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ARTICLE

Teaching children in low-income countries to assess claims about treatment effects: prioritization of key concepts

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Abstract

Background: Health-related knowledge and behaviours developed during childhood are increasingly being recognized as foundational, deeply rooted and resistant to change as children mature into adulthood. The aim of this study was to engage stakeholders in prioritizing key concepts that children need to understand when assessing claims about treatment effects.
Methods: A list of 30 concepts developed prior was categorized into six groups considered important for children to understand in order to assess claims about the effects of "treatments" (any type of healthcare intervention). A teachers' network was established comprising of primary school teachers, who attended a three-day meeting where the concepts were presented, discussed and prioritized using a pre-set criteria thus: (i) relevance of concepts for children, (ii) ease of comprehension of concepts for children, (iii) potential for developing resources to teach the children and (iv) whether the resources once developed would have an impact on children's ability to assess claims. Using a modified Delphi technique, participants ranked each group of concepts using the four criteria on a Likert scale of one to six (1 = lowest, 6 = highest). The rankings were analysed using STATA statistical software.
Results: Twenty-two of the 24 participants reported having understood the concepts well; with self-assessments of their own understanding above 75 on a scale of (1 to 100). All six groups of concepts were considered relevant.
Conclusion: It is important to teach children how to assess claims about benefits and harms of treatments. Resources will be developed to teach children these concepts.

Introduction

Health literacy, as defined by Healthy People 2010, is "the degree to which individuals' have the capacity to obtain, process and understand basic health information needed to make appropriate healthcare decisions" (1). While some studies have assessed adult health literacy or even parental health literacy, only a few have focused on health literacy of children and all these studies have been done in high-income countries (2–5). Health-related knowledge, attitudes and behaviours developed during childhood are increasingly being recognized as foundational, deeply rooted and resistant to change later, when children become adults (6, 7), yet we are not aware of any studies that have addressed assessment of claims about treatment effects by children. Children between the age of 10 and 12 in some countries are taught about fair tests and critical appraisal, (8) but not with a focus on health or specifically teaching them to assess claims about the effects of health care interventions (which we will refer to as treatments). There has been an explosion in communication avenues for all types of information, including health, and children as well as adults are bombarded with all sorts of claims about the benefits and harms of treatments. In addition, belief in unproven claims about treatments causes harm and wastes resources more so in resource poor settings. Examples of this in

Sub-Saharan Africa include inappropriate use of medicines, herbal medicines or nutritional therapies, dietary supplements, cleansing therapies, fever reduction techniques, massage, reflexology and many more. At the same time, effective treatments may not be used, when unsubstantiated claims about treatments are not recognized as such (9). There is a growing body of research evidence demonstrating that low levels of health literacy are associated with untoward health outcomes, increased hospitalizations, emergency room visits and extension of the usual periods necessary for recovery (2, 10–12). Studies have shown that the inability to comprehend and use health information is also a major contributor in health inequities and disparities (13–15). Low health literacy is a stronger predictor of health status than age, education, employment status, income and ethnicity (16). It is a major barrier to effective health care, especially for the under privileged in resource poor countries (17, 18).

Teaching children specifically how to assess claims about the effects of treatments might be effective for several reasons. First of all, children are capable of learning about fair tests and critical appraisal between the ages of 10 and 12 and teaching these basic skills is already part of the curricula in some countries (8). Second, it is possible to reach a large segment of the population before they drop out of school since, large numbers of children drop out after primary level in low-income countries (19–21). Primary school in Uganda comprises seven classes from primary one to primary seven completed during a period of seven years. Children attending primary school are generally aged between 6 and 17 years or even older in some schools, especially in conflict-torn areas. Teaching children at primary school level to assess claims of treatments can capitalize on children's curiosity and enthusiasm to learn, and opportunities to teach them. In addition to the above, primary schools play an important role in many communities in Sub-Saharan Africa, particularly Uganda with a very young population of 49% below the age of 15 years (22) and teaching basic concepts in schools about how to assess claims about the effects of treatments might create opportunities for themselves and their families to learn critical appraisal skills needed when assessing benefits and harms of treatments. Finally, teaching children to assess health information about treatment effects before the formation of problematic health attitudes and behaviours in adulthood might lay a good foundation for a healthier society (6, 7). For these reasons, we are developing and evaluating resources to help teach children how to assess claims about the benefits and harms of treatments.

This paper therefore presents the process and experience from the first phase of the Fair Tests of Treatments project that engaged key stakeholders thus including researchers, primary school teachers, journalists (health communicators) and policy makers in the prioritization of key concepts that are important for people to understand in order to improve their ability to assess claims about treatment effects. A second paper presenting work involving other key stakeholders like journalists in particular has been described elsewhere (23). As a first step, a list of concepts that needed to be understood and applied was developed to help teachers teach children how to assess claims about treatments effects. The process that developed the list of concepts is described in another paper (24). The 30 concepts identified as important for children to understand were organized into six coherent and logical groups.

The objective of this study was to identify, form, and engage a team of potential end users like teachers and experts within the field that would participate in the prioritization of concepts that are deemed important for children to understand when assessing health information (and also in subsequent stages of this project). At a later stage in the project, we intend to develop resources that will be helpful to teachers in teaching primary school children in low-income countries to understand and make use of these concepts when appraising health information.

Methods

We conducted a series of consultations with stakeholders; including primary school teachers, experienced educationalists and researchers with evidence-based medicine or clinical epidemiology expertise. Ethics approval for the Fair Tests of Treatments project, also known as *Supporting Informed Healthcare Choices in Low-income Countries Project* (*Grant no ES498037-project number 1*) was sought from Makerere University School of Medicine Institutional Review Board and approved by the Uganda National Council for Science and Technology in August 2013. The research team, A.N., D.S., and N.K.S. in collaboration with policy makers at the Ministry of Education identified two regions in Uganda with both rural and urban characteristics. The areas identified were Kampala and Wakiso District because they would give a diverse representation of the general schools' set up in Uganda, with both government and private schools in urban and rural settings.

We delivered formal introductory letters to the education departments (regional educational offices) for the two identified districts and scheduled face-to-face meetings. The main aim of these meetings was to gather support in the regions for the project. We conducted separate meetings for each district where we introduced the research project to the regional educational officers, who identified schools within their jurisdiction and initiated contact between the researchers and the selected schools. We aimed to get a small sample of primary school teachers from different backgrounds, but not necessarily a national representative sample as this would require a larger sample size that is not necessary for the

prioritization process (25). We therefore restricted the number of participants to not more than 25 thus about 12 participants per district which we considered a manageable number that would be able to actively participate in the prioritization process.

Using a multistage stratified sampling method in each district, primary schools were identified from a population consisting both government aided and privately funded schools (first stage). The two categories (government and private) were further divided into rural and urban schools (second stage) (26). The schools then listed within each identified category were purposively selected to take part in the research, with each educational authority required to come up with a total of 12 schools. For example in Kampala District, of the six government schools identified, three had to be from a rural and the remaining three from an urban setting and the same applied to schools in the private category there by making a total of 12 schools. The same process was repeated in Wakiso District.

The education authority in each district provided invitation letters introducing the researchers and the *Fair Test of Treatments project* to the selected schools. The research team met with the head teachers for each selected school to give them a brief overview of the project, before asking them to identify a suitable teacher to work with the project on a voluntary basis and 23 teachers were identified this way. The research team followed up with letters formally inviting the teachers to join the teacher's network. A written confirmation of acceptance was required from each teacher to enable planning and logistics. Overall, this provided a balance of teachers from government and private schools in both urban and rural settings. A total of 24 teachers were officially invited to attend a three-day meeting, where the concepts generated prior to this exercise would be prioritized for development of tools/ resources to be used by children to appraise health information.

Concept prioritization meetings

An initial list of 30 concepts that had been generated prior to the concept prioritization meeting by a team of researchers using resources written for the general public like "*Testing Treatments*," provided an overview of key concepts that people may need to understand in order to assess claims about treatment effects (24). The list of concepts was categorized into six logical groups as seen here below. The six groups of concepts includes: (1) Recognizing the need for fair comparison of treatments. (2) Judging whether a comparison of treatments is a fair comparison. (3) Understanding the role of chance. (4) Considering all the relevant fair comparison. (5) Understanding the results of fair comparisons of treatments. (6) Judging whether fair comparisons of treatments are relevant.

We organized a three consecutive day's prioritization meeting for the teachers' network where the research project was introduced, including the project objectives, timelines and deliverables as well as introducing the list of concepts to the participants. Day 1 had several objectives which included introducing ourselves to each other, clearly define roles and responsibilities of the teachers' network and the research team, set realistic expectations and lastly to briefly introduce the concepts to all participants. In order to ensure that all participants had their roles clarified, the research team encouraged them to ask questions about any aspect of the project. We endeavoured to answer all questions raised by the participants on the first day. By the end of Day 1, the research team and all the teachers on the network had introduced themselves to each other and clearly understood everyone's roles and responsibilities in the project. The participants' main role was to actively participate in the prioritization of key concepts that children need to understand when assessing health information.

The objective for Day 2 was to explain and clarify the concepts for the participants on the teachers' network to understand. We presented using PowerPoint slides and discussed in detail a total of 30 concepts grouped into six categories, with relevant examples of claims about treatment effects displayed on video. Participants were encouraged to put into consideration their experience and technical expertise, when thinking of other relevant examples of claims about treatment effects that primary school children could easily understand. They did this using a problem based participant driven approach in small group discussions with six participants randomly assigned to each group, making it four groups in total. The four small groups took it in turn to share their ideas with the whole group. The research team including A.N., D.S., and N.K.S. was on hand to answer questions, correct misunderstandings and clarify any misconceptions that arose out of the presentations. With this background, the research team felt that the participants were now in a position to prioritize the concepts based on their understanding and experience for which potential resources would be developed. The objective for Day 3 was to prioritize the concepts for the development of resources for children to use when assessing harms and benefits of treatments.

We used a modified Delphi Technique (27, 28) to prioritize concepts. The criteria to be used in the ranking of the groups of concepts were explained by the researchers and a mock prioritization exercise using an example different from the concepts but applicable to teachers in different settings was done. This enabled the participants to understand what was required and ask questions before the actual prioritization process began. The research team answered all questions and clarified the prioritization process before the participants were ready to start on the actual prioritization process. We gave the participants sealed identical envelopes containing

three identical forms for ranking the concepts. The forms were marked with a unique identifier number necessary for data collection purposes but not to identify the participants as this process was done anonymously. The envelopes also contained a questionnaire with the same identifier number unique to each individual that we used to collect non personal information about participants' characteristics.

We informed the participants prior to the start of the prioritization exercise not to discuss their scores for each round with each other as this was an individual exercise that would permit equal contribution and participation from each participant. We asked the participants to score each group of concepts using a preselected criterion as seen here below: How important are the concepts for children to learn?; How understandable are the concepts to children?; Are there potential resources that could be developed to teach the concepts to children?; Would these resources likely have an impact on children's ability to assess claims about treatment effects?

For each group of concepts, participants were required to give a numeric score against each criteria above on a scale of (1 to 6, 1 = *lowest*, 6 = *highest*). There was also space to indicate the reason for their rankings.

Results from the first round were analysed immediately and shared with the group. Participants were again asked to participate in the second round using a fresh ranking form from the envelope with a leeway to either modify or maintain their scores from the first round as permitted in the principles guiding the Delphi technique (28). The score sheets were again collected and results analysed once more and fed back to the participants. The same process was repeated in the third round. The process was concluded when results from the successive rounds had little or no significant difference in the scores.

Results

A total of 24 participants participated in the Fair Tests of Treatments project's prioritization of concepts process. Of the 12 schools identified in Kampala District, only 1 declined to be a part of the research project, therefore not sending a teacher. All the 12 schools identified in Wakiso District agreed to take part in the research project and send a teacher to represent them. We therefore ended up with 23 teachers identified using the multistage stratified sampling method, plus one additional teacher from Wakiso District, thus making a total of 24 teachers. Of the 13 teachers from Wakiso district, eight identified their schools as rural and five as urban. Six of the schools identified in Wakiso district were government schools and seven were private schools. With a total of 11 teachers from Kampala district, two of those identified their schools as rural and nine identified their schools as urban. Seven of the schools identified in Kampala district were government schools and four were private schools.

Table 1 Characteristics of participants on the teachers' network

Characteristics	Frequencies	Percentage
Sex		
Female	10	42%
Male	14	58%
Age (years)		
21–30	6	25%
31–40	9	37%
41–50	9	37%

Table 2 Participants' work experience and education

Education	Frequencies	Percentage
Grade III	8	33%
Grade_V	12	50%
Degree	4	17%
Experience (years)		
1–5	3	12%
5–10	5	21%
10+	16	67%

The demographic characteristics of the study participants are summarized in Table 1. The majority of the participants were men thus 14 of the 24. The age range was between 23 and 49 years, with 16 participants, having 10 or more years of work experience in the teaching profession. Eight of the 24 participants, had received at least a grade III professional teaching qualification, 12 had a grade V professional teaching qualification, and 4 had a university degree education. A grade III qualification in Uganda is a certificate in education attained as a postsecondary qualification for primary school teachers and grade V education is equivalent to a diploma in education awarded only by higher institutions of learning, such as universities (29). In addition, 16 of the 24 participants had more than 10 years' teaching experience, and only 3 had less than 5 years, the rest had 5 or more years as summarized in Table 2.

The Uganda National Primary School Curriculum has only four examinable subjects: English, Social Studies, Math and Science (29). Seventeen of the participants identified themselves as upper primary school teachers (primary six and seven), six of the participants as middle primary school teachers (primary four and five), and one as a lower primary school (primary one to three) teacher. Sixteen of the participants identified themselves as math and science teachers, thus "science" teachers while the rest were English and social studies teachers thus "arts" teachers.

Participants' understanding of concepts

Following the presentation, we asked participants to rate their understanding on a scale of 0% to 100%.

Table 3 Participants' self-assessment of their understanding of the concepts

Understanding	Rating	Teachers' self-assessments
Not understood	(0–25)	0
Somewhat understood	(26–50)	0
Understood	(51–75)	2
Understood very well (excellent)	(76–100)	22

Twenty-two of the 24 participants reported understanding the concepts very well (excellent) by awarding themselves a score over 76%, with the remaining two reporting to have understood the concepts well, with a score over 51% (Table 3). Twenty-three of the 24 participants reported they had never come across any of the concepts in their training or in their past and present experience while teaching primary school children.

Ranking of concepts

The participants concluded that all six groups of concepts were relevant to primary school children to understand. The participants' rankings of the six groups of concepts are summarized in Table 4. The participants considered the concepts under group one, thus "Recognizing the need for fair comparisons of treatments." to be highly important for children to understand as this group of concepts scored the highest median scores in all the three rounds. The concepts under group five, thus "Understanding the role of chance" scored the least median scores in all the three rounds. However, the scores for concepts under group five were high enough for them to be considered relevant, thus coming sixth of all the six groups of concepts.

Discussion

The priority setting process confirmed that the six groups of concepts as listed here were relevant with minor differences in the scores and participants agreed that the concepts as listed below can be taught to children: 1. Recognizing the need for fair comparisons of treatments, 2. Judging whether a comparison of treatments is a fair comparison, 3. Understanding the role of chance, 4. Considering all the relevant fair comparisons, 5. Understanding the results of fair comparisons of treatments, 6. Judging whether fair comparisons of treatments are relevant. We are not aware of any other comparable lists of concepts or research to determine an appropriate curriculum for children in this area.

A considerable amount of time was spent on initial consultation and building of relationships that resulted in the teachers' network. During this process, a variety of stakeholders were consulted, including policy makers in the education service that acted as a gateway to the teaching profession. At the preparation and during the initial contact phase, we anticipated that some schools would be unwilling to cooperate. However, of all the 24 schools identified and contacted to be part of the Fair Test of Treatments project, 23 schools were willing to give a teacher time off to enable them take part on the teachers' network, which resulted in a 100% workshop attendance on all three days. This might have been as a result that the two education authorities provided invitation letters introducing the researchers and the project to the schools which gave the project credibility among the schools.

As seen in the results, the majority of the participants were not familiar with the concepts discussed prior to the workshop (30). Many then expressed concern that lower primary school children might be too young to understand these concepts. Several teachers suggested that children in upper primary (primary seven) might be better able to understand the concepts than children in lower classes. However, because primary seven is the final year of primary school, those children are under pressure to perform well on their national primary leaving examination before going to secondary school. This would leave both the children and teachers little time to focus on the concepts, which are not included in the examinable subject content of the syllabus.

Twenty two of the 24 participants rated their understanding of the concepts as "excellent" with a score between 76% and 100% as reported in Table 3. However, this being a self-assessment; the scores could be construed as a result of individual perceptions and opinions, thus we are not able to tell for sure if the participants' scores reflect their true understanding of the concepts. Participants in the teachers' network ranked concept groups that they found easier to grasp higher than those that were relatively difficult. This is consistent with current literature mapping or evaluating people's understanding of the effects of treatments (31, 32). Comments given to explain their scores indicated that participants were more confident that children would easily understand concepts that they too found very easy to understand, thus ranking them highly. Conversely, concepts that the teachers found difficult would be difficult for them to teach the children. A particular strength noted in this study included the use of a process that ensured the concepts were discussed and participants had some level of understanding before ranking them. This permitted the participants in their own way to envision the process required to teach children such concepts thereby making an informed decision while ranking them based on their own unique understanding and experience.

The main limitation of this study is that we were not able to measure participants' understanding objectively thus making it difficult for us to judge precisely how well the participants understood the concepts before individually ranking them. This limitation notwithstanding, the participants were able to prioritize a list of concepts that they deem important for children to understand when assessing health information in the context of a low-income setting.

Table 4 Ranking of the six groups of concepts

Description of group of concepts	Scoring criteria	Median scores from the surveys on a scale of 1–6		
		Round one	Round two	Round three
Recognizing the need for fair comparisons of treatments	How important is it to children?	6	6	6
	How understandable is it to them?	5	5	5
	Any potential resources to develop?	5	5.5	5
	Would such resources have an impact?	5.5	5.5	6
Judging whether a comparison of treatments is a fair comparison	How important is it to children?	5	5	5
	How understandable is it to them?	4	4	4
	Any potential resources to develop?	4	4	3.5
	Would such resources have an impact?	4	4	4
Judging whether fair comparisons of treatments are relevant	How important is it to children?	5	4	5
	How understandable is it to them?	4	4	4
	Any potential resources to develop?	4	3	3
	Would such resources have an impact?	3	3	3
Understanding the results of fair comparisons of treatments	How important is it to children?	5	5	5
	How understandable is it to them?	4	4	4
	Any potential resources to develop?	3	4	4
	Would such resources have an impact?	3.5	3.5	3
Understanding the role of chance	How important is it to children?	3	3	3.5
	How understandable is it to them?	3	3	2.5
	Any potential resources to develop?	3	2.5	4
	Would such resources have an impact?	3	3	2.5
Considering all the relevant fair comparisons	How important is it to children?	6	6	6
	How understandable is it to them?	5	4	4
	Any potential resources to develop?	5	5	4
	Would such resources have an impact?	5.5	4	4

Conclusion

This study shows that all the six concepts prioritized are considered relevant and applicable to primary school children and teachers in Uganda. The teachers also appreciated the need for children to understand these concepts and apply them when assessing health information. We shall proceed with the development of resources that will help teachers to teach children concepts of evidence based medicine.

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Conflict of Interest

The authors have no conflicting interests to declare.

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