**MENTION Workshop on Nutritional Education**

# Report on Nutrition Education in Zanzibar: a needs assessment

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**ACRONYMS:**

CVD: Cardiovascular Diseases

IDF: International Diabetes Federation

MENTION: Increased CoMpetENcies for NutriTION in Zanzibari Health Care

MLEEWC: Ministry of Labor, Empowerment, the Elderly, Women and Children

MoA: Ministry of Agriculture

MoEVT: Ministry of Education and Vocational Training

MoHSW: Ministry of Health and Social Welfare

MZFN: Milele Zanzibar Foundation

NCDs: Non-Communicable Diseases

NE: Nutrition Education

NGO: Non-Governmental Organizations

PRA: Participatory Rural Appraisal

SHMS: School of Health and Medical Sciences of the State University of Zanzibar

SUTAS: Sustainable Use of Tropical Aquatic Systems

SUZA: The State University of Zanzibar

TDHS: Tanzania Demographic and Health Survey

WHO: World Health Organisation

ZAHRI: Zanzibar Health Research Institute

## BACKGROUND INFORMATION

Between 2007 and 2050, the world population is expected to increase by 2.5 billion; most of this growth will occur in urban areas of developing countries [1]. This rapid growth and urbanization is expected to impact poverty and food security environment among urban dwellers leading to food insecurity and malnutrition [2]. Malnutrition poses a high health risk in Zanzibar. Like other developing countries, Zanzibar is struggling with a double burden of under- and overnutrition. This leads to a rapidly increasing prevalence of non-communicable diseases (NCDs). The result is a social and economic challenge for the population and the health system.

The recent Sustainable Use of Tropical Aquatic Systems (SUTAS) project examined in 2013 more than 1314 individuals in 239 households on Unguja Island, Zanzibar, to investigate the interplay of socioeconomic, demographic, environmental, physiological, and behavioral factors in the development of diet-related disorders. The results showed that malnutrition due to food insecurity and poor food access is a central problem in many Zanzibari households and is reflected in central health outcomes such as (a) obesity/overweight, (b) hypertension/prehypertension and (c) increased blood sugar levels. This calls for early health promotion strategies that address individuals, communities and the population at large.

Worldwide, cardiovascular diseases (CVDs) are not only the leading cause of death [3], they are also emerging as a notable public health problem in sub-Saharan African countries [4]. These countries are undergoing epidemiological transitions from communicable to NCDs that have been closely linked to unhealthy behaviours, including poor dietary habits and sedentary lifestyles [5,6]. According to the International Diabetes Federation (IDF), about 12 million people in Africa are estimated to have type 2 diabetes mellitus [7], with the prevalence ranging from 1% in rural Uganda to 12 % in urban Kenya [8,9]. Overweight and obesity have been found to be modifiable risk factors for cardio-metabolic and other chronic diseases [10] including hypertension [11], diabetes [12] and dyslipidemia [13]. Few studies have investigated the association between different obesity indices in association with cardio-metabolic risk factors in sub Saharan African populations [4, 10, 13]. Data from mainland Tanzania have shown an increasing prevalence of overweight and obesity in urban, peri-urban and rural areas [14]. The Tanzania Demographic and Health Survey - conducted every 6 years - has shown an increasing proportion of overweight or obesity over time among women; in TDHS 2010 30.4% of women were overweight, while 11.7% were obese [15]. In 2011 the prevalence of overweight/obesity (according to WHO) in the male adult population was 23%/8%. In women overweight/obesity prevalence was 22%/ 21% (25-64 years) [16]. In 2013 the prevalence of overweight/obesity (according to WHO) in the male adult population was 54%/17% (SUTAS study population); in women overweight/obesity prevalence was 49%/ 37% (15-60+ years) [17]. In the 2010 TDH Survey the overall prevalence of hypertension was 33% (25-64 year olds) with a higher prevalence among men of 37% as compared to women of 29% [15]. In 2013, the prevalence of prehypertension in the full SUTAS study population was 74% and prevalence of hypertension was 78% [17]. In 2011, the mean fast-

ing blood glucose level of the overall study population was 4.4 mmol/L (25-64 years) [16]. In the 2013 SUTAS survey, the mean fasting blood glucose level of the overall study population was 4.8 mmol/L (≥18 to <45 year olds and 5.1 mmol/L (45+ years) [17]. Hence, the increase and high rates of markers illustrate the need for long-term strategies to reduce NCDs at all levels. Diet and lifestyle related multi-morbidities are a serious public health concern because they accumulate throughout childhood and into adulthood. Also, obesity in childhood or adolescence has been associated with twofold or higher risk of adult hypertension, coronary heart disease, and stroke [18]. As a result, identifying and reduce modifiable risk factors and reversing the development of malnutrition have become a national and international priority to reduce disease burden and related social costs. In this context, nutrition education provides meaningful opportunities to reduce health risks from unhealthy dietary behaviours since recent research on Unguja has shown that obesity & related co-morbidities pose a social and ecological burden on both the Zanzibari health system and the population.

Nutrition education (NE) provides knowledge about foods and nutrients, what to do and how to act to improve nutrition. It increases awareness of the importance of eating healthy, improves food environments that enable healthy food choices and build the capacities of individuals to adopt food and nutrition practices that promote good health [19]. Through NE, the communities enhance their knowledge on healthy nutrition and what is needed for emotional and physical well being including a) the ability to prepare healthy foods and meals, b) improving food choices and eating behaviours, c) teaching their children and others about mindful eating and healthy lifestyle decisions.

Nutrition education will therefore facilitate improving the nutrition situation of the Zanzibari population in multiple ways:

First, NE will enable future health professionals (medical school students, medical officers, etc.) to proactively advise and teach patients' enhanced self-care skills. The strategies shall be sustainably embedded within the multipliers' organisational structures.

Second, experts and consultants with sound medical training including nutritional knowledge will enhance the government's ability to counteract and avoid rising a prevalence of nutrition related multi-morbidities.

Third, the initiation of nutrition training in research will provide reliable and regular data on diet related multi-morbidities and their determinants through the health system.

This will be achieved during the MENTION project.

## INTRODUCTION TO THE "MENTION" PROJECT

Increased Co**M**pet**EN**cies for **N**utri**TION** in Zanzibari Health Care (MENTION), is part of "Partnerships for the Health Sector in Developing Countries (PAGEL)" project funded by the German Academic Exchange Services (DAAD). In MENTION, University of Bremen and the Leibniz Institute for Prevention Research and Epidemiology - BIPS (both in Germany) maintain a partnership with the State University of Zanzibar through the School of Health and Medical Sciences (SHMS). The ultimate aim of MENTION is to enhance the availability of experts with sound medical training including nutritional knowledge in Zanzibar in order to enhance the government's ability to counteract and avoid the rising prevalence of nutrition related NCDs in multiple settings. This may be accomplished by supporting and involving proximal target groups - such as academics and laboratory technicians - and distal target groups, e.g. administration.

Political stakeholders are important indirect target groups for addressing the Zanzibari challenges of malnutrition effectively; which requires productive dialogue between stakeholders from medical research and education, professionals, practitioners and stakeholders from several sectors. In order to enhance the understanding of and to address the underlying causes of nutrition-related NCDs in Zanzibar, MENTION aims to pave the ground for evidence-based strategy building and to facilitate the exchange with important players. Stakeholders from Ministry of Education, Ministry of Health, Ministry of Agriculture, Livestock and Environment, Ministry of Labor, Empowerment, the Elderly, Women and Children, National Food Security and Nutrition Programme, Zanzibar Food and Drug Board, Zanzibar Health and Research Institute, The State University of Zanzibar and Milele Zanzibar Foundation were invited to provide their experience and insights into the gaps & needs of NE during a structured workshop which was held in one of SUZA campuses in September 2018.

The workshop was organized as part of MENTION project implementation strategies, which necessitates collecting ideas from stakeholders on what is already there, what is needed, target groups for NE, and the possible channels as far as NE in Zanzibar is concerned. The result of this workshop will be summarised in this report, which will provide a way forward on how to tackle the challenge of NCDs and other nutrition-related problems (where possible) in Zanzibar. It will also inform the health sector for the development of effective and sustainable intervention programs and health policies.

## OBJECTIVE OF THE REPORT

Aim of the report was to assess important aspects in NE most relevant for the Zanzibari population and to identify target groups, their major needs in NE and channels for NE by discussing the following questions:

1. Who needs NE most?
2. Which are the most relevant channels to be used?
3. What are the priority topics for NE in this target population?

## METHODS

For the purpose of this report we used different methods:

A. Quantitative Assessment using questionnaires (adapted from FAO: http://www.fao.org/nutrition/education/en/)
B. Qualitative assessment using focus group discussions

Both, A) and B) were accomplished during the above mentioned structured stakeholder and experts workshop.

C. Transfer using results of A) & B) in comparison with the current SHMS Health Professionals Nutrition curriculum

### The stakeholder and experts workshop

The aim of the workshop was to identify target populations and channels, suitable for effective and sustain NE on Unguja. Experts from Ministry of Education, Ministry of Health, Ministry of Agriculture, Livestock and Environment, Ministry of Labor, Empowerment, the Elderly, Women and Children, National Food Security and Nutrition Programme, Zanzibar Food and Drug Board, Zanzibar Health and Research Institute, The State University of Zanzibar and Milele Zanzibar Foundation were invited to participate in a structural workshop with the aim of assessing gaps and needs for nutritional education within the health professions/medical education. Not all invitees could attend the workshop; hence bias in responses may be possible. A summary of those who participated in the workshop is represented in Table. 1

Previous to the plenary discussion, experts were asked to complete a questionnaire on NE. During the workshop, the terminology and aim of NE were discussed in the plenary, to set the ground for the following focus group discussions. Here, barriers and facilitators of NE were identified. In the subsequent plenary discussion, a consensus on barriers and facilitators of NE was met among all experts. Additionally, during the tea break a poster session providing study results of the SUTAS project enabled the participants to learn about current prevalences of most

important cardio-metabolic diseases among Zanzibari communities and to discuss modifiable risk factors in order to rise to the aims of the MENTION project (see above).

**Table 1: Summary of workshop participants**

| **Summary of workshop participants** | | | |
|---|---|---|---|
| **Government officials** | | | **NGO** |
| Agriculture and Nutri-tion | Research and Education | Health system | |
| 1[a] | 11[b] | 9[c] | 2[d] |

[a]A representative from the ministry of agriculture, food security and nutrition department

[b]One representative from Zanzibar Health Research Institute (ZAHRI), one representative form the Ministry of Education and Vocational Training (MoEVT) and nine participants from The State University of Zanzibar (SUZA)

[c]Two representatives from the districts, four representatives of health practitioners (from Mnazi Mmoja Hospital - government owned referral hospital), and three representatives from the ministries: two from the Ministry of Health and Social Welfare (MoHSW) and one from the Ministry of Labor, Empowerment, the Elderly, Women and Children (MLEEWC).

[d]Two representatives from Milele Zanzibar Foundation (MZFN)

**A. Quantitative assessment**

A structured questionnaire with questions on: target groups, channels and priority topics adopted form FAO (http://www.fao.org/nutrition/education/en/) was given to the participants and the beginning of the workshop and collected when the workshop was completed.

- Questions 1, 2, 3, 5 and 6 were asked to tick a maximum of three target groups that were thought to be important.
- Question four was asked to prioritize target groups where 3 was the highest priority and 1 was the lowest priority.
- Question 7 asked to tick Yes/No regarding whether Zanzibar needs a Monitoring System on NE and give reasons for their choices.
- Question 8 asked to highlight three developments in NE and in what sectors
- Question 9 asked to highlight the important changes in policy and strategy on NE

Questionnaire data was then compiled in a spreadsheet, where percentages of the responses with respect to the number of participants were obtained. Scores of the priorities were calculated as a ratio of total scores to the number of completed questionnaires/number of participating experts.

Three top priorities were considered (the survey indicated three check marks on the options that were thought to be more important), and the reasons for these choices were also collected from the surveys.

## B. Qualitative assessment

### Plenary session on terminology and aim of nutrition education

The terminologies and the aim of Nutrition Education (NE) was described and the participants gave their contributions on NE and identified the most urgent linkages for NE that could contribute to its effectiveness and practice in Zanzibar. This was important to set the stage for the following poster session and the subsequent focus group discussions.

### Focus group discussions

Two structured focus group discussions were conducted based on the Participatory Rural Appraisal (PRA). PRA is a methodological approach that aims to incorporate the knowledge and opinions of rural people in the planning and management of development projects and programmes. For our purpose, we adapted the method to discuss and agree on the following aspects:

1. What are the main barriers for nutrition knowledge on Zanzibar?
2. What are the main barriers for behavioural changes in terms of healthy nutrition in Zanzibar?

Workshop participants were randomly divided into two groups that discussed the above mentioned questions with respect to barriers, causes, and possible solutions. Minutes and photos were then taken to record the contributions and outcomes.

The results of both focus group discussions were then compared and discussed again in the plenary round.

## C. Transfer

In a last step, the summary of the results from the workshop (plenary and focus group discussions) and the results of the questionnaire assessment were then compared to the existing health professionals curriculum. The current contents of the curriculum can be found in annex.

## RESULTS

### Results of A

### Questionnaire responses

Answers to the question “who needs NE the most?” are given in Table 2. On this question, most participants responded that the general public needs NE the most, followed by urban and rural communities and school children; and then mothers.

**Table 2:** Summary of responses on Qn. 1

| **1. With respect to NCDs and Obesity: who needs NE most?** | | | |
|---|---|---|---|
| | **%** | **Rank** | **Reasons** |
| General Public | **78%** | **1** | Disseminating knowledge on NE, NCDs, lifestyle changes, and health improvement to many |
| Communities | **70%** | **2** | Disseminating knowledge to all, because the problem is affecting both but mostly urban. |
| School Children | **70%** | **2** | They need early knowledge on NE and prevention from NCDs; they are vulnerable to malnutrition |
| Pregnant women | 43% | 4 | |
| Mothers | **65%** | **3** | Central person in the family/society, prepares the food |
| Home gardeners | 26% | 5 | |
| Small farmers | 22% | 6 | |
| Commercial farmers | 17% | 7 | |
| Fishers | 22% | 6 | |
| Other | 4% | 8 | |

Table 3. shows the responses for the question on “what setting NE takes place”, where 96% responded that NE takes place in the media so as to disseminate knowledge to all population. 65% responded that NE takes place in community groups for knowledge and encouragement. 57% responded that NE takes place in school feeding programs because early education is important.

**Table 3:** Summary on Qn. 2

| **2. In what setting does NE take place?** | | | |
|---|---|---|---|
| | **%** | **Rank** | **Reasons** |
| Work place | 30% | 9 | |
| The media | **96%** | **1** | Disseminating knowledge to all |
| National Campaigns | **57%** | **3** | Very occasionally |
| Community groups | **65%** | **2** | For knowledge and encouragement |
| Markets/food outlets | 26% | 10 | |
| Maternal & child services | 52% | 4 | |
| Hospital counselling | **57%** | **3** | For patients |
| Other health centres | 39% | 7 | |
| School feeding programs | **57%** | **3** | Early education is important |
| Food security programs | 43% | 6 | |
| Schools | 13% | 11 | |
| - Elementary | 48% | 5 | |
| - Primary | 52% | 4 | |
| - Secondary | 35% | 8 | |
| - Farmer schools | 35% | 8 | |
| Other | 4% | 12 | |

As for the question “which professional groups need a better understanding of NE?”, 74% of the participants answered that policy makers need a better understanding of NE, because they are the decision makers and can bring changes. Doctors also need better understanding of NE because

they see the affected people directly. 61% answered that ministry staff in health, nutrition and agriculture need a better understanding of NE for resource allocation educating the society and practicing within their duties. 57% answered that curriculum developers and writers of educational materials need a better understanding of NE. These responses are represented in Table 4.

**Table 4:** Summary of responses on Qn. 3

| **3. Which professional groups need a better understanding of NE?** | | | |
|---|---|---|---|
| | **%** | **Rank** | **Reasons** |
| Policy makers | **74 %** | **1** | They are decision makers, for law enforcement and bring changes |
| Ministry staff in health, nutrition, agriculture | **61 %** | **2** | Resource allocation, educating the society and practicing within their duties |
| The media | 43% | 5 | |
| Health professionals | | | |
| - Doctors | **74 %** | **1** | They see the affected people directly |
| - Nurses | **61 %** | **2** | Close to the patients |
| - Nutritionists | 52% | 4 | |
| - Health workers | **57 %** | **3** | Easy to communicate with clients |
| School teachers | 52% | | |
| Curriculum developers and writers of educational materials | **57 %** | **3** | Curricula for all age groups |
| Project workers in food security, etc. | 26% | 6 | |
| Other | 4% | 7 | |

"Prioritise target groups: what is the highest (3), second (2) or third (1) priority". The responses to this question are seen in Table 5, which indicated that among the target groups: curriculum developers and writers of educational materials are the first priority. Policymakers as the second priority and ministry staff in health, nutrition and agriculture as the third priority.

**Table 5:** Summary of responses on Qn. 4

| **4. Prioritise target groups: what is the highest (3), second (2) or third (1) priority** | | | |
|---|---|---|---|
| | **Scores** | **Priori-ties** | **Reasons** |
| Policymakers | **1.35** | **2** | They are decision makers, for law enforcement and bring changes |
| Ministry staff in health, nutrition, agriculture | **1.33** | **3** | Resource allocation, educate society and practice within their duties |
| The media | 0.78 | 6 | |
| Health profession-als* | 1.08 | 5 | |
| - Doctors | 0.43 | | |
| - Nurses | 0.56 | | |
| - Nutritionists | 0.82 | | |
| - Health workers | 0.60 | | |
| School teachers | 1.30 | 4 | |
| Curriculum develop-ers and writers of educational materials | **1.39** | **1** | Curricula for all age groups |
| Project workers in food security, etc. | 0.61 | 7 | |
| Other | 0.26 | 8 | |
| * In health professions category, Nutritionists had the highest score. | | | |

"Which elements would be regarded as desirable or essential in training of nutritional educators?". Responses to this are represented in Table 6. In this question, 78% of the participants responded that risk factors of obesity and NCDs are essential intraining of nutritional education, making it the most desirable element. This was followed by behavioral changes to reduce NCDs (65%) and counselling of target groups (52%)

**Table 6:** Summary of responses on Qn. 5

| **5. Which of the following elements would you regard as desirable or essential in training of nutritional educators?** | | | |
|---|---|---|---|
| | **%** | **Rank** | **Reasons** |
| Risk factors of obesity and non-communicable diseases (NCDs) | **78 %** | **1** | Knowledge about NCDs and prevention, many are suffering from NCDs |
| How to prevent obesity and NCDs | 39 % | 4 | |
| The particular challenge of behavioural change/willingness to change/ to reduce obesity/NCD risk | **65 %** | **2** | Behavioural changes |
| Regarding healthy diet | 26 % | 5 | |
| Regarding physical activity and sedentary behaviour | 13 % | | |
| How to counsel particular target groups (pregnant women/ diabetes/ hypertension patients, overweight individuals) | **52 %** | **3** | Having the knowledge makes it easy to counsel |
| Other | 9 % | 6 | |

Answers to the question "What aspect of NE do you think is missing particularly in?" revealed that most people (65%) think that proper nutrition policies are missing in Health and Education, followed by 52% who think general knowledge on nutrition and curriculum development is missing in schools teachers; and 48% think general knowledge in nutrition is missing in curriculum developers. These responses are summarized in Table 7 below.

**Table 7:** Summary of responses on Qn. 6

| **6. What aspect of NE do you think is missing particularly in** | | | |
|---|---|---|---|
| | **%** | **Rank** | **Reasons** |
| Health and education policies | **65 %** | **1** | Proper nutrition policies are missing, policies on supporting family after divorce |
| Ministry staff in health, nutrition, agriculture | 9% | 5 | |
| Health professionals | | | |
| - Doctors | 0 | | |
| - Nurses | 0 | | |
| - Nutritionists | 13% | 4 | |
| - Health workers | 13% | 4 | |
| School teachers | **52 %** | **2** | General knowledge on nutrition, curriculum development |
| Curriculum developers and writers of educational materials | **48 %** | **3** | General knowledge on nutrition |
| Other | | | |

Table 8 represents the responses on the question “does Zanzibar need a monitoring system on effectiveness and sustainability of NE?”. In this question, majority of the participants responded that there is a need to have a monitoring system that would evaluate the progress of NE and its implementation; and be able to make future plans accordingly.

**Table 8:** Summary of responses on Qn. 7

| **7. Does Zanzibar need a monitoring system on effectiveness and sustainability of NE?** | | | |
|---|---|---|---|
| | **%** | **Rank** | **Reasons** |
| Yes | **96%** | **1** | Evaluating progress and planning |
| No | 4% | 2 | |

**Results of B**
**Plenary session on terminology and aim of nutrition education**

***What are the most urgent linkages for NE to become effective?***

Answers to this question highlighted that primary school age is the most important age range, because **teachers** stay much longer with the **children** and can influence them better. Education on nutrition and hygiene shall be complement. In secondary schools, practical training on healthy food preparation may help to support what they have learnt. Starting NE early in life was stated explicitly important by workshop attendees as children are most vulnerable to malnutrition and early prevention of malnutrition seems of high priority.

Most favourable would be the integration of evidence based dietary recommendations from **research** findings in the NE curriculum in schools. To provide these, research findings should inform **policymakers** and **development** of school curricula: experts stated a need to implement nutrition education in the school curriculum, handle the gap between public / private schools’ level regarding **teachers**’ engagement and knowledge. **Mothers** also need to be involved in NE programs.

Social mobilization could be a means to involve the **communities** on NE. Communities could be reached via media, where simple language is needed to increase outreach and coverage of island households. Also, **farmers** need to be educated on how to produce nutritious food, and to

increase food quality from farm to fork. Long-term strategies must be developed to address all the mentioned aspects of improvement.

***The best ways to train multipliers in the health system to counsel and monitor the Zanzibari population on how to eat healthy and maintain a healthy weight***

There is basic knowledge on NE in the Ministry of Health, but it is hardly transferred into districts and to people. This knowledge needs to be expanded and the Nutritional Department (of the MoHSW) be strengthened towards more measures/ more outreach and transfer NE to other ministries (such as MoEVT and MoA) and the public in general. Due to this, communication and coordination between **ministries and administration** must be fostered.

Additionally, **medical staff** would highly benefit from NE in order to facilitate counseling patients, improve the quality of counselling contents. Hence, training is needed on how to communicate knowledge towards different target groups. Additionally, new evidence based guidelines and research findings must be trained to the medical staff, in order to provide current knowledge on diet related disease risk and lifestyle/ behavioural changes to their patients.

It is suggested to use the media (and other methods such as mobile cinemas) to better disseminate the knowledge to the **general public**. **Food safety ensuring organisations/institutions and advocacy groups** also need to be strengthened.

It would be helpful to enhance the engagement of NE in the **Ministry of Agriculture** (for agricultural commodities and market development towards Organic products), **Ministry of Economics** (healthy nutrition related investment strategies), **Ministry of Education** and **ZAHRI** (healthy nutrition related research strategies). All these ministries could work together towards "One health approach". The results of their cooperation, nutrition related researches and interventions could be transferred into policies.

***Role of specialists and multipliers within the health system {"channels"}***

Specialists and multipliers have the role of motivating people; providing knowledge on healthy dietary behaviour, physical activity and sedentary behaviours; promoting healthy weight maintenance; and table a proposal for a national campaign based on research data. They also have the task of convincing people on the willingness to change to live a healthy life in terms of nutrition and physical activities. Healthy food is not available to all Zanzibari people, e.g. fish is the key food for Unguja & Pemba but not available/affordable for the Zanzibari. This hampers development and implementation of feasible approaches to enhance availability and accessibility of nutrient-dense foods with a high quality for the community.

It is suggested to enhance attractiveness and acceptance of physical activity (e.g. by adopting existing gamification approaches) and healthy eating by using media broadcast (TV, Radio, social media, advertisement/posters, print media) to reach remote communities. Also, football matches could be organised to make moving fun.

**Focus group discussions**

**Group 1: the main barriers for nutrition knowledge on Zanzibar**

**Barrier 1:** lack of awareness & understanding, ignorance, religious believes, poor education, poor willingness to change
**Causes:** poor advocacy, poor resources, food and nutrition insecurity, poor food safety,
**Solutions:** to enhance food quality and quantity, to reduce food and nutrition security; hypothesis: when people have enough to eat, they will open for nutrition-related knowledge and NE

**Barrier 2:** poor involvement of stakeholders, administrative partners, spiritual leaders, communities
**Cause:** poor policy system, lack of modern technologies and research, poor infrastructure such as for food distribution and preservation
**Solutions:** green agriculture, technologies developing plants resistant to drought and to diseases, plants with increased nutrient content, improvement of knowledge on food production and preservation (in times/areas of overproduction), post-harvest technologies, ameliorate infrastructure and transport/ distribution ameliorate food access

**Group 2: the main barriers for behavioural changes in terms of healthy nutrition in Zanzibar?**

To support nutrition related health and behavioral change, the following have to be considered: the communities people live in, which type of behavioral changes are easily supported and which intersection is needed between the educational system and the health system.

**Barrier 1:** Missing motivation for coherent policies (education, research, health, agriculture etc.)
**Solution:** Enhancement of intersectoral exchange towards integrated solutions defining/ establishing/ sustaining with appropriate resources interfaces on organizational level

**Barrier 2:** Economic factors (carbohydrate-based food is cheapest, change of industrial developments and income structure)
**Solution:** Wise subsidies on different levels – from healthy school meals to political support for sustainable (organic) farming, higher taxes for soda drinks,

**Barrier 3:** Environmental factors (urban / rural, TV advertisements for processed food)
**Solution:** Targeted outreach measures on district level, support of physical measures by technical means (TV, smartphone etc), also support gamification of healthy lifestyle for the younger generation

**Barrier 4:** Knowledge level/ social factors - different target groups missing awareness.
**Solution:** Training and effective preventive measures is needed.

Children: Regular medical screenings, easy/ early/ motivating awareness raising on healthy nutrition

Parents: Support breast feeding, overcoming unhealthy traditions (e.g. father eats first and rich in protein), easy-to-digest-information on healthy lifestyle,

Teachers: Different levels of knowledge and engagement in private and public schools; NE shall become a compulsory and integrated component of the curriculum

Health workers: more prevention and counselling - knowledge, resources and quality assurance is needed

District officers are important enablers of all aspects listed above, and spiritual leaders can be involved as motivators

**Results of plenary discussion with summary of both groups:**

1. Better education followed by more research, then policymakers and the population can be informed (dissemination). Knowledge needs to be disseminated on local, district, and school levels too.
2. There is a need to form a national committee that will be be multi-sectoral and interdisciplinary, so as to make sure the challenges of NE are broadly overcome.
3. Primary school can be a starting point, where both teachers and pupils can be educated about NE. Curricula can be developed to address food and nutrition; physical activity, sedentary behaviours, and unhealthy lifestyles
4. Training the trainer in the health sector (nurses, midwifes, doctors) to be able to effectively reach families, men and women, and mothers-in-law. Media campaigns can reach all family members
5. To query some traditional and/ or religious beliefs which might be misleading nowadays: religious leaders must be involved and teach people

**Results of C**
**Transfer - comparison between the workshop results and nutrition curriculum contents**

The nutrition curriculum for medical students at the School of Health and Medical Sciences (SHMS) of SUZA has been observed for comparison with what the Zanzibari population needs and what is provided in terms of education. Currently, the curriculum mainly constitutes of:

- Introduction to Nutrition,
- Biomolecular aspects of Nutrition,
- Microbiological aspects of Nutrition,
- Life cycle Nutrition and
- Nutrition and NCDs

Focus of teaching mainly lies on the biochemistry of non-communicable diseases, with a focus on: diabetes, cardiovascular diseases and cancer.

From the outcome results of the qualitative and quantitative needs assessment reveals a stronger alignment with:

- knowledge on NCDs (obesity and overweight also need to be included),
- healthy lifestyles (e.g. healthy dietary behaviour and physical activity, etc)
- effects of fast foods,
- food preparation,
- food preservation and
- organic food cultivation, or at least have awareness on the importance of consuming organic food.

It would also be useful to include highlights on how to conduct nutrition related research.

**Comparison between workshop suggestions and curriculum contents**
Summary of the comparison is seen in Table 1 below, in which the first column represents suggestions on what to be taught to the communities with respect to what they need in terms of NE. The second column sets priorities for NE on Zanzibar comparing experts position and curriculum content, so expresses suggestions from the MENTION team. As corresponding experts did not attend the workshop, specific priorities were completed by using the knowledge and experience from the multidisciplinary team and what recent researches have revealed. The third column shows what is currently included in the SHMS Nutrition curriculum.

**Table 9: Comparison between workshop suggestions and curriculum contents**

| Experts suggestions | MENTION Comments | Nutrition Contents |
|---|---|---|
| It is necessary to explain what nutrition is and why proper food is vital for a healthy well-being. This is expected as an introduction part of nutrition, hence there was no need for discussion. | Starting point should be brief and discuss: what do we need to be healthy and cover the aspects of:<br>- Prevention<br>- Support of Treatment<br>- Clinical interventions of<br><br>The *"italicised"* is low priority | **Introduction to Human Nutrition**<br>• *Nutritional science*<br>• *Origins of human diet*<br>• General concepts on Nutrition |
| It is of highest priority to know the macronutrients and their functions and hence the need to balance them. As this is common sense, the experts did not discuss this further. | **Highest priority**<br><br>Recommendations:<br>1. Include their digestion and metabolism already in first year subjects in the context of nutrition<br>2. Include water | **Macronutrients**<br>• Carbohydrates (including a highlight on glycemic index, and diabetes)<br>• Proteins (including a concepts on Protein Energy Malnutrition, and vegetarianism)<br>• Lipids |
| There is a need to understand how important micronutrients are for body mechanisms and why they should be included in the diet. Hence, experts found no need to further discuss this | **Highest priority**<br><br>Recommendation:<br>1. Replace water by "trace elements"<br>2. Introduce the concept of hidden hunger | **Micronutrients**<br>• Vitamins<br>• Minerals<br>• Water |

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| Effects of fast foods, snacking, energy imbalanced eating behaviour, excess intake of fat, salt, sugar,<br>Fat | **High priority** | **Planning a healthy diet**<br>• Understanding the "Food Pyramid"<br>• Recommendation for fats, carbohydrates, and proteins<br>• Beverages |
| Healthy lifestyles (e.g. healthy dietary behaviour and physical activity, etc) | **High priority**<br><br>Recommendation: Introduction into measurement techniques and methods how to measure key indicators | • Energy balance and weight management<br><br>• Energy Balance<br>• Energy Intake and Energy Output<br>• Body composition and weight management |
| Food preparation | **Medium priority**<br><br>They need to know how to prepare food to preserve nutritional contents and to reduce the risk of food-borne diseases | **Food safety and toxicology**<br>• Proper food handling and preparation<br>• Food-borne diseases<br>• Natural toxins (plants, animals, microorganisms)<br>• Effect of toxic substances in food |
| As it is already part of the curriculum, and special training is set in the ministry for mother and child health nutrition, experts did not discuss this. | **Highest priority**<br><br>Recommendations: extra training on unhealthy traditional believes | **Life Cycle Nutrition**<br>• Pregnancy and lactation<br>• Infants<br>• Adolescents and adults<br>• The elderly |

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| For proper digestive health and prevention of certain diseases such as cancer (eg: colorectal cancer), Zanzibaris need to have this knowledge. Therefore, this was classified as having medium priority, despite its not being suggested by the experts | **Medium priority**<br><br>Recommendations:<br>1. More emphasis on the italicised<br>2. To include antioxidants here, as "nutrition and disease prevention" | **Nutrition and Immunity**<br>• The functioning of the immune system<br>• The immune system of the gut<br>• *Probiotics, prebiotics and dietary fiber*<br>• The role of vitamins, minerals and phytohormones on the immune response |
| | **Low priority** | **Nutrition and diseases**<br>• Antioxidants:<br>• Oxidative stress and antioxidants<br>• Antioxidant nutrients<br>• Antioxidants in disease prevention |
| Knowledge on NCDs, obesity and overweight | **High priority**<br><br>Recommendation:<br>1. Better be termed as "lifestyle and nutrition related diseases"<br>2. To include obesity and overweight. | **Non-communicable diseases**<br>• Diabetes<br>• Cardiovascular diseases<br>• Cancer |
| Organic food cultivation; Advantages of organic food consumption | **Low priority** | General concepts on Nutrition, e.g. use home compost instead of artificial fertilisers |
| Food preservation | **Lowest priority**<br><br>Remarks: This could be done by other sectors such as Agriculture | Not applicable |

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| | **ADD:** | |
| | 1. Dietary reference standards/Dietary guidelines | |
| | 2. Nutrition research methodology | |
| | 3. An overview of public health nutrition | |

From the comparison between experts's suggestions (based on what is thought to be a need to the Zanzibaris) and the current SHMS Nutrition curriculum, it was found that some topics are of highest priority to the community, some are of medium priority and some are low priority to the. Some modifications are also needed to the topics already seen to be of high or medium priorities. Some other important aspects could be added to the curriculum ; such as: Dietary reference standards/dietary guidelines, Nutrition Research Methodology, and an overview of Public Health Nutrition so as to strengthen the program. The results for this comparison calls for curriculum review to accommodate what is missing, in order to enhance the effectiveness of the course, and create the necessary awareness in the community in terms of NE. the following presentation of the curriculum content (Table 2) according to priorities was drafted.

**Table 10: Curriculum Content presentation according to priorities**

| **Priorities** | **Nutrition contents** |
|---|---|
| **Highest priority**<br><br>Recommendations:<br>1. Include their digestion and metabolism<br>2. Include water | **Macronutrients**<br>• Carbohydrates (including a highlight on glycemic index, and diabetes)<br>• Proteins (including a concepts on Protein Energy Malnutrition, and vegetarianism)<br>• Lipids |
| **Highest priority**<br><br>Recommendation:<br>1. Replace water by "trace elements"<br>2. Introduce the concept of hidden hunger | **Micronutrients**<br>• Vitamins<br>• Minerals<br>• Water |

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| **Highest priority**<br><br>Recommendations: extra training on fatal, unhealthy traditional believes | **Life Cycle Nutrition**<br>• Pregnancy and lactation<br>• Infants<br>• Adolescents and adults<br>• The elderly |
| **High priority**<br><br>Recommendation: Introduction into measurement techniques and methods | • **Energy balance and weight management**<br>• **Energy Balance**<br>• **Energy Intake and Energy Output**<br>• **Body composition and weight management** |
| **High priority**<br><br>Recommendation:<br>1. Better be termed as “lifestyle and nutrition related diseases”<br>2. To include obesity and overweight. | **Non-communicable diseases**<br>• **Diabetes**<br>• **Cardiovascular diseases**<br>• **Cancer** |
| **Medium priority**<br><br>They need to know how to prepare food to preserve nutritional contents and to reduce the risk of food-borne diseases | **Food safety and Toxicology**<br>• Proper food handling and preparation<br>• Foodborne diseases<br>• Natural toxins (plants, animals, micro-organisms)<br>• Effect of toxic substances in food |
| **Medium priority** | **Planning a healthy diet**<br>• Understanding the “Food Pyramid”<br>• Recommendation for fats, carbohydrates, and proteins<br>• Beverages |

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| **Medium priority**<br><br>Recommendation:<br>1. More emphasis on the highlighted<br>2. To include antioxidants here, as "nutrition and disease prevention" | **Nutrition and Immunity**<br>• The functioning of the immune system<br>• The immune system of the gut<br>• Probiotics, prebiotics and dietary fiber<br>• The role of vitamins, minerals and phytohormones on the immune response |
| **Low priority** | **Nutrition and diseases**<br>• Antioxidants:<br>• Oxidative stress and antioxidants<br>• Antioxidant nutrients<br>• Antioxidants in disease prevention |
| Starting point should be brief and discuss: what do we need to be healthy?<br><br>The "*italicised*" is low priority | **Introduction to Human Nutrition**<br>• *Nutritional science*<br>• *Origins of human diet*<br>• General concepts on Nutrition |
| **Low priority** | General concepts on Nutrition, e.g. use home compost instead of artificial fertilisers |
| **ADD:** | |
| 1. Dietary reference standards/Dietary guidelines | |
| 2. Nutrition research methodology | |
| 3. An overview of public health nutrition | |

## CONCLUSIONS

We can conclude that the main barriers of NE and its effectiveness in Zanzibari population is poor involvement of stakeholders, lack of knowledge and awareness, social beliefs, and carbohydrate based foods being easily accessible. By this, knowledge dissemination and creating awareness among individuals is a necessary step towards improving nutrition related problems in Zanzibar (especially NCDs and obesity). The target groups that need NE the most are the general public, urban and rural communities, school children and mothers. The professional groups that need better understanding of NE are policymakers, health professionals such as doctors and nurses, and ministry staff in health, nutrition and agriculture. As these are the priority groups, we can also prioritize curriculum developers, as all of these groups can work together for resource allocation, educating the society and practicing within their professional duties.

Also, proper training given to nutritional educators will be useful for them to impart knowledge to the appropriate groups effectively. Essential elements in the training could include: risk factors of obesity and NCDs, behavioral changes/willingness to change and its impact on obesity/ NCDs, and how to counsel target groups (pregnant women/ diabetes/ hypertension patients, overweight individuals). District officers and religious leaders are also important stakeholders to be involved in NE programs and training. The media can be a another important channel to disseminate this knowledge to public in general.

In addition, the existing nutrition curriculum for medical students needs to be reviewed to accommodate what is really needed.

**REFERENCES**


1. United Nations (UN). United nations population prospects. The 2007 revision population database.; Department of Economic and Social Affairs Population Division: New York, 2008; p 244.
2. United Nations World Food Programme ( UNWFP). *Comprehensive food security and vulnerability analysis (cfsva) and nutrition assessment 2010. Kenya high density urban areas*; United Nations World Food Programme Headquarters. Via C.G. Viola 68, Parco de' Medici, 00148, Rome, Italy May 2012, 2012; p 91.
3. World Health Organization (WHO). Fact sheet : Cardiovascular diseases (CVDs) 2016 [updated June 2016. Available from: http://www.who.int/mediacentre/factsheets/fs317/en/ accessed August 2016.
4. Oladapo OO, Salako L, Sodiq O, et al. A prevalence of cardiometabolic risk factors among a rural Yoruba south-western Nigerian population: a population-based survey. *Cardiovasc J Afr* 2010;21(1):26-31.
5. Boutayeb A. The double burden of communicable and non-communicable diseases in developing countries. *Trans R Soc Trop Med Hyg* 2006;100(3):191-99.
6. Mbanya JC, Motala AA, Sobngwi E, et al. Diabetes in sub-Saharan Africa. *Lancet* 2010;375(9733):2254-66.
7. Sobngwi E, Mauvais-Jarvis F, Vexiau P, et al. Diabetes in Africans. Part 1: epidemiology and clinical specificities. *Diabetes Metab* 2001;27(6):628-34.
8. Christensen DL, Friis H, Mwaniki D, et al. Prevalence of glucose intolerance and associated risk factors in rural and urban populations of different ethnic groups in Kenya. *Diabetes Res Clin Pract* 2009;84(3):303-10.
9. Obirikorang C, Osakunor DN, Anto EO, et al. Obesity and Cardio-Metabolic Risk Factors in an Urban and Rural Population in the Ashanti Region-Ghana: A Comparative Cross-Sectional Study. *PLoS One* 2015;10(6):e0129494. doi: 10.1371/journal.pone.0129494
10. Re RN. Obesity-related hypertension. *The Ochsner journal* 2009;9(3):133-6.
11. Carrere P, Fagour C, Sportouch D, et al. Diabetes Mellitus and Obesity in the French Caribbean: a Special Vulnerability for Women? *Women Health* 2017
12. Nayak SB, Rahming V, Raghunanan Y, et al. Prevalence of Diabetes, Obesity and Dyslipidaemia in Persons within High and Low Income Groups Living in North and South Trinidad. *Journal of clinical and diagnostic research : JCDR* 2016;10(5):IC08-IC13. doi: 10.7860/JCDR/2016/18154.7875
13. Bovet P, Arlabosse T, Viswanathan B, et al. Association between obesity indices and cardiovascular risk factors in late adolescence in the Seychelles. *BMC Pediatr* 2012;12:176.
14. Jordan I, Hebestreit A, Swai B, et al. Breast cancer risk among women with long-standing lactation and reproductive parameters at low risk level: a case-control study in Northern Tanzania. *Breast Cancer Res Treat* 2013;142(1):133-41.

15. Tanzania National Bureau of Statistics. Tanzania Demographic and Health Survey 2010. Dar es Salaam, Tanzania: NBS and ICF Macro.
16. Jorgensen JMA. NCD Survey Report - Main finings from the National Non-Communicable Disease Risk Factor Survey 2011. Ministry of Health/Danida HSPS IV, Zanzibar
17. Nyangasa MA, Kelm S, Sheikh MA, et al. Design, Response Rates, and Population Characteristics of a Cross-Sectional Study in Zanzibar, Tanzania. JMIR research protocols 2016; 5(4):e235. doi: 10.2196/resprot.6621
18. Reilly JJ, Kelly J. Long-term impact of overweight and obesity in childhood and adolescence on morbidity and premature mortality in adulthood: systematic review. Int J Obes (Lond). 2011 Jul;35(7):891-8
19. "Education." *International Rice Commission Newsletter Vol. 48*, FAO of the UN, www.fao.org/nutrition/education/en/.