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Public preferences for the allocation of societal resources over different healthcare purposes

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ABSTRACT

Objective: Increasing healthcare expenditures require governments to make difficult prioritization decisions. Considering public preferences can help raise citizens' support. Previous research has predominantly elicited preferences for the allocation of public resources towards specific treatments or patient groups and principles for resource allocation. This study contributes by examining public preferences for budget allocation over various healthcare purposes in the Netherlands.

Methods: We conducted a Participatory Value Evaluation (PVE) choice experiment in which 1408 respondents were asked to allocate a hypothetical budget over eight healthcare purposes: general practice and other easily accessible healthcare, hospital care, elderly care, disability care, mental healthcare, preventive care by encouragement, preventive care by discouragement, and new and better medicines. A default expenditure was set for each healthcare purpose, based on current expenditures. Respondents could adjust these default expenditures using sliders and were presented with the implications of their adjustments on health and well-being outcomes, the economy, and the healthcare premium. As a constraint, the maximum increase in the mandatory healthcare premium for adult citizens was €600 per year. The data were analysed using descriptive statistics and a Latent Class Cluster Analysis (LCCA).

Results: On average, respondents preferred to increase total expenditures on all healthcare purposes, but especially on elderly care, new and better medicines, and mental healthcare. Three preference clusters were identified. The largest cluster preferred modest increases in expenditures, the second a much higher increase of expenditures, and the smallest favouring a substantial reduction of the healthcare premium by decreasing the expenditure on all healthcare purposes. The analyses also demonstrated substantial preference heterogeneity between clusters for budget allocation over different healthcare purposes.

Conclusions: The results of this choice experiment show that most citizens in the Netherlands support increasing healthcare expenditures. However, substantial heterogeneity was identified in preferences for healthcare purposes to prioritize. Considering these preferences may increase public support for prioritization decisions.

1. Introduction

Countries around the world face substantial increases in their healthcare expenditures, mainly as a result of technological developments, population ageing, and income growth (e.g., Chandra and Skinner, 2012; Martín et al., 2011; You and Okunade, 2017). At the same time, there is scarcity of collective resources, so that increasing expenditure on new treatments raises the pressure on the financial sustainability of the healthcare system as a whole and may require disinvestments elsewhere in the system (e.g., Bridges, 2004; Wammes et al., 2020). Decisions about which treatments to fund and which not to fund can be supported by evidence about their marginal costs and effects

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using economic evaluation methods like Cost-Effectiveness Analysis (CEA) or Cost-Utility Analysis (CUA). These methods often embed implicit value judgements, however, potentially reducing the accountability and transparency of prioritization decisions with respect to social values such as equity and fairness (Clark and Weale, 2012; Lessard, 2007; Liljas and Lindgren, 2001).

To make prioritization decisions more responsive to social values, there is an increasing call to broaden the evaluation framework by incorporating public preferences and values in priority-setting (e.g., Gruskin and Daniels, 2011; Kinchin et al., 2023). Public involvement may increase the plurality of arguments considered by decision-makers and thereby contribute to the legitimacy of and public support for difficult rationing decisions, as well as better align the supply of healthcare services with public preferences (e.g., Gustavsson and Lindblom, 2023). Despite the increasing attention to public involvement in priority-setting (e.g., Bijlmakers et al., 2020; Conklin et al., 2012; Mitton et al., 2009), some studies suggest large disparities to exist between the preferred and actual allocation of public healthcare resources (e.g., Rosén and Karlberg, 2002; Xesfingi et al., 2015) and between decision-makers' attitudes towards the use of public preferences in priority-setting and their actual use of these preferences (Regier et al., 2014). Nonetheless, it remains important to increase the legitimacy of and support for prioritization decisions in publicly funded healthcare by providing insight into public preferences.

Stated preference research on priority-setting in healthcare has developed substantially over the past three decades (Whitty et al., 2014). Most studies have focused on public preferences for the allocation of scarce resources either towards (or away from) specific interventions and their outcomes (e.g., Costa-Font et al., 2015; Erdem and Thompson, 2014; Krucien et al., 2020; Rotteveel et al., 2022) or towards different patient and population groups and the decision criteria and principles that should underlie this allocation (e.g., Bae et al., 2023; Luyten et al., 2022; Reckers-Droog et al., 2019; Richardson et al., 2012; Van Exel et al., 2015). While these studies certainly provide value for informing the allocation of healthcare resources at the level of a specific program or a healthcare purpose (curative care in most cases), they are not very informative about public preferences regarding allocation decisions at the level of the healthcare system, where the total healthcare budget needs to be allocated towards different healthcare purposes.

Only few studies have examined public preferences for the allocation of scarce resources over different healthcare purposes at the healthcare system level. Most of these studies have focused on public preferences for the allocation of financial resources between two purposes, for example between curative care and prevention (e.g., Card et al., 2022; Corso et al., 2002; Luyten et al., 2015; Meertens et al., 2013). Some other studies have asked respondents to rank multiple healthcare purposes in terms of their importance of being funded by the government (e.g., Praveen et al., 2014; Ramji and Quiñonez, 2012), but have not asked to allocate resources to the healthcare purposes. So far, to our knowledge, only one study asked respondents to allocate a hypothetical budget over several healthcare purposes (in Greece) (Xesfingi et al., 2015). They found that, on average, citizens divided the budget of €100 fairly equally over the eight healthcare purposes presented to them, and that allocation preferences differed according to personal characteristics of respondents (e.g., gender, family size, employment status, and income).

Building on the insights from the existing literature, this study aims to examine public preferences for the allocation of societal resources over different healthcare purposes in the Netherlands. For this purpose, we conduct a Participatory Value Evaluation (PVE) choice experiment (Mouter et al., 2021a, 2021b). This study contributes to the existing literature in two ways. Firstly, whereas the study by Xesfingi et al. (2015) asks respondents to allocate a hypothetical budget over different healthcare purposes, our study takes the average current expenditure per citizen on each healthcare purpose as the starting point, to embed the preferences of respondents more closely in the reality of current healthcare expenditures and priority-setting needs. Secondly, respondents in our study can trade-off their private spending capacity with public expenditure on healthcare by choosing to increase or decrease the overall level of public expenditure and accepting a corresponding change in healthcare insurance premium, which is mandatory for adult citizens in the Netherlands. As such, this study does not only provide insight in public preferences for the allocation of resources over different healthcare purposes, but also about the preferred level of total public expenditure on healthcare.

2. Methodology

2.1. Participatory Value Evaluation

This study used Participatory Value Evaluation (PVE), a choice experiment in which respondents can express their preferences towards a set of policy alternatives within a (resource) constraint (Dekker et al., 2019; Boxebeld et al., 2023). The essence of a PVE is that citizens are put in the shoes of a policymaker. In an online environment, they see: 1) which policy options the government is considering; 2) the impacts of each of the options on the goals of the government in the specific policy area (e.g., learning outcomes, environment, health) and; 3) the constraint(s) that the government faces (e.g., budget, capacity, minimum target level for goals). Subsequently, citizens are asked to recommend to the government which policy options should be chosen, subject to the constraint(s). See Boxebeld et al. (2023) or Mouter et al. (2021a, 2021b) for a more in-depth introduction of the method. The reason for selecting PVE for the current study over other preference elicitation methods (e.g., discrete choice experiment or best-worst scaling) was that PVE incorporates an explicit constraint in the choice task, which in this study took the form of a public healthcare budget. Confronting respondents with such a constraint forces them to take the scarcity of financial resources faced by policymakers into consideration when stating their preferences. A second reason for selecting PVE was that it makes it possible, as an additional feature, to allow respondents to adjust the constraint, which in this study meant increasing or decreasing the healthcare budget and, hence, the overall level of tax burden. This allowed respondents in this study to trade-off public expenditure on healthcare with their private spending capacity (Boxebeld et al., 2023). Consequently, by using PVE, this study provides insight into public preferences for resource allocation over different healthcare purposes but also for the size of the public healthcare budget.

2.2. Choice task and survey design

A PVE presents respondents with a single choice task in which respondents state their preferences for the alternative policy options and, if applicable, the constraint. In the choice task of the current study, respondents were presented with eight different healthcare purposes. These eight healthcare purposes (i.e., alternative spendings of the healthcare budget) are presented and related to the healthcare functions defined in the OECD Classification of Health Care Functions (ICHA-HC) (OECD/World Health Organization/Eurostat, 2011) in Table 1. In several instances, the healthcare purposes used in this study deviate from the OECD Classification to increase familiarity of the names of the healthcare purposes for respondents and limit the cognitive burden of the choice task. For example, we included the healthcare purposes of general practitioners and other easily accessible healthcare and hospital

Table 1
Overview of included healthcare purposes and related OECD healthcare functions.

Healthcare purpose label presented to respondents	Abbreviated description presented to respondents	Related healthcare function in ICHA-HC classification
General practitioners and other easily accessible care	General practice, physiotherapy, dental care, and pharmacies.	Curative care (HC.1)
Hospital care	All hospital care, including emergency care, hospitalizations, surgery, and other hospital treatments.	Curative care (HC.1)
Elderly care	All care supporting elderly with physical or mental impairments. Includes both home-based and institutional elderly care.	Long-term care (HC.3)
Disability care	All long-term care supporting people with persisting physical or mental functional limitations.	Long-term care (HC.3)
Mental healthcare	Care for people with mental problems, including psychiatry, clinical psychology, and addiction.	Rehabilitative care (HC.2) & Long-term care (HC.3)
Prevention by encouragement	Prevention of diseases and healthcare use by encouraging healthy behaviour. Includes lifestyle coaching, screening programs, information campaigns, and lowering prices of fruits and vegetables.	Preventive Care (HC.6)
Prevention by discouragement	Prevention of diseases and healthcare use by discouraging unhealthy behaviour. Includes increasing prices of tobacco, alcohol, and other unhealthy products (e.g., a sugar or fat tax).	Preventive Care (HC.6)
New and better medicines	Reimbursement of medicines and supporting investment in the development of new medicines.	Medical goods (HC.5)/ Total Pharmaceutical Expenditure (HC.RI.1)

Overview of the eight healthcare purposes presented to respondents together with concise descriptions (see Supplementary Material 2 for full descriptions) and their related healthcare functions following the ICHA-HC classification (OECD/Worldbank/Eurostat, 2011).

care instead of the overarching healthcare function of curative care. Similarly, long-term care was also split into elderly care and disability care, and prevention into prevention by encouragement and prevention by discouragement. The rationale for splitting up prevention is that both types of prevention may differ in terms of their costs, effects, and societal acceptance.[1] Within the healthcare function of medical equipment, 'new and better medicines' was included as a healthcare purpose in this choice experiment, since medical drug innovation seems a prominent driver of increasing healthcare expenditures (Chandra and Skinner, 2012; You and Okunade, 2017). Finally, mental healthcare was selected as a separate alternative, whereas it falls under the two healthcare functions of rehabilitative care and long-term care in the ICHA-HC categorization.

All healthcare purposes were described to respondents by a set of attributes, capturing the estimated effects of public expenditure on these purposes on public health, well-being, and the economy. Given the limited information available in the literature and the resulting uncertainty regarding the magnitude of these effects, they were expressed in ordinal levels (see Table 2) that varied between respondents within predefined ranges. More information regarding the complete set of attribute level ranges by healthcare purpose is provided in Supplementary Material 1. Respondents were presented with these attribute levels and could request additional (qualitative) information by clicking on the 'information' button next to each of the alternatives (see Appendix B for an example of the choice task and Supplementary Material 2 for the content of additional (pop-up) information).

The survey (including the choice experiment) was programmed in the online platform Wevaluate (Populytics, n.d.). At the start of the survey, respondents were informed about the objective of the study (both in text and in a video), the affiliations of the researchers and the funding source, and they were asked for their informed consent for the anonymized processing of their responses. Also, they were informed that a study report might be shared with other researchers and policymakers. Next, as a warm-up task, respondents were presented with a series of statements to which they were asked to state their agreement (see Supplementary Material 3 for details about the statements and the response scale). Besides, they were provided with specific instructions regarding the choice task both in text and in an instruction video.

In the choice task, they were asked how they would allocate the healthcare budget over the eight presented healthcare purposes. Because an overall societal budget might be too abstract for respondents, the budget was presented as the height of the yearly mandatory healthcare premium for every adult citizen in the Netherlands, which was approx. €1500 in 2022 (Rijksoverheid, n.d.). The default expenditure on each healthcare purpose was set at a level approximating the current expenditure in the Netherlands (Dutch Healthcare Authority, 2021; n. d.; RIVM, n.d.). Respondents could increase or decrease the yearly expenditure on each healthcare purpose by moving a slider left or right in steps of €50, with a maximum of €200 less or extra per alternative. This maximum amount of expenditure changes allowed respondents to express their preference for substantial additional investment in or disinvestment of particular healthcare purposes, but also maintained some degree of realism in the trade-offs that respondents make. An exception is the healthcare purpose of prevention by discouragement, since discouragement (e.g., an excise tax) arguably costs little money. Respondents could still move a slider in the same way as for the other healthcare purposes, but their choices for this healthcare purpose did not result in a change of total healthcare expenditure on their choice task screen. In the results presented in this paper, their choices were translated into monetary values for the sake of comparability with respondents' preferences for expenditure on other healthcare purposes. To this aim, the position of the slider received a value between −1 (maximum decrease in the use of prevention by discouragement) and 1 (maximum increase in the use of prevention by discouragement) and was multiplied by €200 (the maximum amount by which the expenditure on other healthcare purposes could be adjusted). Thus, if respondents moved the slider all the way to the left to express their preference for a maximum decrease in the use of prevention by discouragement, this was translated into a monetary value of -€200. In

Table 2
Overview of attributes and levels.

Attribute	Level							
	#1	#2	#3	#4	#5	#6	#7	#8
Health	0	1	2	3	4			
Well-being	−3	−2	−1	0	1	2	3	4
Economy	0	1	2	3	4			

[1] In two recent studies on public preferences for health promotion and disease prevention in the Netherlands, encouraging policies ('carrots') are found to receive more support from citizens than discouraging policies ('sticks') (e.g., Dieteren et al., 2023; Mouter et al., 2022a). A literature review on public acceptability of policy measures that change health-related behaviors also found that citizens tend to support less intrusive policies to a higher extent (Diepeveen et al., 2013).

the overall mean expenditure changes reported in the paper, however, respondents' choices for this healthcare purpose were not included.

On the choice task screen, adjustments in expenditure were shown to lead to equally large changes in the mandatory healthcare premium, highlighting that proposed changes in healthcare expenditures would directly affect citizens' private spending capacity. As a constraint, respondents' choices were allowed to result in a healthcare premium increase of no more than €600 per adult per year (i.e., approx. 20% of the annual health insurance premium per adult citizen in the Netherlands).

After having made their choices, respondents were asked to motivate their choices in an open text field (the results of which are not reported in this paper for reasons of succinctness). Also, they were presented with several background questions to obtain their sociodemographic characteristics.

2.3. Data collection and sample

In total, 1981 respondents (full sample, before exclusions) were recruited from an online panel managed by the private data company Dynata (2022), quota-sampled to be representative of the adult population of the Netherlands (age 15 years and older) in terms of sex, age and education level. At the time of data collection, no guidance for power calculation was available for PVEs but previous studies showed that samples of approximately this size were sufficient to estimate the parameters. Before starting with the experiment, respondents gave informed consent for the use of their data for the purpose of this study. The data collection took place between May 25 and June 14, 2022.

After the data collection, some respondents were excluded from the sample of analysis to remove unreliable responses from the data.[2] Firstly, response time was used to exclude some respondents. All respondents who completed the survey in less than 2 min (which is <25% of the median response time of 9 min) were excluded (43 cases; 2.2% of the total sample). Secondly, the answers of the remaining respondents to the qualitative motivation questions[3] were screened. In case they provided nonsensical answers to all of these questions, they were excluded (31 cases; 1.6%). After removal of an additional 15 respondents (0.8%) whose sex, age or education level was unknown, a final sample of 1408 respondents (71.1%) remained for the analysis. In Appendix A, descriptive statistics of the study sample are presented and compared with data on the Dutch population from Statistics Netherlands (n.d.). While the imbalances seem rather small for sex (e.g., 48.6% men in the sample, 49.4% in the population) and age (e.g., 48.8% and 46.5% age 35–64, 22.8% and 23.7% age 65+ in the sample and population respectively), the imbalance is larger for education level: people who only completed primary education or lower secondary education are somewhat underrepresented in our study sample (22.9% in the sample versus 28.5% in the population).

2.4. Data analysis

The data were first analysed using descriptive statistics, showing respondents' mean expenditure preferences. Secondly, a Latent Class Cluster Analysis (LCCA) was performed. An LCCA uses a factor model in which respondents are probabilistically assigned to clusters on the basis of simple indicators (e.g., here their expenditure preferences) in order to maximize preference homogeneity within and heterogeneity between clusters (Molin et al., 2016). In LCCA, the number of clusters and their sizes are not known beforehand, and there is uncertainty around a respondent's cluster membership (Vermunt and Magidson, 2002). For the identification of the number of clusters, the main criterion regards the balance between model fit and model parsimony. In line with inter alia Molin et al. (2016) and Mouter et al. (2022b), the Bayesian Information Criterion (BIC) based on Log-Likelihood was used to determine the number of clusters in the analysis. The BIC weighs model goodness of fit (indicated by the Log-Likelihood in Table 4) and model parsimony (indicated by the number of model parameters) (Vermunt and Magidson, 2016) and is a well-performing information criterion in the context of latent class analysis (Nylund et al., 2007). The model for which the BIC is minimized is considered to be the model with an optimal balance between model fit and model parsimony. Additionally used criteria regard the ease of interpretation and communication of the model and the probabilistic shares of the clusters, in line with e.g., Molin et al. (2016) and suggestions from Lezhnina and Kismihók (2022).

Apart from the identification of common patterns in preferred expenditure allocations, the LCCA also allows the analyst to explore the association between respondents' class membership probabilities and background characteristics. This provides additional insights into preference heterogeneity between segments of respondents. The latent class cluster model is often estimated simultaneously with a structural model in which covariates are related to the clusters. A disadvantage of this one-step approach is that the included covariates may influence the model estimates and model selection (Vermunt, 2010). An alternative approach is the three-step model, which is used in this study. In this three-step model, a latent class cluster model is estimated first, after which observations are assigned with cluster membership probabilities. Finally, a logistic regression model is estimated to examine the association between the latent clusters and covariates. Because this three-step approach tends to result in an underestimation of the associations between clusters and covariates if not corrected for bias, a maximum likelihood-based correction method is applied, following Vermunt (2010). The LCCA has been performed using Latent GOLD 5.1 (Vermunt and Magidson, 2016).

2.5. Ethics

The study has received approval for data collection from the Human Research Ethics Committee (HREC) from Delft University of Technology (Approval Letter 2123).

3. Results

In the first descriptive analyses, preferences for expenditure on each healthcare purpose are explored (see Fig. 1 for the mean preferred changes in public expenditure and Supplementary Material 4 for the quartile range by healthcare purpose). On average, respondents prefer to increase public spending on all healthcare purposes as compared to

Table 3
Model fit statistics of the LCCA models.

No. of clusters	No. of parameters	Log-Likelihood	BIC(LL)	Δ% BIC(LL)
1	64	−19873.88	40211.76	
2	73	−19585.27	39699.79	−1.27
3	82	−19413.68	39421.85	−0.70
4	91	−19334.51	39328.77	−0.24
5	100	−19271.78	39268.55	−0.15
6	109	−19206.58	39203.39	−0.17
7	118	−19162.72	39180.93	−0.06
8	127	−19117.36	39155.47	−0.06
9	136	−19074.12	39134.23	−0.05
10	145	−19055.13	39161.50	0.07

BIC(LL): Bayesian Information Criterion (based on Log-Likelihood).

[2] A sensitivity analysis has been performed on the entire sample, including those respondents who have been excluded from the main analyses according to the criteria of response time and nonsensical answers to the qualitative motivation questions. There are no substantial differences between the results of the sensitivity analysis (not reported in the paper, available on request) and the main analysis.

[3] For each healthcare purpose, respondents were asked to motivate their expenditure preference.

Table 4
Estimation results for the LCCA model with three clusters.

Healthcare purpose	Overall mean	Cluster 1 (61%)	Cluster 2 (36%)	Cluster 3 (3%)
GPs and other easily accessible care	12	−1	44	−103
Hospital care	19	4	55	−109
Elderly care	30	12	71	−138
Disability care	16	−1	54	−115
Mental healthcare	28	11	69	−127
Prevention by encouragement	9	10	17	−102
Prevention by discouragement	19	21	22	−80
New and better medicines	29	16	58	−85

Prediction of indicators (in €). GPs: general practitioners. Probabilistic cluster shares between brackets.

current expenditure, but the amount varies between healthcare purposes. The largest increases were preferred for elderly care, new and better medicines and mental healthcare, by on average €28 to €30 per person per year. Respondents' preferences for healthcare expenditure, on average, add up to an increase of €144 per year (standard deviation: €280). The wide T-bars in Fig. 1, indicating the large standard deviations, suggest the existence of substantial heterogeneity in expenditure preferences.

Fig. 2 shows the proportions of respondents who wish to increase the level of expenditure, leave the level of expenditure the same as now, or decrease the level of expenditure for each healthcare purpose. While on average respondents preferred an increase in expenditure for each healthcare purpose, 'only' about half of the respondents (i.e., 43%–55%) chose for an expenditure increase. At the same time, about a third of respondents (i.e., 25%–36%) preferred to leave the level of expenditure the same, while a considerable minority of respondents (i.e., 16%–29%) preferred to decrease the level of expenditure. These results reveal the existence of different expenditure preferences within the sample, which will be further explored below.

Table 3 shows the number of parameters, Log-Likelihood, and BIC-values for LCCA models with up to ten clusters. As can be seen, the BIC reaches a minimum value at the model with nine clusters. However, a model with nine clusters is rather difficult to interpret and communicate and comes with some clusters with a very small probabilistic share of respondents. Therefore, in line with Van 't Veer et al. (2023), the percentual change in the BIC-value was computed. As can be seen in the last column of Table 3, a model with two clusters improves the BIC-value by approx. 1.3% relative to a model with one cluster, while a model with 3 clusters improves the BIC-value by approx. 0.7% relative to a model with two clusters. For models beyond three clusters, the improvement in BIC-value becomes negligible (<0.25%). Therefore, the model with three clusters is considered the optimal model for our data: it still has a substantially better fit than a model with two clusters, while further increasing the number of clusters only marginally improves the BIC-value. Finally, a model with three clusters is still easily interpretable and communicable.

Table 4 presents the estimation results of the LCCA model with three clusters. The three clusters clearly differ in their preferences regarding public expenditure on the different healthcare purposes. Cluster 1 generally prefers to increase total collective spending on healthcare by €50 per year (standard deviation: €176) and rather moderate changes to the collective spending on the separate healthcare purposes. The largest deviation between their preferences and the status quo is their desire to increase the use of prevention by discouragement (by the equivalent of €21 per person per year). Cluster 1 is the largest cluster, as 61% of respondents are most likely to belong to this cluster in case three clusters are identified. Cluster 2 generally prefers to increase total public expenditure on healthcare by €370 per year (standard deviation: €160) and on all the separate healthcare purposes. This holds especially for the healthcare purposes of elderly care and mental healthcare, on which this cluster prefers to increase expenditure by €71 and €69 per person per year, respectively. About a third (36%) of the respondents in the study sample are most likely to belong to Cluster 2. Finally, Cluster 3 differs considerably from the two other clusters and prefers to decrease the total expenditure on healthcare by €787 per year (standard deviation: €327) and on every healthcare purpose. Disinvestments are especially

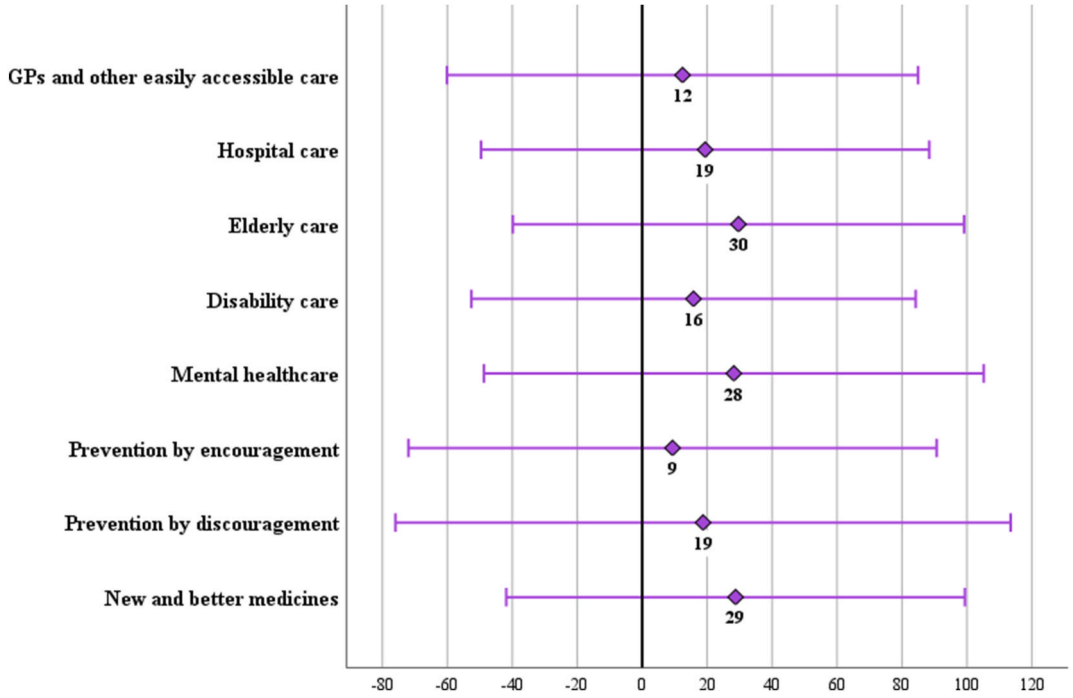

Fig. 1. Preferred changes in public expenditure by healthcare purpose. The diamonds indicate the mean preferred changes in public expenditure (in €), the T-bars indicate the standard deviation on both sides of the mean. GPs: general practitioners.

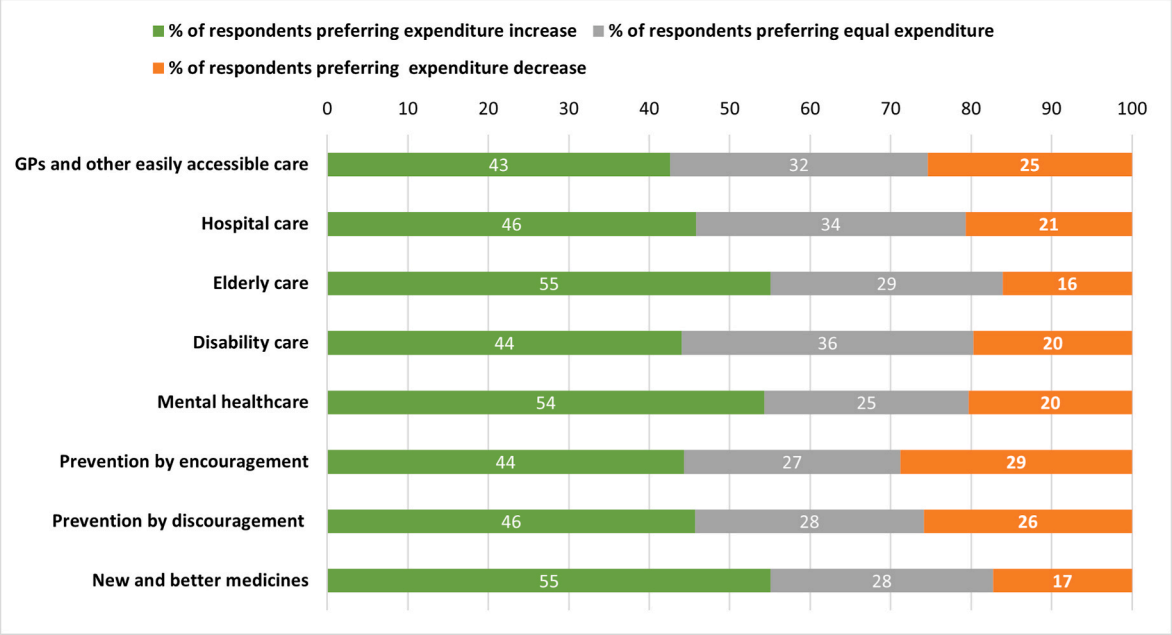

Fig. 2. The proportions of respondents who prefer a higher, the same or lower level of expenditure by healthcare purpose. Please note that the percentages may not sum up to 100% for each healthcare purpose due to rounding to integers. GPs: general practitioners.

preferred on elderly care (-€138) and mental healthcare (-€127). The smallest reduction in expenditure preferred by this cluster (i.e., -€80 on prevention by discouragement) is larger in magnitude than the highest preferred increase in expenditure from Cluster 2. This is by far the smallest cluster, with only 3% of respondents most likely to belong to this cluster.

Apart from the prediction of the indicators, it is also interesting to explore the associations between probabilistic cluster membership and sociodemographic characteristics of respondents. Table 5 only shows the sociodemographic covariates that are, according to a Wald test, significantly (at the 95% level) associated with cluster membership. Younger respondents (age 18–34) have a higher probability of belonging to Cluster 3 than the other age groups, while middle-aged respondents (age 35–64) have a higher probability of belonging to Cluster 1 and a lower probability of belonging to Cluster 2 relative to younger and older respondents. Respondents who completed only primary or lower secondary education are more likely to belong to Cluster 3 than respondents who completed more schooling, while respondents who completed university of applied sciences or research university are more likely to belong to Cluster 1 and less likely to belong to Cluster 2 relative to other respondents. Finally, respondents who recently used healthcare are more likely to belong to Cluster 2, while respondents who did not recently use healthcare have a higher probability of belonging to Cluster 1.

As a supplementary analysis, the three-cluster LCCA was also conducted using the responses to the statements prior to the choice task as covariates instead of sociodemographic characteristics. Table S3 in Supplementary Material 3 reports the results for the two statements that were significantly associated with cluster membership probability. The results are intuitive: respondents who agreed with the statement "We spend too much on healthcare in the Netherlands" are more likely to belong to Cluster 3 relative to respondents who disagreed or were neutral, while respondents who disagreed are more likely to belong to Cluster 2. Respondents who agreed with the statement "We have to spend more money in the Netherlands on innovations and improvements in healthcare" are more likely to belong to Cluster 2 than respondents who disagreed with this statement or were neutral, while respondents who disagreed are more likely to belong to Cluster 3.

Fig. 3 summarizes the preferred changes in collective expenditure on all eight included healthcare purposes for the three identified clusters and clearly shows the differences in preferences between the clusters. Clusters 1 and 2 (almost) always prefer expenditure increases and Cluster 3 always prefers substantial expenditure reductions. Strikingly, the two healthcare purposes for which Cluster 2 prefers to increase expenditure the most, elderly care and mental healthcare, are also those for which Cluster 3 prefers to decrease expenditure the most. A similar observation can be made for disability care. Conversely, for the healthcare purpose of new and better medicines the decrease in expenditure preferred by Cluster 3 is almost the smallest, while Cluster 2 prefers a substantial increase in expenditure. Finally, regarding the two types of prevention, it seems that prevention by discouragement is generally preferred to prevention by encouragement.

4. Conclusion and discussion

The aim of this study was to elicit public preferences for the allocation of the healthcare budget to different healthcare purposes in the Netherlands. In a PVE choice experiment including a large sample of citizens from the Netherlands, respondents could adjust the public expenditure on eight different healthcare purposes relative to current spending by a maximum of €200 upwards or downwards. Two main findings arise from this study.

Firstly, on average, respondents prefer to increase the expenditure on all healthcare purposes, by about €144 per person per year in total, which on aggregate corresponds to an increase of approximately 3% in the public budget for healthcare. This preferred expenditure increase is observed despite respondents being informed that an increase in the health budget would result in an equally large increase in the premium to be paid by citizens. Thus, if they perceive the choice experiment to be consequential, this means that the average respondent is willing to give up €144 per year of their private spending capacity to increase collective expenditure on healthcare by an equal amount. About half of this extra budget, they would allocate to the three most preferred healthcare purposes: elderly care, new and better medicines, and mental healthcare. This contrasts the findings of Xesfingi et al. (2015), who found that citizens in Greece divided a public budget rather equally over the different healthcare purposes in their study.

Secondly, the results reveal substantial heterogeneity in preferences

Table 5
Cluster membership probabilities by sociodemographic covariates.

Healthcare purpose	Cluster 1 (61%)	Cluster 2 (36%)	Cluster 3 (3%)	Wald-test score	p-value
Prediction of cluster membership probabilities					
Age				12.819	0.012
18–34 years (Ref.)	–	–	–		
35–64 years	0.000	−0.474 (0.184)	−0.683 (0.464)		
65+ years	0.000	−0.111 (0.216)	−1.633 (0.725)		
Education level				14.644	0.006
Primary education, lower secondary education (Ref.)	–	–	–		
Upper secondary education, vocational education	0.000	−0.005 (0.205)	−1.268 (0.447)		
University of applied sciences, research university	0.000	−0.364 (0.205)	−1.232 (0.503)		
Healthcare used in past 3 months				20.259	<0.001
Yes (Ref.)	–	–	–		
No	0.000	−0.884 (0.197)	−0.224 (0.404)		
Probabilistic distribution for the covariate levels over the clusters (%)					
Age					
18–34 years	54.4	42.0	3.6		
35–64 years	66.7	30.5	2.8		
65+ years	56.6	42.2	1.3		
Education level					
Primary education, lower secondary education	56.6	38.4	5.0		
Upper secondary education, vocational education	59.1	39.1	1.8		
University of applied sciences, research university	65.2	32.6	2.2		
Healthcare used in past 3 months					
Yes	53.9	43.5	2.6		
No	73.1	24.2	2.7		

Please note that the percentages may not sum up to 100% for each covariate level due to rounding to integers. Robust standard errors in parentheses. Ref.: Reference category. Other included (non-significant) covariates were gender, working in healthcare, informal care provision, self-reported health status, and expectation of using healthcare in the next 3 months.

underlying the above-mentioned mean preferred expenditure changes. Although on average expenditure increases were preferred, only about half of the sample actually preferred increases for each specific healthcare purpose. The LCCA demonstrated the existence of substantive preference heterogeneity as well, as was shown in Fig. 3. While the majority of the sample (61%) had the highest probably of belonging to Cluster 1, a cluster with relatively moderate preferences, the other two clusters represented strongly contrasting preferences; Cluster 2 (36%) preferred considerable increases in expenditure for almost all healthcare purposes, while Cluster 3 (3%) preferred substantial reductions of expenditure on all healthcare purposes.

Besides, the results show considerable variation between healthcare purposes in terms of polarization, i.e. the magnitude of the differences in preferred expenditures between the different clusters. The polarization is largest for the healthcare purposes of elderly care, mental healthcare and disability care, and relatively least polarized for new and better medicines and prevention by discouragement. Previous research has also documented polarized public preferences in the context of healthcare resource allocation (Awad et al., 2020), but not regarding collective expenditure on various healthcare purposes.

An additional noteworthy result from the LCCA was that probabilistic cluster membership probabilities varied significantly by age, education level,[4] and previous healthcare use, but not by gender, employment in healthcare, informal care provision, self-reported health status, or expectations regarding future healthcare use.

Another interesting finding is that respondents preferred investing public resources in prevention by discouragement over prevention by encouragement. This contradicts results from previous stated choice experiments on preventive policies regarding healthy nutrition and COVID-19 vaccine uptake in the Netherlands (Dieteren et al., 2023; Mouter et al., 2022), which found respondents to prefer carrots over sticks. It is unknown why public preferences differ in this study, but a potential reason might be that there was a financial incentive for respondents to increase prevention by discouragement instead of prevention by encouragement, as the latter resulted in a healthcare premium increase while the first did not. As such, it might be that respondents were sensitive to the higher efficiency of discouraging policies relative to encouraging policies. Since this was not our main focus, it is up to future research to examine this more closely.

4.1. Limitations and directions for future research

As a first limitation, generally applicable to stated preference research, hypothetical bias is a potential threat to the external validity of the results (e.g., Haghani et al., 2021). That is, the hypothetical nature of the choice task may lead to differences between respondents' preferences for public expenditure on various healthcare purposes as indicated in this choice experiment and their preferences in reality. Being aware of this potential bias, we have implemented various measures with the aim of mitigating hypothetical bias as much as possible. For example, as pointed out in the introduction, we have chosen to set default levels of public expenditure on each healthcare purpose approximating current levels of expenditure. Besides, we attempted to select healthcare purposes and corresponding labels that are familiar to respondents (see next paragraph), since hypothetical bias may decrease with familiarity with the good or service on offer in a stated choice task (Schläpfer and Fischhoff, 2012). Finally, we included a form of a consequentiality script by mentioning at the start of the survey that the results may be shared with government and other researchers. The aim of this was to increase the policy consequentiality of the study in the perception of respondents, so that they would have a stronger incentive to reflect their own preferences in the choice task truthfully (Haghani et al., 2021; Lewis et al., 2016). Despite these mitigation attempts, the possibility of any hypothetical bias remaining cannot be excluded.

Also, given that healthcare expenditure levels in the Netherlands are already high as a proportion of its GDP relative to other countries, especially for long-term care (OECD, n.d.), further increases seem most feasible if citizens would actually be willing to trade-off their private spending, like they stated in this study. Further research may examine the perceived consequentiality of the payment vehicle as well as the impact of different payment vehicles (e.g., an increase of the tax burden vs. reallocation of existing public resources, a flat-rate tax vs. a

[4] Considering the underrepresentation of respondents who completed only primary or lower secondary education, one could argue that the 5% probabilistic share of Cluster 3 in our sample may be a lower bound for the actual share of the Cluster and the mean preferred expenditures an upper bound. This assumes, however, that the respondents in our sample who completed only primary or lower secondary education are representative for the larger subgroup of the population who completed only primary or lower secondary education. As we cannot test whether this assumption holds, we refrain from drawing any firm conclusions on the implications of the sample imbalance.

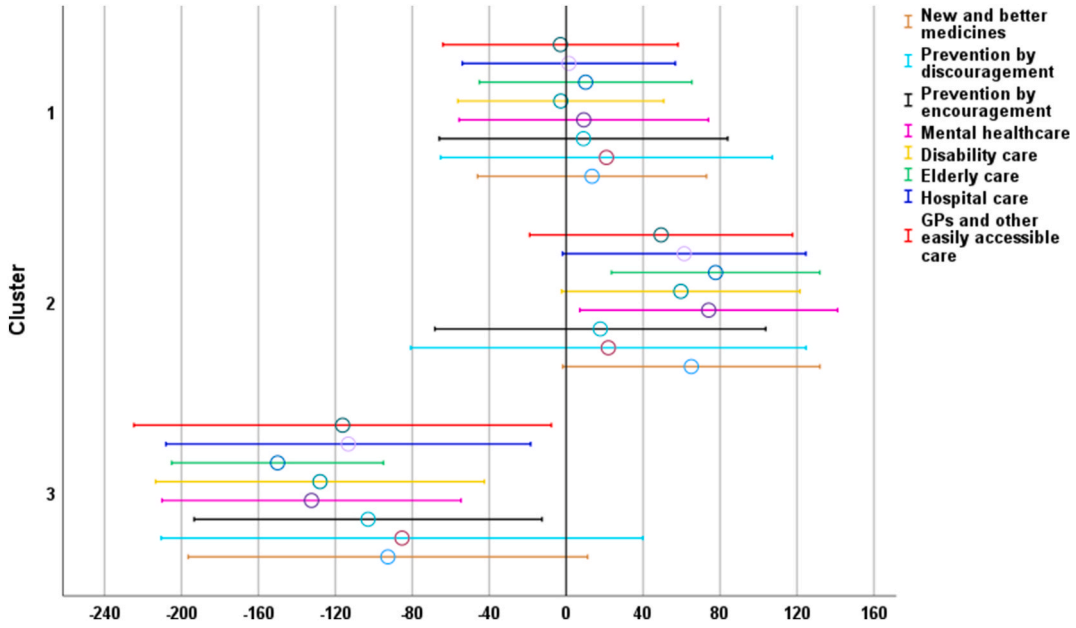

Fig. 3. Preferred changes in collective expenditure on the healthcare purposes for the three clusters identified in the LCCA. The dots indicate the mean preferred changes in public expenditure (in €), the T-bars indicate the standard deviation on both sides of the mean. GPs: general practitioners.

progressive tax, etc.) on citizens' expenditure preferences.

Secondly, in selecting the set of healthcare purposes to present to respondents in the choice task, we deviated from the ICHA-HC classification in several ways. Partly, this was to reduce the cognitive burden for respondents, by limiting the number of healthcare purposes included in the choice task. Additionally, we considered that some of the ICHA-HC labels might not be sufficiently familiar to members of the public. Using these labels might have enlarged the psychological distance between respondents and the healthcare purposes on offer, with potential implications for the elicited preferences (e.g., Veldwijk et al., 2019). For example, we anticipated that "general practitioners and other easily accessible care" and "hospital care" would be more familiar and informative labels to respondents than the fairly general function "curative care". Besides, some of the labels used in this study might have affected respondents' perceptions of and preferences for specific healthcare purposes, such as "prevention by discouragement" or "new and better medicines". Future research could examine public preferences towards the same healthcare purposes using adapted labels or classifications, but also towards the healthcare purposes that we have excluded here, such as long-term youth care, healthcare technologies, and health system governance and administration. Also, the amount of expenditure changes allowed per healthcare purpose (here an increase/decrease of at most €200) could be varied in future studies to examine the impact of this choice on the results.

Thirdly, in other types of choice experiments (e.g., discrete choice experiments) respondents are usually presented with a 'warm-up' choice set (also known as 'instructional choice set') prior to the actual data collection to induce institutional learning (i.e., familiarize respondents with the choice setting) and value learning (i.e., familiarize respondents with the topic) (Abate et al., 2018). Since a PVE consists of a single choice set, a similar familiarization with the choice experiment is not possible. Alternatively, in an attempt to induce institutional learning, we introduced the choice setting by means of an instructional video. Also, we attempted to induce value learning in this study by presenting a set of statements about resource allocation towards different healthcare purposes prior to the choice task, to which respondents needed to indicate their agreement. While this may have helped familiarizing them with the topic of the PVE, this might unintentionally also have affected respondents' preferences in the choice task (Liebe et al., 2016). Therefore, we recommend future research to develop and test a more suitable warming-up task for PVE choice experiments.

Notwithstanding, this study has provided valuable insights regarding public preferences for the allocation of societal resources towards different healthcare purposes. Building on these insights, future research may take up alternative designs in order to examine the role of the attribute levels in public preferences more specifically and to generate marginal utility estimates: adapted versions of our design might allow for the use of a Multiple Discrete Continuous Extreme Value (MDCEV) model (Bhat, 2008; Dekker et al., 2019) or portfolio choice model (Bahamonde-Birke and Mouter, 2019), which have been used in the analysis of previous PVE choice experiments (see e.g., Mouter et al., 2021b; Rotteveel et al., 2022) but were unfeasible to estimate in this study because we used sliders to elicit preferences. Finally, if more information will become available in the future regarding the effects of resource allocation over different healthcare purposes on health, well-being, and the economy, future research will be able to include more specific attribute levels. In combination with the use of an MDCEV model, this may allow future studies to derive welfare estimates for use in economic evaluation. Thus, while the results of this study are valuable in their own right, the current study may also serve as a fruitful fundament for future research into understanding public preferences in healthcare priority-setting.

4.2. Policy implications

For policymakers, considering public preferences for healthcare resource allocation may increase public support for difficult prioritization decisions. Although the mean preference in the sample points towards support for a modest increase in expenditures on the different healthcare purposes, the heterogeneity in preferences between the clusters identified in this study, of which membership probabilities variedby age, education level and recent experience with healthcare, may pose a challenge to policymakers. While the majority group would indeed support a modest increase in expenditure, about a third of the sample would rather see a considerably higher increase and a small minority group would favour a substantial decrease in total spending on healthcare. These differences were also observed at the level of the different healthcare purposes, with the largest disagreement between subgroups relating to expenditures on elderly care and mental healthcare, two healthcare purposes for which demand is expected to increase

considerably over the next decades. Finally, the results presented in this paper are not informative about the extent to which respondents' preferences are well-defined. Therefore, the motivations underlying these preferences and their implications for the development, implementation and communication of prioritization policies require further investigation, for example using qualitative research methods.

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The study was funded by Janssen-Cilag. While some members of the research team are employed by the sponsor, the collection, analysis and interpretation of data, the writing of the article and the decision to submit it for publication are not contingent on approval of the sponsor.

CRediT authorship contribution statement

Sander Boxebeld: Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Software, Visualization, Writing - original draft. **Tom Geijsen:** Conceptualization, Investigation, Methodology, Project administration, Writing - review & editing. **Charlotte Tuit:** Investigation, Methodology, Software, Formal analysis. **Job van Exel:** Conceptualization, Investigation, Supervision, Writing - review & editing. **Amr Makady:** Conceptualization, Funding acquisition, Investigation, Methodology, Writing - review & editing. **Laurence Maes:** Conceptualization, Funding acquisition, Investigation, Methodology, Writing - review & editing. **Michel van Agthoven:** Conceptualization, Funding acquisition, Writing - review & editing. **Niek Mouter:** Conceptualization, Investigation, Methodology, Project administration, Supervision, Writing - review & editing.

Declaration of competing interest

AM, LM and MvA are employed at Janssen-Cilag B.V., the funder of this study. NM reported having stocks in the private company Populytics, a startup of the TU Delft which commercially applies the method Participatory Value Evaluation. TG and CT are employed at Populytics. SB and JvE have no competing interests.

Data availability

Data will be made available on request.

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Appendix C. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2023.116536.

Appendices.

Appendix A: Sample statistics

Table A1
Study sample compared with the general population on sociodemographic statistics

Socio-demographic characteristics	Sample		Population [b]
	(N)	(%)	(%)
Gender [a]			
Man	684	48.6	49.4%
Woman	724	51.4	50.6%
Age			
18–34	400	28.4	29.9%
35–64	687	48.8	46.5%
65+	321	22.8	23.7%
Education level			
Primary education, lower secondary education	323	22.9	28.5%
Upper secondary education, vocational education	542	38.5	36.5%
University of applied sciences, research university	543	38.6	34.9%
Working in healthcare			
Yes	198	14.1	16.1%
No	1210	85.9	83.9%

[a] Respondents were asked for their gender, but the statistics for the general population are based on registered sex, which is rather strongly correlated with gender.

[b] Descriptive statistics on the general population aged 15 and older for January 2022 (for gender and age) or the first quartile of 2022 (for education level and working in healthcare) were retrieved from Statistics Netherlands (n.d.).

Appendix B: Example of choice task

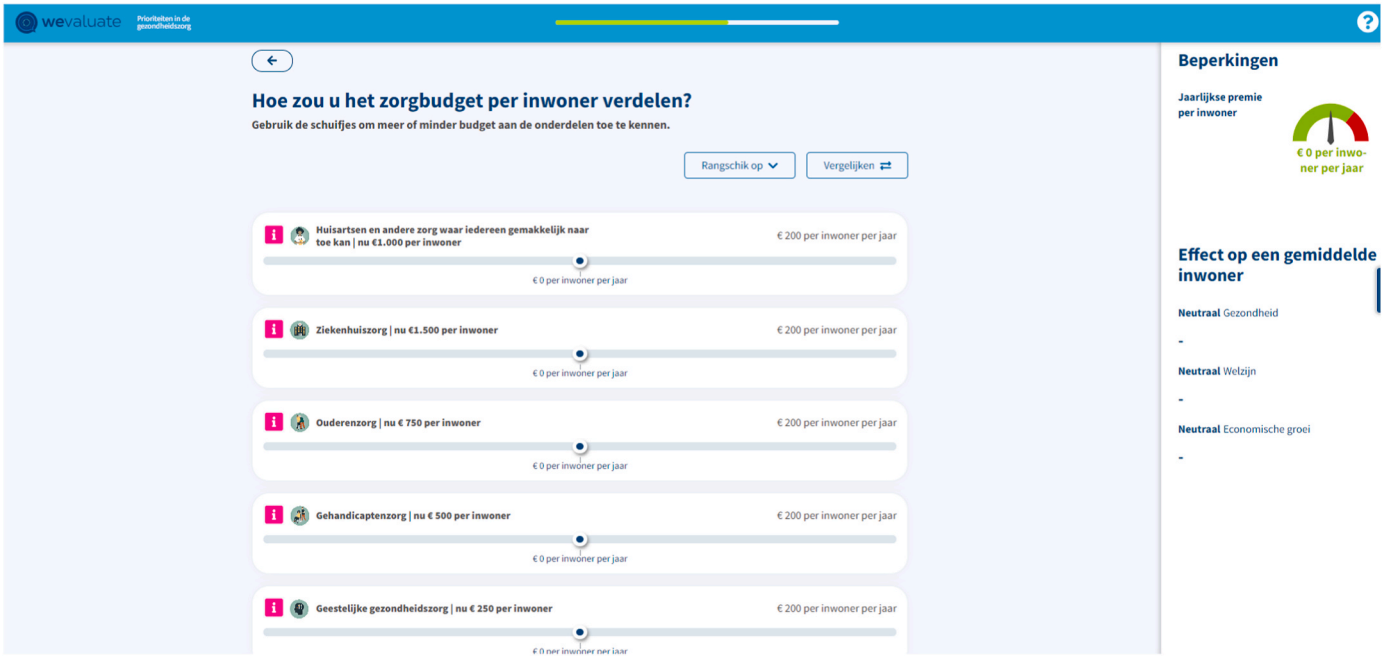

Fig. B1. Example of the choice task faced by respondents

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