“Don’t Distribute Free Food ... Improve Our Dietary Diversification Knowledge and Skills”: Borderlanders’ Perceived Root Causes of Malnutrition in Kagera Border Region, Tanzania

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ABSTRACT

Nutrition is a very important component for the growth and development of any society, specifically for the prevention and control of a range of diseases. In Tanzania, despite a great variability of nutrition status by different characteristics, generally the majority of the populations have poor nutrition. Kagera is among the 26 regions of mainland Tanzania with a total projected population of about 2.5 million. The nutrition status among residents is poor with multifactorial determinants. In this paper, we present qualitative data collected using in-depth interviews with key adult men and women informants in the four Tanzania-Uganda border districts. The main objective was to establish possible causes of the reported low nutrition in Kagera Region. Majority of study participants were affirmative of the availability and plenty of food; the main problem being poor dietary diversification knowledge, attitudes, skills, and practices. They recommend various measures that could improve the current nutrition status. These measures include nutrition education at primary, secondary and tertiary levels; health education at health facility level that will include nutrition topics and peer education at community level; introduction of nutrition bylaws in the community and vitalizing peer education social groups among males and females about the importance of dietary diversification. Therefore, future nutrition research should include culture, religion, and traditional indicators to inform food and nutrition interventions and policy in similar populations to the Tanzania-Uganda borderlanders.

Keywords: Malnutrition, dietary diversification, nutrition education and promotion, Tanzania-Uganda borderlands, Kagera region, Tanzania.

Published Online: November 26*, 2020

ISSN: 2593-8339

DOI: 10.24018/ejmed.2020.2.6.561

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I. INTRODUCTION

Available literature indicate that Tanzanians’ nutrition status is generally poor [1]-[9]. Malnutrition (wasting, stunting and underweight), primarily affecting infants, young children and women of reproductive age, is widely spread and remains a key public health concern [9]-[13]. It is reported, 57% of babies 0-6 months are not exclusively breast-fed for 6 months, 57% of children under-five years are anemic, 45% of women of reproductive age (15-49 years) are anemic and 37% of urban women aged 15-49 years are overweight [14]. Similarly, 7% of under-fives are born with low birth weight (below 2,500 g), 5% of children under 5 are wasted (low weight for height) [14], 36% of women of reproductive age are iodine deficient and 34% of under-fives are stunted. Furthermore, 33% of children under 5 are vitamin A deficient, 14% of children under 5 are underweight (low weight for age), 9% of adults are diabetic and 10% of adults

are obese [14]. Cameron [5] reported that “about 3 million children under the age of five years are affected ... Such a high incidence means that Tanzania has the third largest number of children who are stunted in Africa”.

However, levels of malnutrition vary by regions [2], [15]. For example, the Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS 2015-16) shows that anemia prevalence among women in the reproductive age (15-49) ranges from 23% in Mbeya to 49% in Shinyanga. The most agriculturally productive regions in Tanzania, Morogoro, Rukwa, Iringa, Mbeya, Ruvuma and Kagera report very high levels of stunting [5]. Similarly, among children under 5, stunting ranges from 15% in Dar-es-Salaam to 56% in Rukwa, wasting ranges from 0.4% in Pwani to 6.5% in Arusha, underweight ranges from 6.4% in Dar-es-Salaam to 23% in Rukwa, and anemia ranges from 40.1% in Iringa to 70% in Shinyanga. In addition, data indicate that malnutrition varies with place of residence (rural or urban)

being high in rural compared to urban areas [2], [13], [16], [17]; and by gender, age, education and wealth [9], [11], [17].

Kagera, one of the country's 'honey and milk plenty regions' in respect to food production, is reported facing poverty and chronic malnutrition among its residents [3], [18]-[23]. For example, data from the Center for Counseling, Nutrition, and Health Care (COUNSENUH) Nutrition Intervention Project, Lishe Wajibu (2015-2017) in Kagera, Pwani and Mtwara regions show that in 2014, Kagera had the highest prevalence of malnutrition indicators for children compared to the national average (in brackets): 51.9% (34.7%) overall stunting among children 0-59 months, 33.2% (23.4%) of moderate stunting among the same group, 18.7% (11.7%) of children aged 0-59 months severely stunted, 22.2% (13.4%) of children in the same group underweight. Similarly, indicators for pregnant women show Kagera had a higher number, 8.4% (5.4%) of women aged 15-59 being severely thin and with lower use of iodized salt, 49.6% (62.2%).

A (2014-2015) cross-sectional and longitudinal study of nutrition status among 437 schoolchildren in Bumbire archipelago, Muleba district, reported high prevalence of malnutrition: 30.7% stunting, 12.9% underweight, 4.5% thinness, while overweight was rare (2.4%) [19]. The researchers attributed malnutrition affecting Bumbire Island children to micronutrient deficiencies. A survey in Kagera among 612 women aged 15-49 showed 39.1%, 29.6%, 8.6% and 1.0% of the participants as having either any, mild, moderate, or severe anemia respectively. This suggested that women in reproductive age including adolescent girls (onset of menstruation) and pregnant women (increased blood volume due to pregnancy) residing in rural areas of the region were at risk of anemia [21], [23].

Multi-factorial causes for malnutrition in Tanzania, and in Kagera Region in particular, are known [9], [10], [19], [20], [22]. Factors include, poverty, household food insecurity (in form of availability, access, consumption, and stability), poor care practices (poor initiation of breastfeeding, low rates of exclusive breast feeding, inappropriate introduction of complementary foods and poor child feeding practices), poor Water, Sanitation and Hygiene (WASH) services, situation health status of mothers and children, insufficient access to health services and poor access to adequate health environment. For sure, determinants of malnutrition differ by locality; hence, the understanding of localized factors/determinants would facilitate focused actions by individuals, communities, service providers, intervention planners/designers, implementers, and policy makers in Kagera Region. In this paper, however, we present and discuss one factor, lack of dietary diversification knowledge, skills, and practices to prepare balanced meals, perceived by study participants' cardinal for malnutrition status recorded among residents of the Kagera border region.

II. MATERIALS AND METHODS

The border region we studied, Kagera, is one of Tanzania's 31 administrative regions. It is located in the northwestern part of the country on the western shore of Lake Victoria. The region shares borders with neighboring countries of Burundi,

Rwanda, Uganda and lies across the lake from Kenya. The region has an area of 40,838 km² (15,768 miles²) of which 11,885 km² (4,589 miles²) are under the waters (Lakes Victoria, Ikimba and Burigi and Kagera and Ngono rivers). Kagera lies between 1°00' and 2°45' S and between 30°25' and 32°40' E. Undeniably, given its location and topography, Kagera is blessed with good climate and copious arable land making it one of the food producing giant regions in Tanzania [20], [24], [25].

We reanalyzed qualitative data collected between September 2017 and September 2018 in the four Tanzania-Uganda border districts of Kagera region in Tanzania. The districts are: Kyerwa, Missenyi, Bukoba Urban and Bukoba Rural. Study participants included key informants (KIs): men and women aged at least 18 years; district and village officials, influential members of the community and the district Nutrition Officers. In addition, we also conducted in-depth interviews (IDIs) with some regional officials on the subject matter. The in-depth interview guide sought, among other issues, KIs' understanding of causes of malnutrition reported in their region.

The Muhimbili University of Health and Allied Sciences Institutional Review Board (MUHAS IRB) reviewed and approved the study protocol Ref. No. 2017-09-29/EAC/Vol.XII/73). Regional, district, division, Ward and Village authorities granted permission to conduct the study in their respective areas. Given the sensitive nature of the borderlands, participants provided verbal consent. However, for each interview, we used codes that were known to the researchers only for the purpose of reference when writing the results. Data analysis continued throughout the process of data collection following three stages of qualitative data analysis: data reduction, data display and conclusion drawing and verification [26]. We compensated participants' time spent on the interviews.

III. RESULTS

The reanalysis of data indicated that majority of study participants mentioned, poor dietary diversification knowledge, skills, and practices of available food to prepare balanced meals, a key factor for malnutrition status reported among their communities' members. However, this factor is rarely mentioned in existing literature. A study participant reported, "We really do not know which food contains what nutrients ... So, we just eat whatever is put on the table ... Just to fill our stomachs." Another interviewee observed that there is plenty of food in Kagera. "All we are missing is how to mix them [food] to make balanced meals ... a bit of protein, a bit of starch and a bit of vitamin every meal ... What we do is just filling our stomachs ... Not nourishing our bodies."

Recalling what she used to eat when growing up in Kagera, a female interviewed in Missenyi in her late 60s, said,

We used to eat bananas ... which are mainly water ... but mixed with *empelege* [beans] or *enshoro* [bambara nuts], fish or meat almost every meal ... Nowadays we take *fia* [FHIA bananas] with one handful of beans often without *omukubi* [meat of fish] ... We grew and ate different vegetables like *omulili*, *omutontozi* [pumpkin leaves],

entura, eibota, omushokoolo [beans leaves] in our ebibanja [farms of mixed food and cash crops] and fruits amanyembe [mangos], amafenensi [jackfruits] amatunda [passion fruits] amachunkwa [oranges], amachenza, amapera [guavas], enkelele [strawberries] ... We also collected and ate vegetables and fruits that grew in the bush, shrubs and forests like enshalazi, amashaasha, embatabata, amabungo, amatunda, enziru, enuuma, ezambarau ... Some of which are extinct and where they are available, they sell at unaffordable prices ... We need to be advised on how to mix what we produce to make nutritious combinations as our parents did ... They never went to school ... We did ... Why can't we make use of our environment to improve our nutrition status?

A male interviewee in Bukoba Town asked, "Nutrition and balanced meal in relation to whom? ... Do all people need the same amount of nutrients all the time? Do you expect villagers to know this or you, the elite? ... We need adequate information on this health problem." A male interviewee in Bukoba Rural noted, "Men do not cook ... Our wives decide on what we should eat ... They are the ones who need education on what constitutes a good and balanced meal."

A Nutrition Officer, Bukoba Urban, put it clear that "Bukoba ... and Kagera in general, is blessed with a variety of food ... The problem is poor dietary diversification skills to make adequate or balanced meals for household members in varied age groups and nutrition needs." Discussing the same factor, the Medical Officer in-Charge, Mugana District (Missenyi) Designated Hospital (DDH) observed,

We don't have to distribute free or subsidized food ... We don't have to introduce new food crops ... Our region is very rich in terms of food crops ... We have a variety of food in this region [Kagera] ... More than we actually need ... The problem, I think, is that community members are unaware of which food to mix to make balanced meals ... This is a key problem we have to solve ... If we can improve food preparation knowledge and skills among community members, the mothers and caretakers, in particular, we could raise the nutrition status of our people using resources available in our region.

We probed to capture what the participants meant by 'a balanced meal': "Would you please explain to me what you mean by a balanced meal? A fisherman interviewed in Bugabo stated, "A balanced meal contains all nutrients." However, he was unable to differentiate which 'nutrients' he referred to! A pregnant mother interviewed in Kyerwa stated "We had a health education session at the health center three or four months ago, but I have forgotten what she [the nurse] said it was." A retired civil servant female key informant interviewed in Missenyi summarized her understanding of a balanced meal as follows, "In my understanding, it is a meal containing proper contents of carbohydrates, fats, proteins, vitamins, minerals and water necessary to maintain good health."

A. Recommended Strategies to Improve Dietary Diversification Knowledge, Skills and Practices among Kagera Residents

We further asked the study participants: what measures should be taken to improve dietary diversification knowledge, skills, and practices among Kagera residents to improve their nutrition status? Participants' perspectives varied by age, exposure/education, and sex.

1. Re-introduce health education and promotion programs

Older study participants, females and males alike, recalled and recommended the re-introduction of health education and promotion programs conducted in the 1960s and the 1970s. A retired civil servant (teacher) female interviewee in Missenyi, for example, stated, "Revive health education and promotion programs as it was in the 1960s/70s", adding,

We had radio health programs like *Mtu ni Afya* and *Chakula Bora* ... RTD [Radio Tanzania, Dar-es-Salaam] broadcasted health education sessions and music rich in health messages composed by different orchestra bands in the country like Morogoro Jazz and mobilizing songs from Artists like [the late] Mwinamila and Makongoro ... Remember, at that time we had one radio station! ... It covered the whole country ... Today, we have several radio and television stations, private and public, that could support disseminating health messages even in area-specific first languages ... This is important now because those who benefited from previous initiatives are now phasing out; the young, reproductive generation needs to be supported in this respect.

2. Re-introduce domestic science subject in schools

Similarly, older female study participants recalled undertaking domestic science classes at primary to tertiary education levels, which they claimed enabled them to acquire appropriate life skills they are still applying in life. A female participant interviewed in Missenyi, for example, recalled,

Thank God I went through the Catholic Mission schools under the St. Theresa Sisters ... They taught us life skills that shaped us to become responsible adults, mothers, wives and parents ... We had cookery classes where we were taught different cooking skills for different meals, occasions and needs [for the young to the adults] including what constitutes a balanced meal ... We had practical sessions and competed for domestic science/cookery subjects' prizes at the end of each term ... These subjects should be reintroduced to impart important life skills to our young generation that would contribute to malnutrition reduction in the country.

3. Employ and allocate active health or nutrition officers in every ward or village

Mid-aged generation study participants commented that lack of health or nutrition officers at the grassroot levels fueled malnutrition levels among community members, both the young and the adults alike. Hence, they recommended to the district, regional and the central government to allocate active health/nutrition staff in their areas to promote healthy behaviors and practices including improving residents' dietary diversification knowledge, skills and practices to

prepare balanced meals. A Nutrition Officer, Bukoba Urban, for example, observed,

It is unfortunate that the government no longer employs Village Nutrition Officers who were responsible for health education and promotion activities at the grassroots ... I am sure, with support and initiatives from these officers, we would quickly improve our people's health status ... They know their areas [both the environment and residents] better than us [district or regional officials] to facilitate interventions implementation.

However, the same officer further observed,

Before implementing such interventions, we need to strengthen ward and village health officers' capacity on advising community members on which types of food to mix to prepare balanced meals for healthy or malnourished children and adults ... This might require conducting short trainings within the district to orient the health [nutrition] officers on available food that could be mixed to provide balanced meals to household members.

The Isingiro Health Center in-Charge commented that ward and village health officers would facilitate improving people's health and adopting health behaviors and practices, which could, in turn, reduce the health (malnutrition) burden they are currently facing in their catchment area. A sub village Chairperson interviewed in Bukoba Rural remarked, "These officers would open our [the mothers and the caregivers, in particular], eyes on which food we should be mixing to prepare balanced meals to improve our people's nutrition status ... They know which food crops we have ... Some of which, we don't know their nutritional value ... And could use their experiences with our environment to assist us in this respect."

4. *Establishing nutrition health units at healthcare facilities in the region*

Speaking from his experience working in Kagera region, the Medical Officer in-Charge, Mugana DDH strongly recommended for the establishment of health (nutrition or malnutrition) units at the health centers, district and regional hospitals, which, among other objectives would target improving dietary diversification knowledge, skills and practices among their clients. "Healthcare workers in these units should work hand in hand with village health/nutrition facilitators ... If we can afford undertaking this approach ... Believe me ... Within two years Kagera residents' nutrition status will have improved."

5. *Reinforcement: pass nutrition-specific bylaws*

Informed by the success recorded in reinforcing antenatal care (ANC) services utilization in the region, majority of the village government members interviewed proposed the introduction of nutrition-specific bylaws in every village in Kagera. A village Chairperson interviewed in Missenyi, for example,

We should start with malnourished under five children's parents ... Parents of malnourished children should be fined not less than TShs 50,000 each [\$22] for not appropriately taking care of their children's health ... We

had a similar problem ... Some parents were reluctant taking their children for immunization and other [medical] checkups ... Some families did not send pregnant mothers to the clinics ... We introduced a TShs 20,000 [\$9] penalty five years ago ... Today, almost all pregnant mothers attend clinic as early as possible ... This is the best way to deal with 'hard hearted' villagers.

B. *Who Should Be Targeted by the Dietary Diversification Improving Interventions in Kagera?*

We further sought study participants' opinions on "Who should be targeted by interventions aiming at improving dietary diversification knowledge, skills and practices among Kagera residents?" On the one hand, all of the female participants observed that all adult Kagera residents should participate in such programs/interventions. An old lady interviewed in Missenyi, for example, commented, "Each and every adult in this region is responsible for his/her wellbeing and good health of other citizens ... We should all get this education". Another female participant noted,

Both men and women provide care to the children and other members of the family ... The fathers should provide for nutritious food to be prepared by the wives for the family members' consumption ... Heads of the families [the fathers] should ensure that nutritious food is available all the time to meet family members' health needs.

A single male healthcare provider interviewed in Kyerwa in his early 30s emphasized, "Good health status is important ... Everyone's responsibility ... Everyone [male or female], therefore, needs to have cooking skills ... Not for actual cooking but to effectively contribute to the fight against malnutrition in our region [Kagera]."

On the other hand, majority of the male participants' perspective was that interventions intended for improving dietary diversification knowledge, skills and practices should target mainly the mothers and caregivers. A male participant interviewed in Bukoba Rural who had earlier noted that men do not cook reiterated,

As I have told you, we [the men] do not cook ... Our wives do [cook] and decide what we take every meal and day So, it is them [females: wives, mothers and caregivers] who should be targeted by such programs ... In addition, we [men] are too busy to attend such sessions and unable to practice what [dietary diversification skills and practices] we shall be exposed to ... Target the women.

C. *Who Should Disseminate Dietary Diversification Knowledge, Skills and Practices Messages?*

We further asked our study participants to suggest culturally acceptable individuals to be engaged in disseminating health messages regarding good dietary diversification knowledge, skills, and practices. Proposed individual and groups include:

1. *Peer education via ebyama or (males' and females')*

social groups

A male interviewee in Bukoba Rural who alleged women's social groups or *ebyama* were contributing heavily to malnutrition levels among children in Kagera, suggested a better use of the same social groups as follows,

Omubazi gw'omulilo, mulilo" [tit for tat], the same women's social groups that have brought us to this point [level of malnutrition] should be tasked conducting peer health education amongst their members on say, better health and nutrition practices including good dietary diversification ... They should set aside at least two days a week for a four hours session each day ... Peer educators and *ebyama* leadership should be responsible for follow up to ensure their members practice what is being presented at these sessions ... I tell you, in two years' time, we shall witness [nutrition] changes in our communities.

As indicated earlier, other participants pointed out that village/ward health/nutrition officers are appropriate disseminators and agents of behavior change among Kagera residents regarding good dietary diversification knowledge, skills, and practices. In addition, volunteers, teachers, and healthcare providers were recommended for this activity. Our study participants proposed that sessions could be held at village centers, schools, and normal women social groups' meeting places or at perceived convenient places. Dissemination channels proposed include location-specific radios, TVs, newspapers and mobile 'classes' preferably using common first languages would be appropriate for nutrition interventions. A few participants suggested reaching the men through their social groups and other channels with male-specific responsibilities messages regarding improving dietary diversification knowledge, skills, and practices for improved health (nutrition) status of the Kagera residents.

IV. DISCUSSION

The main objective of this study was to assess possible causes of the reported malnutrition among residents in the border districts of Kagera Region, Tanzania. Malnutrition is undesirable level of nutrition resulting from lack (under-nutrition), excess (over-nutrition) or imbalance of nutrients in the diet leading to ill-health. Malnutrition may be a result of insufficient supply of one or more nutrients or due to an error in metabolism, interaction between nutrients or nutrients and drugs used for treatment. Our study findings suggest that although food supply is plentiful in Kagera, some population groups (the under-fives, women in the reproductive age, the elderly and people with ill-health) are not achieving right levels of micronutrients in their diets to support good health. These findings are not unique to our study. Johansen & Alistides' [27] study conducted in Kamachumu Division, Muleba district, concluded,

Malnutrition in Kamachumu [Division] is multifaceted and requires multisectoral, multidisciplinary and multilevel action to alleviate it ... There is lack of health education about nutrition ... 98.6% of the respondent take

meals more than once per day, [indicating] there is no lack of food ... The problem is lack of education on how to [prepare] balanced diet [meals], i.e. no fruits and vegetables ... There is need for urgent interventions to prevent and mitigate malnutrition in Kamachumu.

Apparently, and as study participants remarked, the region has abundant sources of nourishments (calories, proteins, minerals, vitamins, and fats) required for adequate human nutrition status. However, and as study participants recounted, what is critically lacking among Kagera residents are virtuous dietary diversification knowledge, skills, and practices to enable them to prepare balanced meals for household members' (children and adults) consumption. In turn, and as perceived and reported by the study participants, lack of good dietary diversification knowledge, skills, and practices among Kagera residents leads to malnutrition levels recorded in the region.

We observed, most of the borderland families we visited or stayed with, consumed carbohydrate-rich staple-based diets that have low minerals and vitamins and rarely consumed together with micronutrient-rich foods such as beef, fish, poultry, fruits and vegetables. Where vegetables were taken, they were overcooked and in small quantities. The men rarely ate vegetables and fruits, which they considered appropriate for women and children [20]. On the average, most of the families we visited or stayed with, took meat or fish two or three times a week after *omujajaro* or the open market day. These findings are not limited to the Tanzania-Uganda borderlands. Ochieng's, *et al.* [12] study on 'Determinants of dietary diversity in Tanzania' reported similar findings among studied communities. We further observed that very few families grew 'traditional' vegetables on their farms or *ebibanja*. Families that had vegetable gardens reported selling much of the products at the open markets or to middle businesspersons, which denies their families sources of micronutrients.

Some of our study participants, scientists, physicians, nutritionists [12] and public health experts emphasize eating properly cooked vegetables, the 'traditional' types, in particularly, such as beans leaves, African nightshade (*S. nigrum*), okra/lady's fingers (*Abelmoschus esculentus*; *bamia*), amaranths, African eggplant (*Solanum aethiopicum*; *bilinganya/nyanya chungu?*), sweet potato leaves (*Ipomoea batatas*; *matembele*), cassava leaves (*kisamvu*) and pumpkin leaves (*Cucurbita maxima*; *msusa*) is an important source of micronutrients, fiber, vitamins and minerals. That is, an adequate diet providing all essential micronutrients will contribute to not only a better nutrition but will in the long run also reduce the burden of chronic diseases. However, one needs to be equipped with adequate dietary diversification knowledge, positive attitudes, and skills to meet this goal.

Findings, conclusions, and recommendations from a study on the 'Determinants of dietary diversity of the household, children under five years, and women in Tanzania' [12] support our study findings as follows,

Diets in most households in Tanzania lack diversity because the intake of meat, poultry, fish, and vegetables and fruits is low ... Most consumed foods within the household are cereals, vegetables, oils and fats, spices,

condiments and beverages. Children ($d = 0.4$; $p < 0.05$) and women ($d = 0.5$; $p < 0.01$) in female-headed households have low dietary diversity compared to those in male-headed households. Women and children access less diverse diets since 46% and 26%, achieved minimum dietary diversity respectively. Production of vegetables (coef. 0.34; $p < 0.05$) play an important role in improving the dietary diversity of women. Gender (coef. 0.05; $p < 0.10$) and education of the household head (coef. 0.02; $p < 0.01$), food preparation and nutrition training (coef. 0.10; $p < 0.05$) are important factors influencing dietary diversity of the members of a household. Results suggest that there is a need to support community-based programs to provide information on food and the importance of vegetables, their preparation, consumption, and utilization to address food and nutrition challenges. Men can contribute towards improving household nutrition security by reducing consumption of food away from the home, especially during periods of food shortages.

It was clear from our study participants' narratives that men have a key role to play towards improving nutrition status among Kagera residents. However, at the time of the study, men's contribution in this course was very minimal. Same situations have been reported in similar studies. van't Riet's *et al.* [28] study 'Non-home prepared food in two low income areas in Nairobi, Kenya', for example, reported, "Men benefit more than women and children in terms of diet diversity because they often eat lunch and sometimes dinner away from home, thus increasing their chances of consuming other food items not usually available in their household". Another project-based study [29] reported, "Men rarely participate in household nutrition decisions leaving this task to their wives, thereby leaving most women and children with smaller food portions and less nutritious meals compared to men."

Five emerging points from this study need a discussion at this juncture. First, many interventions still focus on women neglecting the role of men in improving the household nutrition status. As some of our female participants suggested, interventions intended to improve Kagera residents' dietary diversification knowledge, attitudes, skills, and practices should target both men and women aged 18 and above. Second, such interventions should contain men-friendly sessions/modules on the importance of balanced meals to household members and men's responsibilities in household nutrition decisions. In turn, such men's understanding, and awareness would encourage greater men's participation in household food consumption decisions leading to improved nutrition status of their families and community members.

Third, as Johansen & Alistides' [27] and Kamazima *et al.* [20] concluded, malnutrition in Kagera is multifaceted and requires multisectoral, multidisciplinary and multilevel actions to alleviate it. Interventions intended to improve dietary diversification knowledge, attitudes, skills and practices for improved nutrition status of Kagera residents, should tackle dietary diversification barriers faced at the individual, family, interpersonal, community, organizational and public policy levels and informed by scientific evidence [20].

Four, for the promotion of micronutrients consumption in Kagera, nutrition interventions should promote nutrition-sensitive agriculture in the region. In collaboration with other nutrition actors in Kagera like The Tanzania Social Action Fund (TASAF), Tumaini Letu Development Organization (Muleba), Kagera Development Trust Fund (KADETFU), Tanzania Development and AIDS Prevention Program (TADEPA), District Councils and the Central Government, could support the introduction of microfinance projects such as poultry, fish farming and gardening (vegetables and fruits) that would increase sources and consumption of micronutrients-rich foods in the region.

Finally, nutrition interventions in Kagera border region will not start from the scratch. A National Nutrition Social and Behavior Change Communication (SBCC) Strategy July 2013–June 2018 is in place. It provides detailed information on planning/designing, implementation, monitoring and evaluating nutrition interventions in the country. Similarly, Tanzania has a long history of implementing health education and promotion programs successfully. Hence, borrowing from Radio Tanzania Dar es salaam's (RTD's) experience gained from the 1960s/1970s health education and promotion broadcasting activities and the use of (social) media currently available in the region would benefit these programs reaching majority of the residents in a culturally-accepted manner. In turn, these interventions would rescue Kagera residents from further malnutrition damages, other public health-related problems and safeguarding and preserving *Buhaya* culture and dignity.

Balanced diet or balanced meal?

On the one hand, according to Wikipedia (nd.), a balanced diet "contains differing kinds of foods in certain quantities and proportions so that the requirement for calories, proteins, minerals, vitamins and alternative nutrients is adequate and a small provision is reserved for additional nutrients to endure the short length of leanness." On the other hand, "A balanced meal is a snapshot of a diet that covers the three core food groups: a quarter protein, a quarter carbohydrate and half vegetables [30]. From these definitions and the study participants' perspectives, a term 'balanced meal' rather than 'a balanced diet' is more appropriate in the Kagera context. That is, a balanced diet would require actual and precise measurement of proportion of calories, protein, minerals and vitamins, which could be more demanding and unfriendly to residents individually and families; where experience, taste and eye estimations guide the quantity to be added to any mix.

V. CONCLUSION AND RECOMMENDATIONS

To conclude, the study participants from the Tanzania-Uganda borderlands acknowledge the availability of plenty varieties of foods. The mentioned challenges include poor dietary diversification knowledge, attitudes, skills and practices to make adequate or balanced meals among Kagera residents. They recommend several measures to remedy this situation including the re-introduction of health/nutrition education that existed several decades ago, re-enforcement of bylaws to households to oversee the well-being of all household members, pregnant women to attend clinic and vitalizing peer education social groups among males and

females about the importance of dietary diversification.

We are aware that through various channels, culture (norms, myths, and taboos), religion and traditional knowledge [31], “Shape local diets, food preferences, intra-household food distribution patterns, child feeding practices, **food processing and preparation techniques** [our emphasis] and health and sanitation practices” [32]. We recommend, future nutrition research should include culture, religion, and traditional indicators to inform food and nutrition interventions and policy in the country.

ACKNOWLEDGMENT

We, the authors thank the Rwechungura and Kwesigabo families, Kagera, Tanzania for financing fieldwork in the four border districts on the Tanzania-Uganda border; acknowledge cooperation from the borderlanders, study participants, village, ward, division, district, and region authorities. We also thank colleagues at the Muhimbili University of Health and Allied Sciences (MUHAS) for reading and commenting on earlier versions of this paper.

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