BioMed Central also requires that authors cite any publicly available data on which the conclusions of the paper rely in the manuscript. Data citations should include a persistent identifier (such as a DOI) and should ideally be included in the reference list. Citations of datasets, when they appear in the reference list, should include the minimum information recommended by DataCite and follow journal style. Dataset identifiers including DOIs should be expressed as full URLs. For example:

Hao Z, AghaKouchak A, Nakhjiri N, Farahmand A. Global integrated drought monitoring and prediction system (GIDMaPS) data sets. figshare. 2014.  
<http://dx.doi.org/10.6084/m9.figshare.853801>

With the corresponding text in the Availability of data and materials statement:

The datasets generated during and/or analysed during the current study are available in the [NAME] repository, [PERSISTENT WEB LINK TO DATASETS].<sup>[Reference number]</sup>

## ***Competing interests***

All financial and non-financial competing interests must be declared in this section.

See our [editorial policies](#) for a full explanation of competing interests. If you are unsure whether you or any of your co-authors have a competing interest please contact the editorial office.

Please use the authors initials to refer to each author's competing interests in this section.

If you do not have any competing interests, please state "The authors declare that they have no competing interests" in this section.

## ***Funding***

All sources of funding for the research reported should be declared. The role of the funding body in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript should be declared.

## ***Authors' contributions***

The individual contributions of authors to the manuscript should be specified in this section. Guidance and criteria for authorship can be found in our [editorial policies](#).

Please use initials to refer to each author's contribution in this section, for example: "FC analyzed and interpreted the patient data regarding the hematological disease and the transplant. RH performed the histological examination of the kidney and was a major contributor in writing the manuscript. All authors read and approved the final manuscript."

## ***Acknowledgements***

Please acknowledge anyone who contributed towards the article who does not meet the criteria for authorship including anyone who provided professional writing services or materials.

Authors should obtain permission to acknowledge from all those mentioned in the Acknowledgements section.

See our [editorial policies](#) for a full explanation of acknowledgements and authorship criteria.

If you do not have anyone to acknowledge, please write "Not applicable" in this section.

Group authorship (for manuscripts involving a collaboration group): if you would like the names of the individual members of a collaboration Group to be searchable through their individual PubMed records, please ensure that the title of the collaboration Group is included on the title page and in the submission system and also include collaborating author names as the last paragraph of the "Acknowledgements" section. Please add authors in the format First Name, Middle initial(s) (optional), Last Name. You can add institution or country information for each author if you wish, but this should be consistent across all authors.

Please note that individual names may not be present in the PubMed record at the time a published article is initially included in PubMed as it takes PubMed additional time to code this information.

## ***Authors' information***

This section is optional.

You may choose to use this section to include any relevant information about the author(s) that may aid the reader's interpretation of the article and understand the standpoint of the author(s). This may include details about the authors' qualifications, current positions they hold at institutions or societies, or any other relevant background information. Please refer to authors using their initials. Note this section should not be used to describe any competing interests.

## **Endnotes**

Endnotes should be designated within the text using a superscript lowercase letter and all notes (along with their corresponding letter) should be included in the Endnotes section. Please format this section in a paragraph rather than a list.

## **References**

All references, including URLs, must be numbered consecutively, in square brackets, in the order in which they are cited in the text, followed by any in tables or legends. The reference numbers must be finalized and the reference list fully formatted before submission.

Examples of the BioMed Central reference style are shown below. Please ensure that the reference style is followed precisely.

See our editorial policies for author guidance on good citation practice.

**Web links and URLs:** All web links and URLs, including links to the authors' own websites, should be given a reference number and included in the reference list rather than within the text of the manuscript. They should be provided in full, including both the title of the site and the URL, as well as the date the site was accessed, in the following format: The Mouse Tumor Biology Database. <http://tumor.informatics.jax.org/mtbwi/index.do>. Accessed 20 May 2013. If an author or group of authors can clearly be associated with a web link (e.g. for blogs) they should be included in the reference.



## **Example reference style:**

### ***Article within a journal***

Smith JJ. The world of science. *Am J Sci.* 1999;36:234-5.

### ***Article within a journal (no page numbers)***

Rohrmann S, Overvad K, Bueno-de-Mesquita HB, Jakobsen MU, Egeberg R, Tjønneland A, et al. Meat consumption and mortality - results from the European Prospective Investigation into Cancer and Nutrition. *BMC Med.* 2013;11:63.

### ***Article within a journal by DOI***

Slifka MK, Whitton JL. Clinical implications of dysregulated cytokine production. *Dig J Mol Med.* 2000; doi:10.1007/s801090000086.

### ***Article within a journal supplement***

Frumin AM, Nussbaum J, Esposito M. Functional asplenia: demonstration of splenic activity by bone marrow scan. *Blood* 1979;59 Suppl 1:26-32.

### ***Book chapter, or an article within a book***

Wyllie AH, Kerr JFR, Currie AR. Cell death: the significance of apoptosis. In: Bourne GH, Danielli JF, Jeon KW, editors. *International review of cytology.* London: Academic; 1980. p. 251-306.

OnlineFirst chapter in a series (without a volume designation but with a DOI)  
Saito Y, Hyuga H. Rate equation approaches to amplification of enantiomeric excess and chiral symmetry breaking. *Top Curr Chem.* 2007.  
doi:10.1007/128\_2006\_108.

### ***Complete book, authored***

Blenkinsopp A, Paxton P. *Symptoms in the pharmacy: a guide to the management of common illness.* 3rd ed. Oxford: Blackwell Science; 1998.

### ***Online document***

Doe J. Title of subordinate document. In: *The dictionary of substances and their effects.* Royal Society of Chemistry. 1999. <http://www.rsc.org/dose/title of subordinate document>. Accessed 15 Jan 1999.

### ***Online database***

Healthwise Knowledgebase. *US Pharmacopeia,* Rockville. 1998.  
<http://www.healthwise.org>. Accessed 21 Sept 1998.

### ***Supplementary material/private homepage***

Doe J. Title of supplementary material. 2000. <http://www.privatehomepage.com>. Accessed 22 Feb 2000.

***University site***

Doe, J: Title of preprint. <http://www.uni-heidelberg.de/mydata.html> (1999).  
Accessed 25 Dec 1999.

***FTP site***

Doe, J: Trivial HTTP, RFC2169. <ftp://ftp.isi.edu/in-notes/rfc2169.txt> (1999).  
Accessed 12 Nov 1999.

***Organization site***

ISSN International Centre: The ISSN register. <http://www.issn.org> (2006).  
Accessed 20 Feb 2007.

***Dataset with persistent identifier***

Zheng L-Y, Guo X-S, He B, Sun L-J, Peng Y, Dong S-S, et al. Genome data from sweet and grain sorghum (*Sorghum bicolor*). GigaScience Database. 2011.  
<http://dx.doi.org/10.5524/100012>.

**Figures, tables additional files**

See [General formatting guidelines](#) for information on how to format figures, tables and additional files.