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We use this protocol and it's working

A protocol for co-designing a school-based healthy eating intervention for adolescents in urban Bangladesh

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ABSTRACT

Background

Unhealthy eating among adolescents can lead to an increased prevalence of overweight and obesity. Urban Bangladesh has one of the highest rates of overweight and obesity in adolescents. To support these adolescents to eat healthily, bespoke interventions are needed that are co-designed with stakeholders, particularly with adolescents themselves. This study aims to co-design a school-based healthy eating intervention for adolescents in urban Bangladesh.

Methods

The study will employ concept mapping, a mixed-method approach to co-design a school-based healthy eating intervention for adolescents in urban Bangladesh. Two urban schools in the Dhaka Metropolitan City will be selected. Concept mapping workshops involving internal stakeholders (adolescents, parents, and teachers) as well as external stakeholders will be carried out. Trochim's concept mapping methodology will be used which will entail generating statements on healthy eating intervention for adolescents in urban Bangladesh, sorting the statements, and rating them based on importance and feasibility scales. The data will be analysed using the R-CMap package implemented in R, utilising multivariate analyses. Concept maps, such as point maps, cluster maps, pattern matches, and bivariate plots, will be generated. The emergent maps will offer a visual and structured illustration of the groups' conceptions regarding healthy eating interventions based on their importance and feasibility. The stakeholders will be consulted once again to discuss the analysis findings and incorporate their feedback. Thus, by reaching a consensus, the intervention(s) deemed to be of the utmost importance and feasibility will be ultimately determined.

Discussion

This study involves a novel methodology to co-design a school-based healthy eating intervention for adolescents in urban Bangladesh. This participatory approach will allow the views of different stakeholders including adolescents to be taken into consideration and therefore, the intervention is likely to be acceptable and feasible to implement and improve healthy eating among adolescents in urban Bangladesh.

Keywords: co-design, concept mapping, adolescents, healthy eating, intervention, school

ATTACHMENTS

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GUIDELINES

Background

From early life onwards, the physical and cognitive development of adolescents is associated with healthy eating (1). Unhealthy eating is one of the major risks for non-communicable diseases, particularly diabetes (2) hypertension, and cardiovascular diseases among adolescents (3,4). Healthy eating implies consuming a diet which is balanced in nutrients (5), while unhealthy eating, implies high consumption of energy-dense, nutrient-poor foods such as sugar-sweetened beverages, sweet and salty snacks, processed foods, and low consumption of fruits and vegetables (1,6,7).

In an LMIC country like Bangladesh, where more than one-fifth (36 million) of its total population are adolescents (8), the prevalence of unhealthy eating is very high. Almost 91% of adolescent boys and 94% of adolescent girls have inadequate fruits and vegetables (9). In Bangladesh, the prevalence of overweight and obesity ranges from 2% to 26%, with adolescents in urban areas showing a prevalence of 19% for overweight and 11% for obesity (10). Several initiatives are present in Bangladesh to address unhealthy eating behaviours in adolescents. In 2021, the Ministry of Education and the Ministry of Health and Family Welfare, in collaboration with UNICEF, launched a programme to promote healthy eating education among adolescents by forming clubs in the secondary schools (11). However, despite such interventions, unhealthy eating among adolescents continues to be a serious problem in Bangladesh.

There is limited empirical evidence on the drivers of unhealthy eating among adolescents in Bangladesh that considers different stakeholders' perspectives. Therefore, to understand these drivers, we conducted an exploratory qualitative study in October-December 2023 in Bangladesh. We conducted 12 focus group discussions (FGDs) with adolescents, parents, and teachers in three secondary schools (one private urban, one public urban, and one public rural school) in the Dhaka division and 12 key informant interviews (KIIs) with experts in childhood nutrition and those involved in designing and implementing programmes on adolescent health. The findings showed that while all participants had basic knowledge about healthy eating, various factors like socio-cultural influences, economic circumstances, individual tastes, and convenience significantly shaped the dietary choices of adolescents. The lack of emphasis on healthy eating within schools and the impact of digital fast-food advertising were also found to be important. In addition, we found that the government nutrition policies were focused on rural schools, despite higher rates of unhealthy eating among adolescents in

urban areas. It highlighted the complexity of the problem and the importance of involving adolescents, parents, and teachers in designing policies and interventions.

Building on our previous work, this study focuses on co-designing a school-based intervention to promote healthy eating among adolescents in urban Bangladesh. Co-design, originating from the field of participatory design, involves stakeholders collaboratively exploring and articulating needs and devising solutions (12). Co-design approaches have been effectively applied for developing health-related interventions among adolescents (12,13,14), although we could not find any study using similar approaches with adolescents in Bangladesh. We will use concept mapping, a participatory, mixed-methods approach that allows researchers to gather, structure, and evaluate conceptual information from both individuals and groups, resulting in a coherent conceptual representation of the subjects being studied (15, 16). Furthermore, concept mapping has demonstrated utility in evaluating health-related concepts (15, 16, 17). In our study, this approach will empower stakeholders to generate statements about school-based healthy eating interventions for adolescents in urban Bangladesh. This brainstorming stage of concept mapping is considered to be not only time and cost efficient, but also more comprehensive compared to the process of conducting individual interviews (16). Moreover, concept mapping is widely preferred approach when the objective is to progress from basic content generation to more intricate tiers of conceptualization (16). Given its capacity to quantify complex constructs and its inherent participatory nature combined with a comprehensive mixed-methods approach, this methodology is optimally tailored to meet the objectives of the study (16). In our study, employing this approach, stakeholders will categorise the brainstormed statements based on their comprehension, and the data will be analysed using multivariate analyses (15, 16, 18).

Aim and objectives

This study aims to co-design a healthy eating school-based intervention for adolescents aged 10-19 years in urban Bangladesh. Its objectives are:

1. To engage key local stakeholders (adolescents, parents, teachers, policymakers and experts) in the co-design process
2. Using concept mapping, to identify intervention components that are deemed to be important and feasible in urban Bangladesh.

Study design

The study applies a co-design participatory methodology (14) using concept mapping (18).

Study setting and sampling

The study will take place in urban Bangladesh. Two secondary schools (one private and one public) will be selected in the Dhaka Metropolitan City. The criteria for selecting schools will be: co-education schools that teach in Bengali and follow the national curriculum textbooks (NCTB) syllabus and the curriculum prescribed by the Dhaka Education Board.

Duration of the study

The study will be for 9-months, with three months of field work in Bangladesh.

Funding statement

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Authors' contribution

All authors equally contributed to the study design. NS prepared the initial draft manuscript. All authors (LB, FA, MD, DP) reviewed the draft and approved the submitted version.

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Recruiting stakeholders

1 Both internal and external stakeholder will be recruited. Internal stakeholders will be adolescents, teachers, and parents.

2 For adolescents, the inclusion criteria will be aged between 10 and 19 years, studying at any of the selected secondary schools, and written informed consent for participating in the study, and if under 18 years, written informed consent from their parents or appointed guardians as well.

2.1 If parents are illiterate the researcher will verbally read the participant information sheet and consent form to them and take verbal consent for each item on the consent form. Their statement/s and verbal consent will be witnessed by the local supervisor or a research assistant.

3 For teachers, the inclusion criteria will be currently employed at one of the selected secondary schools and having completed the two years of probation period.

4 For parents/appointed guardians, the inclusion criteria will be living with an adolescent studying at one of the selected secondary schools.

5 External stakeholders will be included based on their expertise and experience.

6 We will recruit policy actors who are involved in designing or implementing policies on healthy eating among adolescents in Bangladesh and experts on healthy eating among school-age adolescents working in non-government organisations (NGOs), international non-government organisations (INGOs), schools, and health providers.

7 All the stakeholders will need to provide written informed consent to participate in the study.

8 To recruit internal stakeholders, we will approach the head teachers of the selected schools.

9 After seeking their permission flyers about the study will be posted on school notice boards and presented at school events and communication channels.

10 Stakeholders willing to join the workshops will be asked to contact the author (NS) directly. Key

external stakeholders known to the study team will be approached via phone calls and emails by two authors (NS and FA).

11 Snowball sampling techniques will be used thereafter to identify other external stakeholders.

Co-designing intervention

12 The co-design process (Figure 1) will be informed by the four stages of the Trochim's concept mapping approach (18).

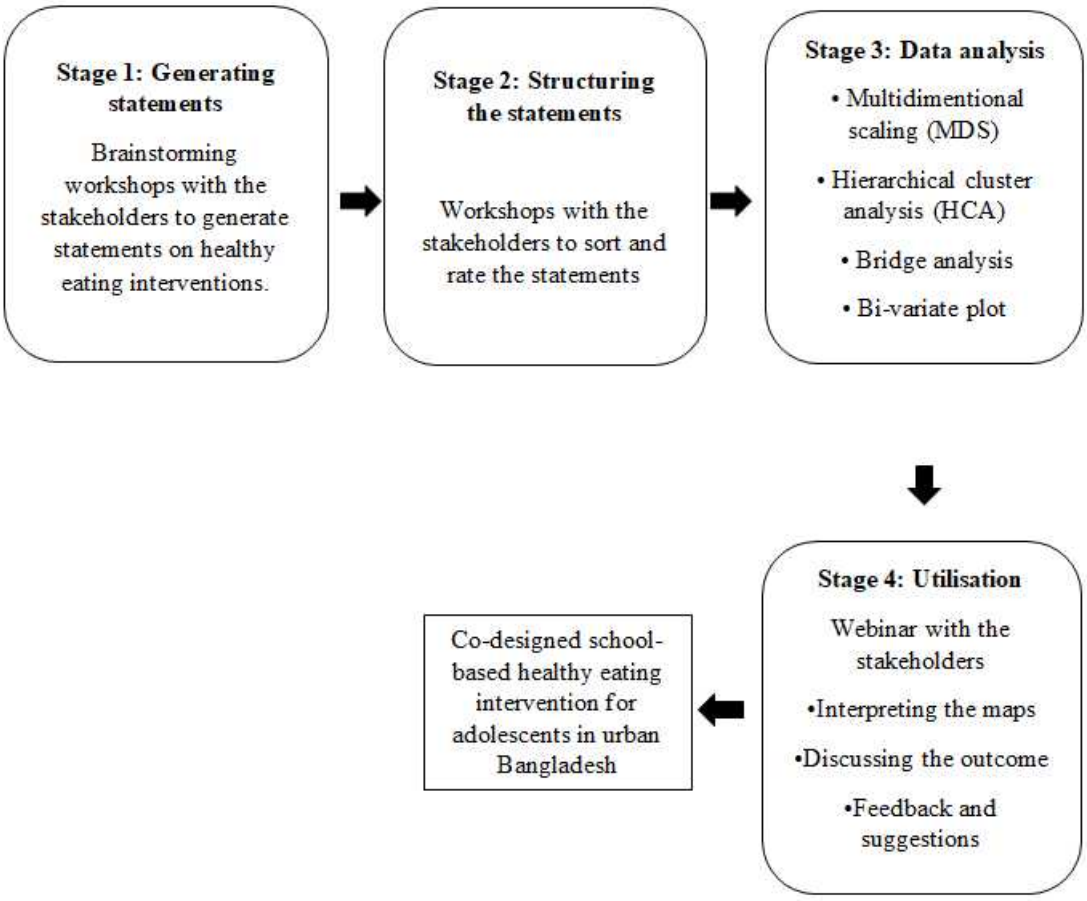

Figure 1: Co-designing methodology using the concept mapping approach.

13 All workshops will be conducted in-person.

14 In stage 1 and stage 2, the workshops will be conducted separately with the adolescent boys, adolescent girls and the adult stakeholders, while in stage 4, all stakeholder groups will be brought together in the workshop.

Co-designing intervention: Stage 1 - Generating statements

1h 30m

15 We will conduct 01:30:00 workshops with the stakeholders that will involve brainstorming 1h 30m around the theme of promoting healthy eating among adolescents in urban Bangladesh.

16 To guide the discussions, we will use a single focus prompt “The intervention in school that will promote healthy eating among adolescents in urban Bangladesh is…” and the supporting prompt questions, such as “What will be the intervention component(s)? and “How do you suggest delivering the intervention?”.

17 To stimulate the participants' ideas, we will share findings from our exploratory study, which highlights the drivers of unhealthy eating among the adolescents. Hence, the aim of the workshop will be to generate statements regarding school-based healthy eating interventions for adolescents in urban Bangladesh.

18 This workshop format will be replicated three times.

19 We will conduct two single-sex workshops for adolescent boys and girls, while combining adult stakeholders such as parents, teachers, and external contributors in another workshop.

20 Each workshop will involve 10-15 stakeholders (18), and given that we are planning three workshops, we anticipate approximately 45 participants in total (15 adolescent girls, 15 adolescent boys, and 15 adult stakeholders).

21 Moreover, we will conduct individual discussions with external stakeholders who will consent to

participating in the study but may not be able to join the workshops in person.

22 Their statements will be integrated with the statements from workshop with the adult stakeholders. As a result, we will have three distinct sets of statements derived from the three workshop sessions.

23 We will clean the statements (18), by editing them for clarity and by eliminating duplicates.

24 The research team will validate the final statements which will then be used for the subsequent sorting and rating exercises during the second workshop.

Co-designing intervention: Stage 2 - Structuring the stateme...

1h 30m

25 The aim of the second workshop will be to sort and rate the statements. The same workshop will be repeated three times similar to the first workshop.

26 Each of the three stakeholder groups will be provided with their corresponding sets of statements.

27 Each workshop will be for 01:30:00 and will consist of two segments: sorting and rating th 1h 30m statements.

28 **Sorting**:

28.1 Stakeholders will be given sticky notes, pens, and a large chart paper to sort statements. They

will consider statement pertaining to intervention components and delivery modes separately.

28.2 Stakeholders will be asked to group statements that are similar and give this group or category a label.

28.3 They will be instructed that each statement can only belong to one category and grouping all statements in one category is not allowed nor having a category with just one statement (18).

28.4 Before proceeding to the rating activity, stakeholders can discuss and add additional statements or modify existing ones.

29 **Rating**: Stakeholders will be provided with statements in stick notes again and this time, they will be asked to discuss and rate each statement on a Likert scale for feasibility (1 = Not at all feasible to 5 = Extremely feasible) and importance (1=Relatively unimportant to 5=Extremely important) (18).

Co-designing intervention: Stage 3 - Data analysis

30 The sorted and rated data will be analysed using multidimensional scaling (MDS) (19) and hierarchical clustering analysis (HCA) (20) using R-CMap package, implemented in R (21) to create maps that will represent clusters of the statements.

31 Next, we will employ bridge analysis to compare average cluster ratings between two variables, such as importance versus feasibility (18).

32 We will employ a bi-variate plot, such as a go-zone map (18), which will identify the priority items for action, such as the healthy eating intervention components and modes of delivery, from all the clusters.

33 The priority items, such as the interventions components and the delivery modes will be determined to be those that surpass both the mean ratings of importance and feasibility (18).

Co-designing intervention: Stage 4 - Utilisation

34 A workshop will be conducted subsequent to the analysis of the concept mapping data, wherein representatives from each stakeholder group will be invited together to deliberate upon the concept maps and provide their feedback. It is plausible that there could be disagreements regarding the interventions that have received the highest importance and feasibility scores in the analysis.

35 Thus, by reaching a consensus, the intervention(s) deemed to be of the utmost importance and feasibility will be ultimately determined. Additionally, the workshop will address how the findings can contribute to the development of healthy eating policies and interventions for adolescents in urban Bangladesh.