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Preference-Based Assessments

Incorporating Concern for Health Equity Into Resource Allocation Decisions: Development of a Tool and Population-Based Valuation for Uganda

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ABSTRACT

Objectives: Health economic analyses that simultaneously address the concerns of increasing population health and reducing health inequalities require information on public preferences for using healthcare resources to reduce health inequalities and how this is valued relative to improving total population health. Previous research has quantified this preference in the form of an inequality aversion parameter in a specified social welfare function. This study aimed to elicit general population's views on health inequality and to estimate an inequality aversion parameter in Uganda.

Methods: Adult respondents from the general population were recruited and interviewed using survey adapted from an existing questionnaire, including trade-off questions between 2 hypothetical healthcare programs. Data on participants' demographic and socioeconomic characteristics and health-related quality of life measured by 5-level version of EQ-5D were collected.

Results: A nationally representative sample of 165 participants were included, with mean age of 37.1 years and mean 5-level version of EQ-5D at 0.836. Most respondents indicated willingness to trade-off some total population health to reduce health inequality. Translating the preferences into an Atkinson inequality aversion parameter (14.70) implies that health gain to the poorest 20% of people should be given approximately 6 times the weight of health gains to the richest 20%.

Conclusions: Our study suggests it is feasible to adapt questionnaires of this type for a Ugandan population and this approach could be used to measure public aversion to health inequality in other settings. The elicited inequality aversion parameter can be used to support the assessment of health inequality impact in economic evaluation in Uganda.

Keywords: health inequalities, priority setting, resource allocation, Uganda.

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Introduction

Inequalities exist in access to healthcare services, morbidity and mortality, burden of disease, and health outcomes among groups of people, whether those groups are defined socially, economically, demographically, or geographically. Inequalities in burden of disease and healthy life expectancy could be exacerbated by disproportionately lower utilization of healthcare resources among the disadvantaged.[1,2] Health systems worldwide have objectives to increase population health and to reduce health inequalities. Reducing these inequalities is a key feature of global health policy agendas, as part of the sustainable development goals.[3,4]

In Uganda, health inequality, such as worse health outcomes including child health,[5] higher maternal morbidity, and higher prevalence of HIV/AIDS[1] in poorer groups than richer ones, is a prominent concern.[6] The Ministry of Health of Uganda aims to ensure mechanisms that offer equity for all citizens in accessing health services for life-threatening health problems in pursuit of the health system objectives.[7] Economic evaluation methods have been used to produce information that can inform allocation of scarce healthcare resources in Uganda[8-10] and the design of health benefits packages in other East African countries.[11,12] Nevertheless, the implicit preferences imposed within these cost-effectiveness methods are that all health gains are valued equally no matter to whom they accrue, and these studies do not evaluate who gains or who loses from alternative policy decisions. Given concern for reducing health inequality, policy makers require evidence on how the potential health interventions affect the distribution of population health. There are challenges in undertaking economic evaluation analyses that simultaneously address the value of increasing population health and the value of reducing inequality in health outcomes between population groups. Such analyses require information on whether the general public has a

preference for using healthcare resources to address these inequalities and how inequality reduction is valued relative to increases in total population health.

Previous research has attempted to measure this preference and to quantify it in the form of an inequality aversion parameter within a social welfare function.[13] A social welfare function for health describes how different distributions of population health lead to different amounts of population wellbeing. The amount by which wellbeing is reduced by health inequality is expressed by an inequality aversion parameter in the social welfare function. The strength of inequality aversion determines the amount of total health that a population would be willing to forgo to achieve a reduction in unfair health inequality. Quantifying inequality aversion in this way enables methods to integrate health inequality impact into economic evaluation, for example, distributional cost-effectiveness analysis[14] to specify the societal value of an intervention's impact on health inequality. Empirical studies to quantify the strength of inequality aversion were conducted in England[15-19] and Spain,[20-22] and a revised design proposed in another English study[23] used an online survey that incorporates a video animation that has been previously validated. The elicited inequality aversion parameters for England have been used in economic evaluations with a focus on inequality.[24-26] Nevertheless, the suitability and feasibility of this method have not been explored in more resource-constrained settings.

The first objective of this study was to assess the feasibility of the approach to quantifying preference for health inequality reduction in the form of an inequality aversion parameter in Uganda; the lessons learned would inform future studies to investigate this topic further. The second objective was to understand Ugandan general public's view on health inequality and their preferences toward reducing inequality, compared with improving overall health. The results can be used to support the assessment of health inequality impact in economic evaluation.

Methods

Survey Design

The survey used in the English study[23] was adapted to the Ugandan context, following the survey structure and incorporating local evidence. The adapted survey consists of 3 sections, background, trade-off questions, and animated video.

Background

The background section introduces the concept of "health inequality" and the 5 equal-size groups used to describe socioeconomic status based on household asset possessions (extremely poor, poor, in between, rich, and very rich). Examples of the 2 extreme groups were provided: the "very rich" households include those with residents who have university degrees, who work as finance managers, and who own businesses; the "extremely poor" households include those where the main source of income is from factory or farm work. The expected years of good health of a typical individual in each of the 5 groups were presented as increasing with socioeconomic status (60 years, 62 years, 64 years, 66 years, and 68 years), and the gap of 8 years between the 2 extreme groups, "extremely poor" and "very rich," was highlighted. The years of good health were estimated using Uganda life expectancy data in 2014 at 64 years[27] and our assumption that the middle group ("in between") was represented by the average health and the difference between 2 adjacent groups was 2 years (informed by the estimates in Malawi[28]).

Trade-off questions

The trade-off questions section starts with the 2 hypothetical healthcare programs. Respondents were given the information that the Ministry of Health of Uganda was able to fund only 1 of the 2 programs. The 2 programs were described as being only accessible through public healthcare services, costing the same as each other, and leading to better health for the "extremely poor" and "very rich" groups (not affecting the other 3 groups). The 2 programs differed in how much in total they improve health added across both groups and in how much they benefit the "very rich" and "extremely poor" groups. As one previous study found using small or unrealistically large health gains in the hypothetical scenarios made little difference in terms of inequality aversion,[29] we used the same magnitude of health benefits as the English study.[23] A total of 7 trade-off questions were included. An example of the questions is shown in Figure 1. Program A was fixed in all questions as favoring the "very rich" group (3 years increase in "years of good health" per person to "extremely poor" group and 7 years to "very rich" group), whereas health benefits from program B differed across questions. In the first trade-off question, program B provided an increase of 8 years to "extremely poor" group and 3 years to "very rich" group; in the following questions, the health benefit gained by the "extremely poor" group in program B was reduced, from 7 years (question 2) to 2 years (question 7), resulting in different total health gain and health gap between the 2 groups across questions. Respondents were asked to choose from "program A," "program B," or "2 programs are equally good."

Animated video

An animated video was developed to help participants understand health inequalities and trade-offs. The video presents different viewpoints of 3 individuals and encourages respondents to think carefully about their responses to the survey questions. The use of a video of this type has been proved to be successful to reduce the proportion of respondents reporting extreme inequality aversion.[23]

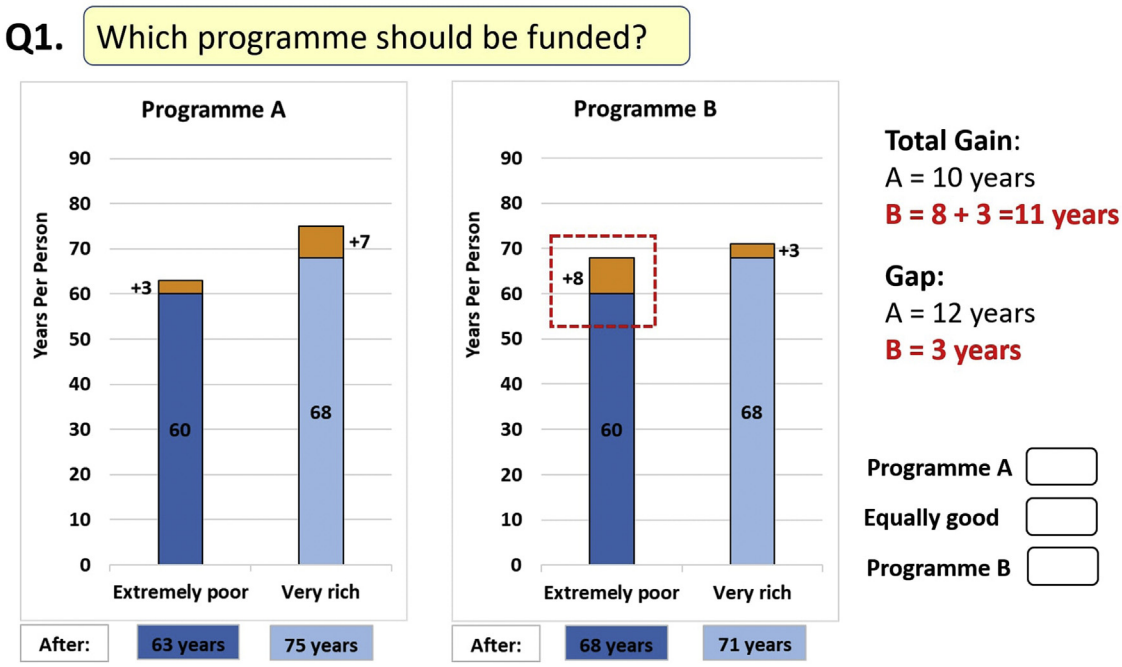
All survey materials were developed in English and then translated into Luganda (the main language spoken in the Central region, Uganda). The detailed survey (in English and in Luganda) is available in Appendix A in Supplemental Materials found at https://dx.doi.org/10.1016/j.vhri.2022.04.006. The video (in Luganda) can be accessed using the link https://vimeo.com/599604025, and the script (in English and Luganda) is available in Appendix B in Supplemental Materials found at https://dx.doi.org/10.1016/j.vhri.2022.04.006.

Sampling and Recruitment

Considering that Uganda is a culturally and linguistically diverse country with 10 main languages and >43 individual languages, using multiple languages was not logistically possible within the resources available for this study. Therefore, we decided to recruit participants from the general public in the Central region only, which covers approximately 30% of the Ugandan general population.[27] To reflect the geographical and socioeconomic spread, we collected data from both rural and urban areas in the region. Based on the resources available, we aimed to recruit 160 participants whose characteristics in age and sex were representative of those of the general population in Uganda.[27] Data were collected between March 2021 and May 2021.

We recruited 2 research assistants as field "mobilizers" to help with participant recruitment and 2 interviewers to conduct the interviews. We started "field mobilization" before the fieldworker training, with the remote districts (Mubende and Masaka), from

Figure 1. An example of the trade-off questions.



which the rural areas were selected. We visited the Resident District Commissioners, the political representatives of the president in the districts, and the District Health Officer, the representative of the Ministry of Health in the district. The District Health Officers then identified 5 villages in their district to be included in our study. In each village, we met the Local Council chairpersons with whom we liaised to identify study participants after explaining the objectives and target sample population. The Local Council chairpersons were asked to invite potential participants for the study. The invited potential participants that showed up were then included in the study, ensuring spread of the sample by sex and age group. The field mobilization for the urban districts (Kampala and Wakiso) was also conducted before the data collection, in liaison with Local Council chairpersons of the identified areas. Adults who were able to understand the trade-off questions (judged by the interviewers) were eligible to participate.

Survey Administration

An informed written consent was obtained before the guided individual face-to-face interviews using electronic Windows-based tablets.

The interview includes 4 parts. First, participants were asked to provide information about some demographic characteristics (sex, age, education, ethnicity, and religion). Second, their current level of health was measured using the 5-level version of EQ-5D (EQ-5D-5L) instrument (including the 5-dimension health status classification system and a separate visual analog scale).[30] Third, the 2 trained interviewers guided participants in the inequality survey, by presenting the background and trade-off questions sections using PowerPoint slides (see Appendix C in Supplemental Materials found at https://dx.doi.org/10.1016/j.vhri.2022.04.006). After providing their responses to the 7 trade-off questions, participants were asked to watch the animated video, and afterward, interviewers presented and explained the trade-off questions to participants and collected their responses again. Finally, participants answered questions about socioeconomic status (marriage, employment, income, and household size), health conditions (overall health and illness), the impact of religion on responses, and the impact of COVID-19 pandemic on their life (feel threatened by the pandemic, became unemployed because of the pandemic). For each respondent, their responses were recorded into an Excel file and saved on the tablets and then uploaded to a secure shared drive daily for quality check. To help interviewers adhere to the survey procedures, an instruction file was developed (see Appendix D in Supplemental Materials found at https://dx.doi.org/10.1016/j.vhri.2022.04.006). Each participant received Ugandan Shilling 25 000 (US$7) as a compensation for their time.

Analysis

Descriptive analysis

The characteristics of participants were described using means and standard deviations (SDs) for continuous variables, and frequencies and percents for categorical variables. The EQ-5D-5L health-related quality of life scores were calculated using the value set for Uganda.[31]

Response categorization

Responses obtained after watching the video were used in analysis. The response to each question could be A, B, or equally good (=). The health gain of the "extremely poor" group from program B decreases from question 1 to question 7 (health gain of the "very rich" group stays fixed), so when the response switches to A at some point, a consistent response for the subsequent question(s) would be A. Therefore, all the possible responses to the 7 questions could be categorized into the following groups: "prorich" that prefers health gains to the better-off (eg, AAAAAAA); "neutral" concerned with total health gain, regardless of which group benefits more (B=AAAAA); "propoor" that puts

more weights to the health gain of the worse-off (eg, BB=AAAA); "poor only" concerned only with health benefits of the worst-off (BBBBB=A); and "proequality" that values reducing health inequality and is willing to lose potential health benefits to the worse-off (eg, BBBBBBA) (Appendix Table 1 in Supplemental Materials found at https://dx.doi.org/10.1016/j.vhri.2022.04.006).

Inequality aversion parameter

The point at which the respondent chose "equally good" can be considered to represent that point where the health distributions of the 2 hypothetical healthcare programs were equivalent, that is, the indifferent point. The distribution of health can be presented as "equally distributed equivalent health," by specifying an inequality aversion parameter for a social welfare function such as those proposed by Atkinson[13] and Kolm.[32] These type of social welfare functions reflect the societal value of an outcome, such as health, by applying the inequality aversion parameter to reduce the overall value as a result of inequality. The general approach we propose can be applied to any similar function, but taking the Atkinson inequality aversion parameter as our specific example, equally distributed equivalent health can be calculated as follows:

$$EDE = \left(\frac{1}{N}\sum h_i^{1-\varepsilon}\right)^{\frac{1}{1-\varepsilon}}$$

h_i = individual health for a person in subgroup i
N = total population size
ε = Atkinson inequality aversion parameter (1)

For each response category, the indifferent point was identified. If no "equally good (=)" was chosen, we assumed the indifferent point was on average the midpoint between the 2 questions in which respondents changed their response from B to A. For respondents who did not switch responses in all 7 questions, that is, AAAAAAA or BBBBBBB, we assumed the next half-step change (0.5 year) would be considered equivalent (Appendix Table 1 in Supplemental Materials found at https://dx.doi.org/10.1016/j.vhri.2022.04.006).

The Atkinson inequality aversion parameter for each response category was estimated, by solving Eq. (1). Taking category 2 (=AAAAAA) as an example, the indifferent point was where program A leads to 3 years to "extremely poor" group and 7 years to "very rich" group and the corresponding figures of program B are 8 years and 3 years. By solving the equation below, Atkinson inequality aversion parameter ε is calculated at −2.06.

$$\left(0.2 * \left[(60+\mathbf{3})^{1-\varepsilon}+62^{1-\varepsilon}+64^{1-\varepsilon}+66^{1-\varepsilon}+(68+\mathbf{7})^{1-\varepsilon}\right]\right)^{\frac{1}{1-\varepsilon}}$$
$$= \left(0.2 * \left[(60+\mathbf{8})^{1-\varepsilon}+62^{1-\varepsilon}+64^{1-\varepsilon}+66^{1-\varepsilon}+(68+\mathbf{3})^{1-\varepsilon}\right]\right)^{\frac{1}{1-\varepsilon}}$$

We then ranked all responses from participants to identify the category in which the median response was located. The Atkinson inequality aversion parameter for that category was used to represent the relevant value for the general population. To allow for uncertainty, we used nonparametric bootstrap (5000 times) to estimate the 95% confidence interval for the median response category. From this, we calculated the implied equity weight using Eq. (2) to show the weight of health gain to the "extremely poor" group compared to the health gain to the "very rich" group.

Equity weight = $\left(\frac{\text{Health}_{\text{very rich}}}{\text{Health}_{\text{extremely poor}}}\right)^{\varepsilon}$ ε = Atkinson inequality aversion parameter (2)

We also reported the median response category for subgroups defined by age group, sex, and education, to explore whether and how the preference differs across population subgroups.

Ethics

The study was approved by the institutional review board at the Uganda Virus Research Institute Research and Ethics Committee (reference: GC/127/20/08/783) and by the Uganda National Council for Science and Technology (reference: SS597ES) and was conducted in accordance with the Declaration of Helsinki.

Results

Participants

In total, 168 participants were recruited, of whom 165 respondents provided consistent responses and their responses were included in analysis. The full description of demographic, socioeconomic, and health-related characteristics is presented in Table 1. The mean (SD) age of the participants was 37.1 (13.8) years. The sample was generally representative of the Ugandan adult population in terms of age and sex, with 53.3% aged 18 to 34 years, 37.0% aged 35 to 59 years, 9.7% aged 60 years or older, and 52.7% female (Table 1). Compared with the general population, the sample had a higher education level (likely because those with lower education may have difficulties understanding the trade-off questions), more people of the Baganda ethnic group (data collected in the Central region where more people of this ethnic group live), and comparable religion distribution. More than half of the participants (60.6%) were married/cohabiting; 85.5% were employed (including self-employed) and 69.7% had a monthly income below 400 000 Ugandan shillings (approximately US$115). The mean household size was 2.6 adults and 2.7 children.

For current level of health, 53.4% reported good/excellent health and 30.3% reported the presence of illness, with ulcers being the most common (9.09%). Mean (SD) EQ-5D-5L score was 0.836 (0.170) (Table 1), and the distribution was highly skewed with 20.6% reporting full health (Fig. 2). Most participants (81.8%) reported the influence of their religious beliefs on responses to trade-off questions. More than 90% (93.9%) indicated that they felt threatened by the pandemic, and more than half of them (51.5%) became unemployed because of pandemic (Table 1).

Responses

The distribution of responses for each category is summarized in Table 2. No respondents were prorich or neutral. Most respondents, 79.4% were propoor, suggesting their willingness to trade-off some total health benefits to reduce health inequality. One participant (0.6%) was concerned with health benefits of the extremely poor group only (poor only), and 33 participants (20%) were proequality.

Inequality Aversion

The Atkinson inequality aversion parameter for each response category was calculated and summarized in Table 2. The median response was in category rank 11, that is, propoor 7 with response as BBBBBAA, in which the health benefits of program B at 3.5 years for the "extremely poor" group and 3 years for the "very rich" group were considered equivalent to program A at 3 years for the "extremely poor" group and 7 years for the "very rich" group. This was supported by the bootstrapped samples that 95.5% of the median category was in rank 11. For population subgroups defined

Table 1. Demographic and health-related characteristics of participants.

Characteristics	General population, %	Sample included in analysis (N = 165)
Age (year), mean ± SD		37.1 ± 13.8
Age groups, n (%)		
Young (18-34)	55	88 (53.3)
Middle aged (35-59)	35	61 (37.0)
Old (≥60)	10	16 (9.7)
Sex, n (%)		
Female	51	87 (52.7)
Male	49	78 (47.3)
Education, n (%)		
Primary or lower	71	97 (58.8)
Secondary	23	52 (31.5)
Higher than secondary	6	16 (9.7)
Ethnicity, n (%)		
Baganda	17	92 (55.8)
Banyankore	11	17 (10.3)
Bakiga/Basoga	14	13 (7.9)
Others	58	43 (26.1)
Religion, n (%)		
Christian	53	88 (53.3)
Anglican	32	44 (26.7)
Muslim and others	16	33 (20.0)
Marital status, n (%)		
Married/cohabiting		100 (60.6)
Single		40 (24.2)
Divorced/widowed		25 (15.2)
Employment status, n (%)		
Employed, including self-employed		141 (85.5)
Unemployed		5 (3.0)
Others		19 (11.5)
Income level, n (%)		
≤400K		115 (69.7)
400-1850K		44 (26.7)
>1850K		6 (3.6)
Household		
No of adults, mean ± SD		2.6 ± 1.3
No of children, mean ± SD		2.7 ± 2.1
Overall health, n (%)		
Excellent		12 (7.3)
Good		76 (46.1)
Fair		73 (44.2)
Poor		4 (2.4)
Illness, n (%)		
Yes		50 (30.3)
Ulcers		15 (9.09)
Hypertension		12 (7.27)
HIV/AIDS		11 (6.67)
EQ-5D-5L scores, mean ± SD		0.836 ± 0.170
EQ-5D-5L score, n (%)		
Full health		34 (20.6)
Religion influence on responses, n (%)		
Yes		135 (81.8)
Feel threatened by the pandemic, n (%)		
Yes		155 (93.9)
I may contract the disease.		113 (68.5)
I cannot afford to pay medical bill.		18 (10.9)
I may lose my job/ business.		22 (13.3)
I may burden my family if I were sick.		2 (1.2)
Unemployed due to the pandemic, n (%)		
Yes		85 (51.5)

AIDS indicates acquired immune deficiency syndrome; EQ-5D-5L, 5-level version of EQ-5D; HIV, human immunodeficiency virus; K, thousand.

by age group, sex, and education level, the median response category was also rank 11 in all subgroups.

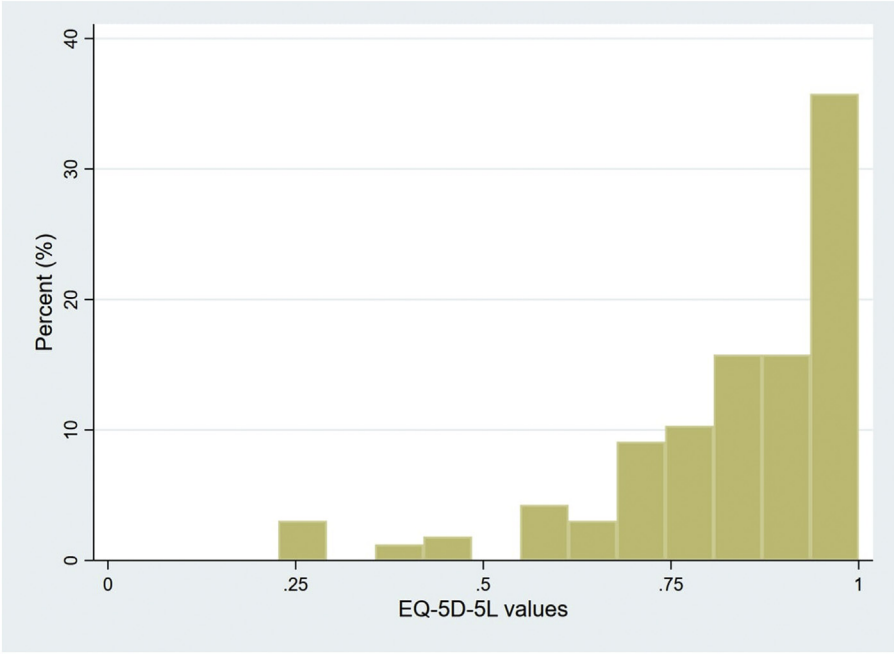
The Atkinson inequality aversion parameter for the median category was 14.70 (Table 2). The implied equity weight was estimated at 6.30, indicating that the incremental health gain to the poorest 20% of people in Uganda should be weighted approximately 6 times the same incremental health gain to the richest 20% group.

Discussion

In this study, we adapted a questionnaire that has been used in England[23] to the Ugandan context, aiming to elicit the general public's views on health inequality and to understand how averse they are to inequalities between rich and poor groups. Our results present the feasibility of applying this type of survey in Uganda. They also indicate that the wellbeing derived from health in the Ugandan general population would be maintained if a substantial amount of total population health were sacrificed to achieve a more equal distribution of health.

The finding that Ugandans value health gains for disadvantaged groups with poor health more highly than gains for better-off groups is consistent with the results of previous empirical studies using a similar questionnaire conducted in England[15-19] and Spain.[20-22] The responses to this type of survey are sensitive to the design of the questionnaire, such as how the health inequality was described and how the questions were framed. The revised design in England[23] proposed the use of an animation video to assist in the interview, which reduced the proportion of respondents reporting extreme inequality aversion. One previous study also investigated how large the health benefits should be in the hypothetical scenarios in the trade-off questions and found that the impact was minimal.[29] Based on these findings, we adapted the survey used in England to the Ugandan context and it has proven to be feasible and to perform as expected. Given that this is the first attempt to apply this questionnaire in a resource-constrained setting, further studies into the design of the questionnaire such as the terminology used to describe socioeconomic groups would be beneficial, as would similar studies to confirm these findings.

Figure 2. Distribution of EQ-5D-5L values of the sample (N = 165).



EQ-5D-5L indicates 5-level version of EQ-5D.

In terms of the inequality aversion parameter estimates, an earlier English study[18] reported an Atkinson value of 28.9, which drew comment on how the study design may have led to the inclusion of extreme egalitarian responses.[23] A revised design that included more up-front training elements was used in another English study,[23] which estimated the Atkinson ε value at 10.95. In this study, we follow a similar revised design and observed the median response in category propoor 7 (response BBBBBAA) and estimated the Atkinson ε value at 14.70. The implied equity weight for the poorest group is a function of the inequality aversion parameter combined with the baseline distribution of health, and in Uganda, it was estimated at 6.30, which is slightly lower than that in England at 6.95.[23] This could be explained by that the Ugandan baseline level of health for the 2 extreme groups (60 and 68 years) is lower than that in England (62 and 74 years). Regardless, the results suggest that members of the Ugandan public have a similar level of preference toward health inequality reduction as the public in England. It is unknown how strong this preference is compared to other countries in the African region due to the unavailability of such estimates.

Table 2. Response categories of participants.

Rank	Category	Response	n (%)	Atkinson ε
1	Prorich 1	AAAAAAA	0	−3.05
2	Prorich 2	=AAAAAA	0	−2.06
3	Prorich 3	BAAAAAA	0	−1.05
4	Neutral	B=AAAAA	0	0
5	Propoor 1	BBAAAAA	0	1.11
6	Propoor 2	BB=AAAA	0	2.33
7	Propoor 3	BBBAAAA	5 (3.0)	3.69
8	Propoor 4	BBB=AAA	0	5.29
9	Propoor 5	BBBBAAA	67 (40.6)	7.29
10	Propoor 6	BBBB=AA	0	10.03
11	Propoor 7	BBBBBAA	59 (35.8)	14.70
12	Poor only	BBBBB=A	1 (0.6)	∞
13	Proequality 1	BBBBBBA	28 (17.0)	NA
14	Proequality 2	BBBBBB=	1 (0.6)	NA
15	Proequality 3	BBBBBBB	4 (2.4)	NA

NA indicates not applicable.

In addition to indicating the extent to which people value reduction in health inequalities compared to improvement in total health, inequality aversion parameters can be used in analyses that inform the selection between alternative healthcare policies for where there is an interest in incorporating equity criteria in health benefits package design.[28,33] In the presence of a choice between health policies that entails a trade-off between inequality reduction and improvement in total health, it can inform which policy provides value for money given how inequality in health affects population wellbeing.

We note the limitations of this study. One consideration is the generalizability of our findings. Although the participants' age and sex resembled those of the general population and the distribution of religion was similar, larger samples across more regions and encompassing more ethnic groups of the Ugandan population would be beneficial. A second consideration is the impact of the COVID-19 pandemic on the reported preferences. More than 90% of participants felt threatened by the pandemic, and more than half of them became unemployed (Table 1). This might have driven people's preference for using healthcare resources to target the disadvantaged and more vulnerable groups. Evaluating whether this is the case is beyond the scope of this study. Despite these limitations, this methodology may have the potential to be used more widely in resource-constrained settings if the survey

instruments can be adapted for incorporation into existing data collection opportunities, such as population surveys. Further application of this approach would be valuable to advance understanding of the methodology and for policy makers to understand the general public's strength of preference for reducing health inequality. Nevertheless, it should be noted that the method reported here is heavily reliant on interviewers' performance, so interviewer training and quality control are key to success.

Conclusions

As the first attempt to apply the methodology of health inequality preference elicitation developed in the United Kingdom in resource-constrained settings, this study supports the feasibility of the interview-monitored survey including trade-off questions and an animated video by conducting face-to-face interview with members of the general public in Uganda.

Most respondents suggested in their responses that they were willing to trade-off some total health gain to reduce health inequality. Atkinson inequality aversion parameter was estimated, implying that incremental health gain to the poorest 20% of people in Uganda should be given approximately 6 times the weight of health gains to the richest 20% group, at a similar level of that in England. The parameter also provides values for the application of methods to integrate health inequality impacts into health resource allocation and policy prioritization in Uganda.

Supplemental Materialsmaterials-methods

Supplementary data associated with this article can be found in the online version at https://dx.doi.org/10.1016/j.vhri.2022.04.006.

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