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DEVELOPMENT OF A FACILITATOR GUIDE FOR NUTRITION EDUCATION ON OVERWEIGHT AND OBESITY IN THE EASTERN REGION OF GHANA

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ABSTRACT

Overweight and obesity are global public health problems. Although overweight and obesity are high in urban areas, the prevalence of overweight and obesity is increasing steadily in rural areas. However, interventions to address overweight and obesity in rural areas are limited. This study reports on the process of developing a facilitator guide for a nutrition education program on overweight and obesity in rural Ghana. The transtheoretical model guided this study. The study was conducted in three districts in the Eastern Region of Ghana. The facilitator guide was developed according to the Food and Agriculture Organisation's (FAO) guidelines for planning community nutrition education. This study engaged nutrition and agricultural officers working in the study area and academics through an iterative process to draft, revise, and design the facilitator guide. The procedures included a desk literature review, analysis of secondary data, telephone interviews, a seminar and two workshops. The guide consists of five lessons. Lesson 1 creates an awareness of overweight and obesity by providing a definition and the Stunkard Figure Rating Scale. It also includes data on the prevalence of overweight and obesity and abdominal obesity of women in the study area. Lesson 2 discusses body image perceptions and their association with overweight and obesity. Lesson 3 highlights the economic, social and health consequences of overweight and obesity. Lesson 4 explains the four-star diet and how to achieve it. The lesson includes a description of each star of the four-star diet with local examples. Lesson 5 discusses physical activity and steps to increase physical activity. Each lesson ends with a key message. Songs were developed for Lessons 3, 4 and 5. This study describes the process of developing a facilitator guide for overweight and obesity education at the community level. The guide can be used to raise awareness of overweight and obesity and weight management.

Key words: Overweight, Obesity, Transtheoretical theory, Four-star diet, Overweight intervention, Exercise, Ghana

INTRODUCTION

Overweight and obesity are global public health problems [1,2,3]. In 2020, about one out of every three people was overweight [4]. Overweight and obesity are associated with increased morbidity, including type 2 diabetes, hypertension and strokes, and comorbidities [5]. In addition, being overweight and obese are significant risk factors for reduced quality of life, disability, increased healthcare costs, and psychological problems such as low self-esteem and poor body image [6]. Currently, overweight and obesity rates are higher in urban areas; however, the prevalence in rural areas is increasing rapidly [7]. Population projections indicate that increases in rural overweight and obesity rates will contribute substantially to the burden of the disease in the coming years [8].

Changes in lifestyle and behaviour factors such as unhealthy eating habits, stress, and physical inactivity are important risk factors of overweight and obesity [9]. In 2016, about a third of the global population (27%) had low physical activity levels [10]. Low levels of physical inactivity are associated with energy imbalance and the development of excessive fatness. In 2010 only about 0.4% of the global population consumed the mean recommended intake of vegetables and fruits [11]. However, the consumption of calories from processed foods is increasing [12]. For example, significant growth in the availability of packaged foods and sugar-sweetened beverages in Asia and Africa has increased [13, 14]. Such foods are often high in added sugars, trans fats and salt but low in fibre and nutrient density and contribute to weight gain regardless of physical activity levels [15].

According to the Food and Agriculture Organisation (FAO), overweight and obesity, unhealthy food habits and physical inactivity are influenced by insufficient knowledge, traditions and taboos or limited understanding of the relationship between diet and health [16]. More than half of individuals diagnosed with diabetes who had limited knowledge of overweight and obesity were obese in Ghana in 2014 [17]. Similarly, low physical activity levels have been reported among individuals with low awareness of physical activity recommendations and guidelines [19]. Nutrition education programs have been recommended to address this knowledge and behaviour gap.

The benefits of nutrition education are widely documented. Specifically, nutrition education (NE) is one mechanism for people to learn new nutrition information and develop the attitudes, skills, and confidence needed to improve their nutrition behaviours. Effective nutrition education can decrease the incidence of overweight

and obesity and aid weight management [19]. Despite tremendous research in identifying the prevalence and determinants of overweight and obesity, intervention research that addresses overweight and obesity among adults is limited in sub-Saharan Africa [20, 21]. Even though research reported that children from South Africa, Tunisia and Uganda had no overall effect on dietary behaviours, changes were noted in physical activity levels and body weight [22]. Yet, community readiness for overweight and obesity prevention is low in some Ghanaian and South African communities [23, 24]. In response to these, stakeholders interviewed in Kenya recommended health promotion programs that focus on dietary and physical activity education using key evidence-informed recommendations [25]. Therefore, obesity prevention programs for adults developed through multisectoral engagements are required in sub-Saharan Africa.

In Ghana, the prevalence of overweight and obesity is increasing, especially among women [26,27]. According to the 2014 Ghana Demographic and Health Survey (GDHS), about 40% of adult women were overweight or obese [28]. The 2014 GDHS prevalence of overweight/obesity was 10% above the 2008 prevalence. Although a high prevalence has been reported for urban residents [29], about a third of women in rural areas are also overweight or obese. In addition, the most significant within-group increase is in rural areas [28]. To the best of our knowledge, no existing overweight and obesity education program has been tested in a rural setting in Ghana. Government interventions on maternal and child health (MCH) do not include instruction materials on overweight and obesity. Furthermore, the Ghana Health Service (GHS) provides most of the MCH interventions at the facility level, limiting their ability to reach women who do not use such services. Women farmers are such a group.

This study aimed to develop a facilitator guide that can increase public awareness of overweight and obesity, the implications associated with overweight and obesity, and how to manage weight. The current study reports on developing the guide using multisectoral partnerships and the transtheoretical model. This study also presents a summary of the content of the guide.

Theoretical background

This work is guided by the transtheoretical model (TTM). The model explains the readiness of individuals to change their behaviour through a series of stages based on the person's degree of motivation [30]. The model proposed four constructs: the stages of change, the process of change, self-efficacy and decisional balance. The stages of change include pre-contemplation, contemplation, preparation, action, and maintenance [31]. People can be assigned to a stage of change based on

their behaviour and intentions for future action. At the precontemplation stage, individuals are uninterested or unwilling to make a change. They are mainly uninformed or underinformed about the risk associated with their behaviours and how to initiate change [32]. At the contemplation stage, individuals intend to make a change; they have information about the pros and cons of changing their behaviour. Individuals decide and prepare to make changes at the preparation stage. Behaviour change in the short term occurs at the action stage. Individuals who can sustain their changed behaviours progress to the maintenance stage. The model recommends cognitive processes such as awareness creation about the causes, consequences and cures for a particular health problem as interventions at the earlier stages. Behavioural processes such as counterconditioning and stimulus control are recommended at the action and maintenance stages.

The model has been used to understand the adoption and maintenance of healthy dietary habits, physical activity and weight management [31, 33]. These studies have reported an increase in fruit and vegetable intake, physical activity and reduction in body weight and high fatty foods. The recommendations from these studies are to 1) classify individuals into different stages of change/readiness, 2) identify the barriers associated with the stages individuals are currently in, and 3) select interventions that are effective for the specific stage of change the individual was classified in [34].

Considering the high risk of overweight and obesity in the study area, the population can be considered at risk. As a rule of thumb, the TTM classifies 40% of a population at risk in precontemplation, 40% in contemplation, and 20% in preparation stages [30]. The facilitator guide, therefore, was developed for the entire population focusing on processes of change appropriate for those in the precontemplation, contemplation and preparation stages (Table 1). The processes of change applied were consciousness raising, counterconditioning and dramatic relief. Consciousness raising is the process of change recommended for those at the precontemplation stage. To raise consciousness, the guide was designed to provide information about overweight and obesity and included questions that allowed the participants to evaluate their behaviour. To promote counterconditioning, positive self-statements (included as key messages) and substitutions for unhealthy diets and sedentary behaviours were also provided. Role-playing is the intervention included for dramatic relief. The facilitator and community are expected to plan a food demonstration exercise where a diversified meal will be prepared with locally available ingredients.

MATERIALS AND METHODS

Study setting

The facilitatory guide was developed as part of the LinkINg Up initiative with funding from the Queen Elizabeth Scholars (QES) program, LINKIN-Ghana. LinkINg Up is a women's livelihood and nutrition program implemented by the University of Ghana, McGill University, Heifer Ghana, and six partner institutions (Ghana Health Service, Department of Agriculture, Upper Manya Kro Rural Bank, Ghana Education Service and District Assembly) in the Lower Manya Municipality, Upper Manya Krobo District and Yilo Manya Municipality, in the Eastern Region of Ghana. The LinkINg Up Initiative has been collaborating with these officers since the project's inception. These stakeholders were involved in designing and implementing the initiative's intervention packages. Some of their contributions include selecting farmer-based organizations (FBOs) to participate in the intervention and training of participants on agriculture and livelihood development.

About 286 women farmers in six farmer-based organisations are participating in a quasi-experiment through the LinkINg Up initiative. Findings from the baseline survey in 2019 indicated a high prevalence of overweight and obesity but limited dietary diversity. The prevalence of overweight and obesity in these districts was higher (54%) than the national average for women, 44% [28]. However, the GHS unit in the study communities lacked teaching aids to support nutrition education on overweight and obesity. Therefore, this guide was developed in collaboration with the GHS upon their request.

PROCEDURE FOR DEVELOPING THE GUIDE AND DISCUSSION

The facilitator guide was developed following the Food and Agriculture Organisation's (FAO) guidelines for planning community nutrition education [16]. To define the nutrition problem and determine the causes of the problem, a literature search and dietary data analysis of women participating in the LinkINg Up initiative was conducted to design the first draft of the guide. The draft developed through the desk review was shared with academic consultants and institutional officers in the Eastern Region. In the subsequent sections, provide a description and motivations for selecting each of these groups and their contribution to the guide.

Literature review of overweight and obesity recommendations

The first procedure was to search for existing materials from established institutions and projects that could be used or adapted for the facilitator guide.



Meetings were held with officers from the Ghana Health Service. The following divisions of the Ghana Health Service were contacted Health Promotion Division, Public Health Division and Diet Therapy Unit. Unfortunately, these three divisions did not have health promotion materials on overweight and obesity. The research team were directed to the online health promotion repository of the GHS for materials. But none of the materials was applicable to this study as of June 28, 2021. A meeting was also held with the project manager of the [Meals4NCDs Project](#) and World Vision Ghana. The project and World Vision Ghana did not have materials that could be adopted.

The research team searched the websites of the United States Agency for International Development, the Japan International Corporation Agency, the Food and Agricultural Organisation and PATH Ghana. These organisations have a long history of promoting nutrition and health interventions in Ghana. The search terms used were 'facilitator guide' combined with 'overweight', 'obesity', 'physical activity' and 'four-star diet.' The search did not yield information on existing materials that could be adopted.

The study team also contacted researchers who are into overweight and obesity in Ghana. Through one of the researchers, the authors were provided with the Nutrition Facts for Ghanaian Families 2009, developed by the Nutrition Department of the Ghana Health Service [35]. The first draft of the guide was, therefore, developed using information from the Nutrition Facts for Ghanaian Families, 2009 and the Dietary and Physical Activity Guidelines for Ghanaians [36]. The facilitator guide's introduction, logistics and setup were adapted from Nutrition Facts for Ghanaian Families, 2009. The information sheet of the obesity risk knowledge scale (ORK-10) and WHO materials on overweight and obesity and physical activity were also used [37, 38].

Results of a community survey on overweight and obesity, body weight satisfaction and dietary intake in the study area

The analysis consisted of descriptive statistics using means and frequencies. Three variables were of interest, body mass index, body weight perceptions and dietary diversity. Using the body weight and height data collected during the survey, the mean body mass index of women in the community was overweight ($25.2 \pm 5.1 \text{ kg/m}^2$). During the data collection, the Stunkard silhouettes were administered to the women. The disparity between the women's perceived body weight and the ideal body weight based on silhouette showed a high rate of body image dissatisfaction (Figure 4.2). Two out of every five women desired to be

heavier (42%), 38% were satisfied with their current status and 20% desired to be thinner than their current status.

The analysis also showed that dietary diversity among women was low. On average, the women consumed about four food groups daily. This is lower than the five food groups recommended for minimally adequate dietary diversity among women. The most common meal was banku (maize pudding) served with grounded pepper (a sauce made with pepper, onions and tomatoes). The data analysis findings were included in the guide to contextualise the problem of overweight and obesity and low dietary diversity.

Engagement with Nutrition and Women in Agriculture Development Officers

This study engaged four nutrition officers from the Ghana Health Service (GHS) and three women in agricultural development directorate officers (WIAD) from the District Agriculture Department (DAD). These officers worked in the study communities and have been involved in implementing the LinkINg Up initiative. The nutrition officers at the GHS provide nutrition education to women of reproductive age who attend antenatal and postnatal clinics. Therefore, their nutrition education services are usually conducted outside the community level. The WIAD is a technical directorate that provides agriculture and nutrition interventions for women farmers at the community level. This study engaged these officers to increase communication and networking among the officers from the two institutions. In addition, training the WIAD officers will be helpful since they can continue providing nutrition education to the women farmers long-term. Four officers had a bachelor's degree, 1 had a diploma, and 2 had masters degrees. One of the nutrition officers had served in the current position for nine years, another for three years, and the other two for two years. Two WIAD officers had served for three years and one for four years.

Assessment of officers' knowledge of overweight and obesity: Based on the FAO's recommendation, the officers' knowledge of overweight and obesity were examined. The officers were administered the ORK-10 scale to assess their understanding of the presentation, risk factors, and consequences of overweight and obesity. Response to the scale provided the officers' level of knowledge on the subject matter. The ORK scores of the officers ranged from 4-7 (mean 6.85; SD=0.04). The nutrition officers had the highest scores compared with the WIAD officers.

First workshop with nutrition and agriculture officers: A workshop was organised with these officers. The workshop aimed to invite the officers to review the first

draft of the guide and provide the opportunity for knowledge sharing among the officers. The nutrition officers provided training on how to measure weight and height and the four-star diet (Figure 1).



a) Nutrition officer teaching how to measure height
b) Nutrition officer teaching how to measure body weight
c) Nutrition officer teaching the four-star diet

A session was devoted to reviewing of the draft facilitator guide. The officers made four essential contribution to the guide at this workshop 1) include a session on body weight perceptions, 2) they provided local words for overweight and obesity, 3) Refining of local meals to meet the four-star diet recommendations, and 4) Creation of key messages for the lessons. They also recommended that we create songs to summarise the lessons. Based on the feedback from the workshop, the guide was revised and shared with the academic consultants.

Review by academic consultants

Two consultants were involved in this study. Consultant 1 is a Human Nutrition and Nutrition Education Lecturer at the University of Health and Allied Sciences, Ho, Ghana. He holds a PhD in Human Nutrition and Statistics and a certificate in International and Community Nutrition. His research focuses on promoting nutritious underutilised, and desirable dietary habits through nutrition education and research. He is a trained FAO nutrition educator with extensive experience designing nutrition education materials in Ghana. He leads a team that has created a school-based nutrition education program to inform nutrition behaviour change in Ghanaian school children in Ghana's Eastern and Volta Regions and is also a facilitator on the Nestle Healthier Kids school-based nutrition education program. He also has expertise in statistical modelling and evaluation of nutrition education programs. Consultant 2 is an MSc student in Human Nutrition at McGill University; she is currently studying the social determinants of health in rural Ghana, Africa. She focuses on understanding the determinants of overweight and obesity among

rural farmers in Ghana and complementing it with a qualitative study to understand the local perception of overweight and obesity. The role of the consultants was to confirm the consistency of the guide with national and global recommendations for weight management and examine the coherence and cultural appropriateness of the lessons. Their recommendations are outlined below:

1. Inclusion of the Stunkard figure rating scale to Lesson 1 so that participants can associate different body sizes with corresponding body mass indexes
2. Regarding the risk factors of overweight and obesity, Consultant 2 recommended that the guide emphasise the lifestyle risk factors of overweight and obesity instead of heredity. Therefore, the guide did not include heredity as a risk of overweight and obesity.

Telephone interviews to evaluate the songs designed by Consultant 1

The Lesson songs developed by Consultant 1 were shared with the Nutrition and WIAD officers for evaluation. The comments of the officers on four of the songs are displayed. The officers recommended a revision of the rhythm and content of the song.

Seminar presentation of the facilitator guide to Public Health PhD Students

At the seminar, the goal of the study and content of the guide was presented to eight PhD students and a Professor at the University of Ghana, School of Public Health. The group consisted of students with background in Nutrition, Economics and Health Promotion. Their recommendations which were addressed are listed below:

1. Include pictures of local foods from the study community
2. Read the Education for Effective Nutrition in Action (ENACT) program of the Food and Agriculture Organisation. They recommended that the guide should be designed using the Transtheoretical theory since this was the theory used for the ENACT program. Initially, the guide was being developed using Pender's Health Promotion Model.
3. Contract a professional graphic designer to design the guide. Based on this recommendation, the guide was given to a professional designer after the content had been revised.

Finalisation workshop with nutrition officers

Following the revisions by the academic consultants a workshop was held with the four nutrition officers. They recommended a section on portion sizes. Therefore, a dietician was consulted who provided the eat guide of the Ghana Dietitian Association. The dietician was consulted who provided the eat guide of the Ghana Dietitian Association.

RESULTS AND DISCUSSION

Content of facilitator guide on overweight and obesity

The guide consists of five lessons on overweight and obesity awareness and how to manage weight (Supplementary File 1). The lessons were designed to demonstrate the practical application of food and nutrition information in an interactive and participatory format.

- Lesson 1. The objective of this lesson is to create awareness of overweight and obesity and its prevalence in the study area. The participants are introduced to the definition of overweight provided by the ORK-10 information sheet. Lesson 1 also contains the Stunkard Figure Rating Scale with corresponding body mass indexes. The section also includes data on the prevalence of overweight and obesity in the study area. The lesson ends with the two main causes of overweight and obesity: unhealthy diets and sedentary lifestyle.
- Lesson 2: The objective of Lesson 2 is to create awareness of body image preferences and its association with overweight and obesity. The topics covered in this lesson include cultural norms associated with overweight and obesity. From the work of Asante in the study area, the guide provides body image preferences of Krobo women, and body image and overweight and obesity linkages. The lesson highlights how body image dissatisfaction can lead to unhealthy dietary behaviours.
- Lesson 3: this lesson provides participants with information about the consequences of overweight and obesity. The lesson begins with a recap of Lesson 2. The participants are allowed to brainstorm on the potential consequences of overweight and obesity. Three main consequences of overweight and obesity: health, economic and social are discussed. Some of the economic consequences mentioned include increased medical cost, inability to work due to sickness and higher rates of poverty [39]. A song on the consequences of overweight and obesity is also included in this lesson.
- Lesson 4: The Ghana Health Service currently recommends the four-star diet for healthy nutrition. This lesson focuses on achieving food variety through the four-star diet. Food variety is inversely associated with weight gain [40]. The lesson describes the four-star diet and provides information about each star. The lesson highlights the importance of eating the different food items within and among the food groups. Three recipes that meet the four-star recommendations were designed by the community and the nutrition officers. The lesson has pictures of fruits and vegetables from a food demonstration

conducted by the nutrition officers in one of the communities in the study districts.

- Lesson 5: The final lesson is devoted to physical activity and how to achieve it. The lesson starts by providing the WHO definition of physical activity which is any bodily movement produced by skeletal muscles that requires energy expenditure [38]. This is followed by a description of low, moderate and vigorously intense physical activity. Practical guidelines on how to achieve physical activity is suggested to participants.

CONCLUSION

Overweight and obesity are global public health challenges. However, interventions to address this challenge are limited in rural areas. This study presented the process of developing a facilitator guide for creating awareness on overweight and obesity and how to manage weight. The development of the guide was informed by a literature search, data, institutional officers and academics. At the time of writing this manuscript, the facilitator guide had not been piloted at the community level. The research team could not do this due to project deadlines. The research team has designed a sub-study to pilot the guide at a later date. Nevertheless, the guide can be used by similar communities by replacing the local data with the data of the community under study. The guide can also be used by maternal and child health clinics traditionally focused on undernutrition to raise awareness on overweight and obesity.

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Table 1: Staged-based interventions for overweight and obesity

Stage of change	Individuals in the stage of change	Process (es) of change selected	Definition process of change	Examples from the facilitator guide
Pre-contemplation	Individuals with limited knowledge and no intentions of changing their behavior in the near future	Consciousness raising	Increasing understanding and awareness of overweight and obesity	<ul style="list-style-type: none"> - Definition of overweight and obesity, causes and consequences were included in the guide - Provision of information of the prevalence of overweight and obesity in the study area
Contemplation	Individuals with the intension to change who require motivation	Self-reevaluation	Appraising the pros and cons associated with weight management	<ul style="list-style-type: none"> - Body image perceptions in the community - Availability of diverse foods within the community
Preparation	Individuals who have decided to change their behavior in the next 30 days	Counterconditioning	Substituting alternatives for problem behavior	<ul style="list-style-type: none"> - Positive key messages to reiterate the lesson of the da - Replace undiversified diets with diversified diets using the four-star diet
		Dramatic relief	Experiencing and expressing problems and solutions (e.g. through role play)	<ul style="list-style-type: none"> - Food demonstration to increase dietary diversity using ingredients from the study community

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