Global Leadership Training Programme in Africa 2018

Activity Report of Field Research

Association between diet of primary school students and their nutritional status in rural and urban Tanzania

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I. Summary

The double burden of malnutrition has been shown to have a striking effect in low- and middle- income countries[1]. Undernutrition is responsible for more than half of child mortality[2] and undernourished child have a higher risk of becoming overweight in adulthood[1]. Overweight is a risk factor of non-communicable diseases (NCDs)[3] which are the cause of over 85% of premature deaths in low- and middle- income countries[4]. As stated in Sustainable Development Goals (SDGs) Goal 2, ensuring access to food for all people, the poor and people in vulnerable situations such as children are the target of nutritional support interventions and policy[5]. School meals are known as an effective method to support children's physical and mental health[6].

Tanzania is one country facing a double burden of nutrition. The stunting rate for children under five years old ranges from 15% in the lowest marked region and 57% in the highest region [7]. On the other hand, obesity and blood pressure are expected to rise in Tanzania[8]. Furthermore, urbanization is predicted to be one of the reasons for the high consumption of processed foods with high sugar and fat[9]. For schools, there is no law or policy to food to be provided during the schoolday. Moreover, primary school age children in Tanzania are not involved in national nutrition survey.

Total of 980 seven to nine years old students (490 from Dar es Salaam and 490 from Kisarawe) and the same number of their guardians were recruited. 9 schools from Dar es Salaam and 4 schools from the rural area were visited. Data were collected in April 1st to 11th for urban and April 30th to May 3rd for rural. Children received three surveys; a modified version of FFQ (Food Frequency Questionnaire) developed by Zack et al. for the Tanzanian is used and with images of portion size[12], three days of 24-hour recall (two weekdays and one weekend) and sociodemographic questions. On top of that, height and weight were measured to calculate their BMI (Body Mass Index). Parents were asked to answer socio-demographic questions and HFIAS (Household Food Insecurity Assess Scale).

Urban sampling yielded 915 eligible forms (500 guardians and 415 students) and 630 from rural (320 guardians and 310 students). Out of the total sample, 398 (181 male, 216 female and 1 missing) in the urban group and 262 (121 male, 140 female and 1 missing) in the student group in rural were eligible for analysis. The most common reason for exclusion from analysis was returning an incomplete survey.

School lunch was provided in public primary schools visited. Eating lunch at home was the most popular form of having lunch. Unhealthy snacks were sold in both areas. If nutritional intervention is going to take a place, limiting junk food might be effective to achieve SDGs goal 2. Further analysis is required to examine the eating behavior and their nutritional status.

I. 要約

栄養不良の二重負荷は低中所得国の国々で問題となっている[1]。栄養不良はこれらの国の小児死亡の半数以上を占める主要原因とされ[2]、さらに栄養不良児は成人後に過体重になるリスクが高い[1]。過体重は非感染症疾患のリスクであり[3]、非感染症疾患は低・中所国の早期死亡の 85%以上であると推測される[4]。持続可能な開発目標、目標２で全ての人々、特に脆弱な立場にある人々が栄養のある食糧を確保できるようにすると提言されているように、栄養問題は重要な課題である[5]。そして、学校給食は子供の精神、身体の成長をサポートするのに優れた手法であるとされている[6]。

タンザニアも栄養不良の二重負荷に面している国の一つである。五歳児未満の発育阻害は、発症率の低い地域では約 15%、高い地域では約 57%である[7]。しかし、肥満と高血圧は反して増加する見通しである[8]。その原因の一つに都市化が加工食品、脂質や糖の高摂取の要因であると考えられている[9]。学校に対する学校給食の導入、および、導入校への基準に関する法はない。さらに、タンザニアの小学生は国民栄養調査に含まれていない。

合計 980 人（ダルエスサラームから 490 人、キサラウェから 490 人）の 7-10 歳の児童とその保護者に研究参加を募った。ダルエスサラームでは 9 校、キサラウェでは 4 校で募集がかけられた。都市部では 4 月 1 日から 11 日に、農村部では 4 月 30 日から 5 月 3 日の期間にインタビューが行われた。児童に対し、食事分量の示されたイラストガイダンスを利用し、編集された Zack et al.によるタンザニア用食物摂取頻度調査票、三日間の２４時間思い出し法（平日２日、週末１日）と社会属性の３種類の質問票に沿ってインタビューが行われた。さらに BMI を算出するために身長体重の測定も行われた。保護者には社会属性と Household Food Insecurity Assess Scale の質問票を配布した。

都市部からは 915 人（保護者 500 人、児童 415 人）、農村部からは 630 人（保護者 320 人、児童 310 人）が研究に参加した。そのうち都市部からは 389 人（男児 181 人、女児 216 人、１名不明）、農村部からは 262 人（男児 121 人、女児 140 名、1 名不明）が分析可能であった。いずれにせよ、参加を募った学校では学校給食制度がなかった。大多数の生徒は食事のために帰宅していた。健康に望ましくない菓子は両地域で販売されていた。もし栄養に関するプログラムが導入されるのであれば、ジャンクフードの制限が持続可能な開発目標、目標 2 を達成するうえでは効果的かもしれない。更なる食習慣と栄養状態の分析が必要である。

II. Research activity

(1) Introduction

The double burden of malnutrition is striking low- and middle- income countries[1]. Undernutrition is responsible for more than half of child mortality[2] and undernourished child has a higher risk of getting overweight in adulthood[1]. Overweight is a risk factor of non-communicable diseases (NCDs)[3] and it is the cause of over 85% of premature deaths in low- and middle- income countries[4]. As stated in sustainable development goals (SDGs) goal 2, ensuring access to food for all people, in particular for the poor and people in vulnerable situations such as children is important to address this nutritional issue[5]. School meal is known as an effective method to support children's physical and mental health[6].

Tanzania is one of the countries facing a double burden of nutrition. The stunting rate for children under five years old has a range; the lowest region marked approximately 15% and the highest region was approximately 57%[7]. Contrariwise, obesity and blood pressure are expected to rise[8]. Urbanization is predicted to be one of the reasons for the high consumption of processed foods with high sugar and fat[9]. For schools, there is no law or policy to guide foods to be provided. Moreover, primary school age children in Tanzania is not involved in national nutrition survey.

Children's diet is an important topic of study to reduce the double burden of malnutrition which causes deaths from NCDs. As children's diet is an important topic to reduce the double burden of malnutrition, examining urban and rural Tanzanian primary school children's diet and nutritional health is vital for future intervention. This research focuses especially on their dietary behaviour in school.

(2) Study area

Tanzania: Dar es Salaam (urban) and coastal region in Kisarawe (rural) (figure 1)

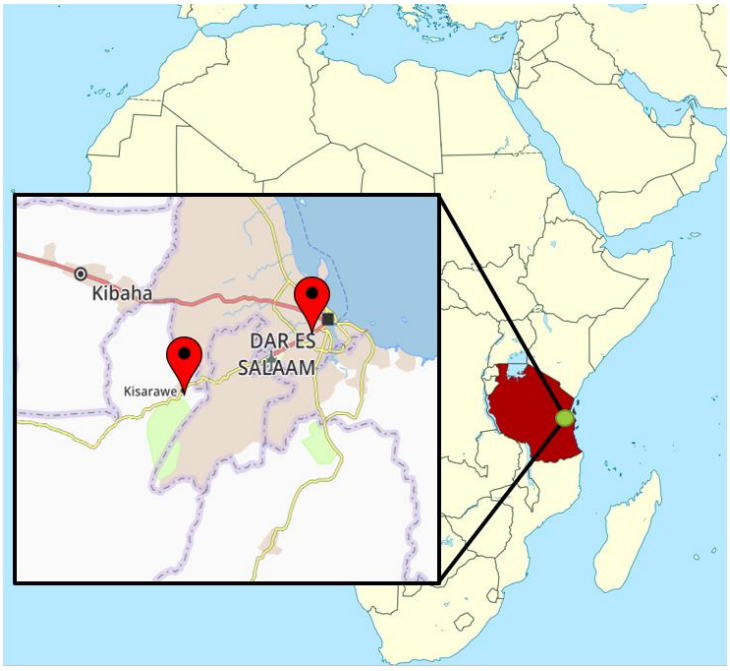

Figure 1. Dar es Salaam and Kisarawe

(3) Methodology

Total of 980 seven to nine years old students (490 from urban and 490 from rural area) and the same number of their guardians were recruited. The sample size of children was calculated based on the study by Browne et al.[10] with software for epidemiologic statistics; OpenEpi[11]. Schools were picked by field coordinator from MUHAS (Muhimbili University of Health and Allied Sciences); 9 schools from Dar es Salaam and 4 schools from the rural area were visited. Data collection period were April 1st to 11th for urban and April 30th to May 3rd for the rural area. Ethical approval was obtained from the University of Tokyo ethics committee and MUHAS. Consents were obtained from regional councils, schools, guardians and children. Consent forms were distributed at school and children gave guardians the form and survey (image 1).

Image 1. Distributing consent forms

Students received three surveys; modified version of FFQ (Food Frequency Questionnaire) developed by Zack et al. for the Tanzanian is used and with images of portion size[12], three days of 24 hour recall (two weekdays and one weekend) and sociodemographic questions. On top of that, height and weight were measured to calculate their BMI (Body Mass Index). Parents were asked to answer socio demographic questions and HFIAS (Household Food Insecurity Assess Scale). Surveys were translated to Swahili by a student from MUHAS and research assistants. Children's data were collected electronically using KoBo Toolbox (image 2). Surveys for guardian and consent forms were in printed forms. Children received a card to put stickers after answering the surveys to keep the track and after completion, they received a pen as a gift.

Image 2. Interviewing children using tablet

Research assistants were recruited using snowball sample and first assistants were the recommendations from field supervisor and field coordinator. For urban, nine of them were recruited and an additional nine for the rural area. The first group received two days of training and the second group received one-day training, including use of KoBo toolbox. For the analysis, BMI-for-age was used for the cutoff and statistically analyzed using Stata version 15.

(4) Research findings

Urban sampling yielded 915 eligible forms (500 guardians and 415 students) and 630 from rural (320 guardians and 310 students). Out of the total sample, 398 (181 male, 216 female and 1 missing) in the urban group and 262 (121 male, 140 female and 1 missing) in the student group in rural were eligible for analysis.

No school lunch was provided in public primary schools visited. In the rural area, porridge was provided as breakfast from charity Champion Chanzige (image 3). Depending on the economic situation of the area, some were given for free, some charged small money. This charity also provided chicken to a school to support children with disability and children suffering financially (image 4).

Image 3. Lady providing porridge

Image 4. School chicken in Kibasila primary school

Most children, 351 (93.92%) from urban and 254 (97.32%) of children had their lunch at home. In urban areas, the small number of children 22 (5.57%) were eating at stall. The majority had their lunch at home, yet, snacking junk food at school was observed. Stalls in school hardly provided healthy snacks. (image 5)

Image 5. Snacks sold in school

(5) Discussion

Majority of children are found to be having lunch at home. This may be because younger children finish their class by noon and have enough time to get back to home. On the other hand, older children who live far from school does not have a healthy choice. Both urban and rural, unhealthy snacks were observed, yet, a greater number of stalls were seen in urban. Rather than a guidance on implementing school food, limiting junk food and giving nutritional education to guardians may be effective to improve their health.

The quality of data must be concerned; surveys for parents were self-administered, this may have missed the illiterate guardians and quality of responses. Moreover, 24-hour recall is hard to analyze as there are lots of missing information. This could be due to children not remembering what they had, or research assistants not writing in details as not considering the cultural difference, e.g. only mentioning "beef" but this often means fried skewed beef. Due to missing fair amount of parts of the food frequency questionnaire (FFQ), this data may not be valid to analyze as well.

(6) Conclusion

No school lunch is provided in public schools and porridge was distributed by NGO in the rural area. Eating lunch at home was the most popular form of having lunch in both areas. Therefore, nutritional education to mothers could be an effective approach to change dietary habits. Schools' food environment was poor in terms of availability of junk food. If nutritional intervention is going to take a place, limiting junk food might be cost effective strategy to achieve SDGs goal 2. Further analysis is required to examine the eating behavior and their nutritional status.

(7) Acknowledgement

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III. Reflection to the GLTP in Africa

I went to high school in Uganda and that has had a huge impact on my career choice. It started as a part of a school activity to visiting orphanages. I realised that there was a disparity between the orphanages; well-funded western owned orphanage's children were dressed better than some of the children in the neighbourhoods and local church-based orphans wer struggling to have food for dinner. Since then I started to think about how I could help and what skills could contribute to society. I went to London for university and became a licensed nutritionist there. After returning to Japan, I went for further study to specialise in global health at the University of Tokyo. GLTP in Africa was introduced to me by a doctoral student from my lab who previously went to Kenya for research on this program. As I was hoping to conduct some nutritional research in Africa, this opportunity pushed me to think about my research in detail. The process was tough, yet organizing what I wanted to do for my masters project from early stage gave me great guidance for my research. Getting opportunity to work with one of the greatest alumni from my home university was very fascinating, it was a dream-come-true moment.

In the field, I always had someone whom I could ask for help and I learned a lot both research-wise and personally. As I have lived in Uganda before, it was surprising to see how western Africa had developed. The country itself was more developed, yet ancient culture was still seen everywhere, and people's behaviours are sometimes similar to Japanese. I was amazed by how government works were contributing to the country's development. For example, the roads were beautifully done and "Mwendokasi", a bus with bus stops, had their own lane so they did not get stuck in the traffic. As for pedestrians, there were many people in wheelchairs, which provided by the government for free, heading to the hospital. Some local friends took me to different markets or their houses and I had chances to feel how the local lives as well. One of the favourite moments in Tanzania was a chat with taxi drivers during the traffic. One who could speak English told me so much about Tanzania, such as natural medicines that are taken by Maasais, or

their relationship with other countries. What I felt was most wonderful about Tanzania was the diversity of language, ethnicity and especially religion mixed peacefully. The period I visited overlapped with Lent in Christianity and Ramadan in Islam. Many times, people needed to go for fasting or do some ritual and may not have been able to commit to their business-wise works. However, because of the diversity, the city was still functioning by helping each other. It was really shocking and raised questions about the religious divisions seen in other countries.

Continuously challenges were brought up throughout this research. The language was the first and probably the biggest issue in the field. The language barrier made difficult to live in daily life with locals and affected the quality of conversation with co-workers. Using English for workshop materials have made them understand the idea of it, however, not all of them managed to take in fully. It may also come to cross with their culture, not many of them raised a question or asked for further explanation. The second group of research assistants' workshop was more successful as research assistants from the first group explained about their experience in Swahili. It was unfortunate that I could not understand what they were explaining yet could see clearly the discussion was more active. Anyhow, knowing the language or understanding their capability of English may have improved the quality of data and had a better relationship with the team. Due to the miscommunication, there was a lack of an understanding of the type of surveys, likely food frequency questionnaire (FFQ) and possibly 24-hour recall are not valid with the data collected.

The financial challenge was another major issue. The cost of hiring people and employment form needed to be modified from the original plan. The unexpected budget change caused temporary finance shortage, thankfully generous support from supervisor made it possible to come over. Some challenges were not possible to avoid, such as research assistance's illness. Two of my research assistances got ill during the data collection in the rural area. One had a severe symptom and she did not have health insurance. It was disheartening not being able to complete the study together and made me re-recognise how vulnerable the health situation is.

From the experience, I have learnt that connection and understanding the culture are the keys to conduct research in this country. This applies to every step; ethics clearance, recruitment, workshop preparation, and getting permissions from schools. Without connection, most steps would not go smoothly on time manners. I have been very fortunate to have a great supervisor who supported throughout the process in the most efficient way. As I mentioned as a challenge, cultural knowledge is one of a big part to work. If I had a better cultural understanding, the preparation may have done more neatly and managed to avoid the confusions. I will take this lesson to develop my connection and study harder to understand how I can be flexible to work with different values and sustain the quality of research.

The experience I gained in GLTP in Africa has led me to a new opportunity to develop my career. Since August I have finished an internship in Vanuatu, an island nation in the western Pacific, to analyse the BMI of primary school children and assess the effectiveness of school canteen policy there. While the setting is very different from Africa, I am very excited to see how government and schools are approaching to double burden of malnutrition. I am keen to continue to expand my knowledge and skills to bring back to Africa one day.

I would recommend this program to anyone who is considering conducting a research in Africa or even just going for a presentation by former candidates, which would be very informative. Conducting quality research is not as easy as you might be expecting. It requires time for the process and for yourself to get used to the environment. UNU offers this great opportunity to conduct a study for few months which might be very difficult without funding. Compared to other programs, this progamme's candidates are limited to Japanese students who want to conduct research in Africa contributing to SDGs. If your research topic meets this criteria, I believe it is a great chance to get experience. Another benefit of this programme is the community that you can make. Some former students might have already made a connection with professors in Africa and you may be able to find your supervisor through this programme. Even if not, you could get a lot of useful advice from UNU staffs. As I had a wonderful experience, I hope there will be more people going to Africa for research with the communities there to continue to make the world a better, more equitable place.