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## Health Policy Analysis

# Decision-Making Criteria among National Policymakers in Five Countries: A Discrete Choice Experiment Eliciting Relative Preferences for Equity and Efficiency

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### ABSTRACT

**Background:** Worldwide, there is a need for formalization of the priority setting processes in health. Recent research has used the term multicriteria decision analysis for methods that systematically include preferences for both equity and efficiency. The present study compares decision-makers' preferences at the country level for a set of equity and efficiency criteria according to a multicriteria decision analysis framework. **Methods:** Discrete choice experiments were conducted for Brazil, Cuba, Nepal, Norway, and Uganda. By using standardized methods, we elicited preferences for intervention attributes using a individual choice questionnaire. A multinomial logistic regression was applied to estimate the coefficients for all single-policy criteria, per country. Attributes were assigned to an equity group or to an efficiency group. After testing for scale variance, predicted probabilities for interventions with both types of attributes were compared across countries. **Results:** The Norway and Nepal groups showed considerable prefer-

ences for efficiency criteria over equity criteria with percent change in respective predicted sum probabilities of [10%, –84%] and [6%, –79%]. Brazil and Uganda also showed preference for the efficiency criteria though less convincingly ([–34%, –93%], [–18%, –63%], respectively). The Cuban group showed the strongest preferences with equity attributes dominating efficiency ([–52%, 213%]). **Conclusions:** Group preferences of policymakers show explicit but varying trade-offs of efficiency and equity in these diverse settings. This multicriteria decision analysis approach, using discrete choice experiments, indicates that systematic setting of health priorities is possible across a variety of countries. It may be a valuable tool to guide health reform initiatives. **Keywords:** discrete choice experiment, efficiency, equity, priority setting.

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### Introduction

Worldwide, there is a need for formalization of health priority setting processes at both the national and local levels [1–5]. Too often policy decisions are made without transparency of decision-making criteria, but with implicit trade-offs. Some countries have taken steps toward making the process more transparent such as in the United Kingdom where the coalition government's program on "Freedom, Fairness and Responsibility" reconfirmed the leading role of the National Institute for Health and Clinical Excellence (NICE) to support value-based decisions in health care [6]. With its 15-year-old advanced health priority setting system, which takes an efficiency-based, extra-welfarist approach, the United Kingdom is currently reviewing its threshold cost per quality-adjusted life-year as a reference base for health funding decisions. In low-

and middle-income countries, the decision-making criteria are less formalized. With the adoption of the Millennium Development Goals, developing country governments have made commitments to address major health issues affecting their populaces, in areas of maternal health, child health, and HIV/AIDS. While these goals have been implemented into the health plans of the ministries of health in many developing countries, progress on the Millennium Development Goals has been slow. Making national and local decision-making criteria and values more transparent may be part of a solution toward achieving better health outcomes in an effective manner.

Preference-based techniques provide a tool for mapping the policy environment and have a potential to lead to evidence-based development of policies. Methodologies such as cost-effective analysis have been increasingly used to provide evidence for smarter policy decisions. While cost-effective analysis has been

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useful in the past decade in institutions such as NICE, this methodology carries limitations [7–11]. While the concept of efficiency is incorporated into cost-effective analyses, it does not inherently capture a clinical perspective, such as severity of the disease nor the societal distribution of disease and disability from the policy perspective [7–9]. National agencies, such as NICE, have stated that the formal inclusion of social values in the national policy process may be applied as a result of local interpretation of recommendations, which could lead to variations in regional and district health service delivery [10,11].

In the past decade, systematic techniques have been developed to define the rational basis of allocating health services. This work has coalesced into a subfield of health economics with preference research presenting the methods and feasibility for including equity, efficiency, and other criteria in decision making in a variety of countries and settings [1–3,11–17]. These experiences may show a substantial and important impact of these criteria on decision making based on effectiveness and efficiency [12].

The analysis presented here explores what attributes a diversity of national-level policymakers in five countries find important while formulating plans on the extension and distribution of health care services in environments with constrained resources. We apply a method to analyze the simultaneous use of several criteria based on discrete choice experiments (DCEs) applied in health [14,18,19]. The use of DCEs fits into a broader framework for using evidence for rational priority setting, which is termed multicriteria decision analysis (MCDA) [12,15,20–25]). MCDA findings can illuminate similarities and differences across groups of country decision makers for a more transparent policy process.

The objective of our present study was to describe the decision-making process used by policymakers applying DCEs conducted in multiple country settings using an MCDA framework and present a comparative analysis of the results across countries. In doing so, we group the criteria results in an equity and efficiency category to estimate the relative importance of these two criteria in country health priority settings.

### A Diversity of Country Health Systems

Our sample of five countries explicitly accounts for the diversity in economic development, population size, and state of health care systems across the globe. Countries were selected in which MCDA had been performed by using similar questionnaire designs. Among their national health systems, the countries exhibit much heterogeneity and different levels of sophistication. The countries also vary by the level of gross domestic product (GDP) per capita ranging from very low-income countries such as Uganda and Nepal to the middle-income country Brazil and the high-income country Norway. A brief overview of each country's health system characteristics is provided here.

Nepal is at the lowest end of the scale for GDP and has a national public health service. The country has taken many steps to address the Millennium Development Goals, and the governmental health sector develops both short-term and long-term strategic plans for the improvement of health indicators. The most recent long-term health plan for 1997–2017 explicitly focuses on providing care to its marginalized populations. Uganda receives a large amount of donor support for its health system including substantial funding from the United States' President's Emergency Plan for AIDS Relief program. Classified as a low-income country by the World Bank, Uganda is confronted with high levels of HIV/AIDS and malaria. Despite its significant health problems, under five mortality rates and maternal mortality rates have been steadily declining in Uganda for the past few years. A coordinated effort for health provision in Uganda occurs through the national Health Sector Strategic Planning initiative that involves hospitals, district health centers, and village health teams. While the government

and donors provide many essential health services, Uganda is reliant on out-of-pocket payments and private insurance companies to pay for services.

Cuba's national health system is managed by the Cuban government, which assumes fiscal and administrative responsibility for the funding and delivery of health care to all its citizens. While one may expect stakeholders in health in Cuba to have a preference for equitable distribution of health programs, Cuba also pursues efficiency through one of the most proactive medical training programs in the world. In Brazil, the provision of health care follows multiyear plans developed through the country's Unified Health System. These 4-year plans focus on issues such as reducing child mortality, political organization of the health sector, and consolidation of decentralization of the health care system. The government focuses on primary care provision through the Family Health Program, through collaboration between the national Ministry of Health and individual states. The private sector comprises the majority of the overall services provided in terms of expenditures.

Norway, at the highest end of the GDP scale, has a health system that is completely centralized. The entire population is covered by the national health plan, and it has a well-established financing and service provision system. As with other developed countries, Norway faces a growing issue of how to tailor its health system to a population that is quickly aging.

### Methods

We used a standardized survey with a core set of preference criteria as attributes based on literature reviews and verified by national focus groups before each DCE took place [12,17,26]. Our study identified six primary attributes for the present analysis, which include key criteria used in health decisions. Five attributes each had two levels and one attribute, the age criteria, had three levels. The attributes were disease severity (healthy life expectancy less than 2 years), total beneficiaries (reaching more than 10% of the population), age (reaching groups in low, middle, and upper ages), individual benefits (giving greater than 5 years of full health), willingness to subsidize (propoor, greater than 70% government subsidization), and cost-effective (cost per life-year less than gross national product per capita). These attributes are consistent with those used in previous studies, which have been shown to be important criteria for understanding the preferences when choices are made for prioritizing interventions [1,12]. The parameter definitions remained consistent for all five countries. Nepal data were collected by using slight variations in definitions for the variables, which were modified to allow for an analysis with the other countries. All attribute definitions are detailed in Appendix A as Supplemental Materials found at [doi 10.1016/j.jval.2012.04.001](https://doi.org/10.1016/j.jval.2012.04.001). The research group selected the five countries (Cuba, Brazil, Uganda, Norway, and Nepal) included in this study (L.N. and F.P.), allowing for a large range of health systems and development stages as indicated by GDP and coverage level of the national health system. We follow standardized DCE methodology and have reported individual country studies elsewhere (for a summary, see Baltussen et al. [1]). Table 1 provides a summary of the country respondents and settings including the number of participants and the response rate.

The data collection methodology was standardized across countries. Preparatory workshops and direct self-administered interviews were carried out together with leading local country researchers and organizers from established research institutions. There were up to 80 policymakers per country who participated in this study. A core group for each country was involved in the adaptation and translation of the DCE questionnaire, supervised the implementation of the survey, and chaired the survey and feedback sessions. Respondents took on average 1 hour to complete

**Table 1 – Characteristic country respondents.**

	Brazil	Cuba	Uganda	Norway	Nepal
Number	73	37	17	32	66
Respondent type in health field	Policymakers and professionals	Policymakers and professionals	Policymakers and health experts	Policymakers and professionals	Policymakers and health experts
Sampling frame	National level	National level	National and program level	National level	National and program level
Experience (y)	Junior to senior	Junior to senior	Senior	Mid-level to senior	Mid-level
Response rate (%)	91	97	95	100	100
Setting	Center for Health Economics, São Paulo	Cuban Society for Health Economics, Havana	Uganda National Academy of Sciences, Kampala	Directorate of Health and Public Health Offices, Oslo	Directorate of Health, Kathmandu

Note. Professionals: researchers or medical experts; health experts: medical or public health experts; time period: Nepal 2006; others 2009–2010.

the questionnaire. All surveys were conducted in person according to protocol. Table 1 provides a summary of the country respondents and settings including the number of participants and the response rate. The response rate was high, ranging between 91% and 100% across countries. In each case, the choice experiment was carried out inside each country among groups of relevant policymakers and decision makers involved in national-level decisions. Individuals from countries outside of the sample or with international positions were not included. The specific attributes as described in the Appendix were included in a protocolized experimental design with a high efficiency (99.4%) [1,17,26,27]. To facilitate the consistency of answers, participants in the surveys were further given instructions and coaching on how to answer the questionnaires correctly, both in the group sessions and individually. Collected data were pooled for all countries, and a parameterized heteroskedastic multinomial logit model was fitted to test for the equality of scale (i.e., variance) across countries [28,29]. Subsequently, we tested for the equality of the estimated parameters between models by using a likelihood ratio test [29–31].

To make inferences, we employed the percentage differences

in predicted probabilities [32]. Differences in predicted probabilities take into account the problems with varying levels of the scale attributes and allow comparisons of the five countries [33]. The base scenario (from which differences are calculated) is an option where all attributes take the value of 1 (except for age where upper age is 1) while the other alternatives simulate the effects of selecting interventions based on equity and efficiency.

The attributes were *post hoc* categorized as belonging to either the equity or efficiency realm. The equity category includes criteria for fairness, defined as any criterion dealing with the distributional impact across subpopulations such as age, income level, and severity of disease [12,34]. The category of efficiency, defined as the maximal health gain for the least cost, included attributes of individual health impact, health impact by total number of people, and health impact per cost. Attributes classified for equity were disease severity, age group, and willingness to subsidize, while those classified for efficiency were total beneficiaries, individual benefit, and cost-effectiveness.

By using these common definitions for equity and efficiency, we introduced three hypothetical interventions: one baseline in-

**Table 2 – Model (heteroskedastic MNL) results for six policy criteria, by country.**

	All	Brazil	Cuba	Uganda	Norway	Nepal
Disease severity	0.468 <sup>†</sup> (0.000)	0.501 <sup>†</sup> (0.000)	−0.158 (0.153)	0.698 <sup>†</sup> (0.000)	0.682 <sup>†</sup> (0.000)	0.538 <sup>†</sup> (0.000)
Total beneficiaries	0.354 <sup>†</sup> (0.000)	0.660 <sup>†</sup> (0.000)	−1.032 <sup>†</sup> (0.000)	0.355 <sup>†</sup> (0.012)	0.238 <sup>†</sup> (0.028)	0.484 <sup>†</sup> (0.000)
Target age mid	−0.0705 (0.249)	−0.386 <sup>†</sup> (0.001)	0.810 <sup>†</sup> (0.000)	−0.137 (0.408)	−0.243 (0.133)	0.358 <sup>†</sup> (0.002)
Target age high	−0.453 <sup>†</sup> (0.000)	−0.0928 (0.342)	0.284 <sup>*</sup> (0.051)	−0.719 <sup>†</sup> (0.026)	−0.978 <sup>†</sup> (0.000)	−0.833 <sup>†</sup> (0.000)
Individual benefits	0.451 <sup>†</sup> (0.000)	0.507 <sup>†</sup> (0.000)	−0.258 <sup>†</sup> (0.002)	0.200 (0.222)	0.688 <sup>†</sup> (0.001)	0.579 <sup>†</sup> (0.000)
Propoor (WTS)	0.162 <sup>†</sup> (0.000)	0.0101 (0.926)	0.604 <sup>†</sup> (0.000)	0.221 (0.247)	0.203 (0.110)	0.235 <sup>†</sup> (0.001)
Cost-effectiveness	0.871 <sup>†</sup> (0.000)	1.498 <sup>†</sup> (0.000)	0.150 <sup>*</sup> (0.067)	0.444 <sup>†</sup> (0.002)	0.936 <sup>†</sup> (0.000)	0.510 <sup>†</sup> (0.000)
Scale						
Brazil	0.158 (0.211)					
Cuba	−15.26 (0.977)					
Uganda	−0.235 (0.184)					
Norway	0.126 (0.309)					
Chi-square test equality of scales	5.34 (0.255)					
Log-L	−2047.7	−484.6	−346.7	−148.9	−270.9	−617.9
LR test equality of parameters	357.3 (0.000)					
No. of observations	7178	2126	1144	518	1024	2366
No. of individuals	225	73	37	17	32	66

Note. P values in parentheses. LR test calculated as  $-2[LL_{\text{Pooled}} - (LL_{\text{Brazil}} + LL_{\text{Cuba}} + LL_{\text{Uganda}} + LL_{\text{Norway}} + LL_{\text{Nepal}})]$ . LR, likelihood ratio; MNL, multinomial logit; WTS, willingness to subsidize.

\*  $P < 0.1$ .

†  $P < 0.05$ .

‡  $P < 0.01$ .

**Table 3 – Country equity and efficiency preference results.**

	Intervention	Log odds of selection	Probability of selection	Percentage difference of predicted probabilities (in reference to the base intervention) (%)
<b>Brazil</b>				
Base	S0	3.08	0.56	
Equity	S1	0.42	0.04	–93
Efficiency	S2	2.67	0.37	–34
<b>Cuba</b>				
Base	S0	–0.41	0.16	
Equity	S1	0.73	0.51	213
Efficiency	S2	–1.14	0.08	–52
<b>Uganda</b>				
Base	S0	1.20	0.40	
Equity	S1	0.20	0.15	–63
Efficiency	S2	1.00	0.33	–18
<b>Norway</b>				
Base	S0	1.77	0.41	
Equity	S1	–0.09	0.06	–84
Efficiency	S2	1.86	0.45	10
<b>Nepal</b>				
Base	S0	1.517	0.40	
Equity	S1	–0.06	0.08	–79
Efficiency	S2	1.57	0.43	6

tervention (with all attributes equal to 1), a second with all attributes for efficiency equal to 1 (and all equity attributes equal to 0), and a third intervention with all equity attributes equal to 1 (and all efficiency attributes equal to 0). These three interventions (baseline, efficiency, and equity) are shown in Table 3 as S0, S1, and S2.

By applying these reference interventions, we calculated the predicted probability of selection for the baseline intervention and then for the subsequent interventions with qualities of either equity or efficiency. The difference between the predicted probabilities for the equity-only and efficiency-only interventions and that of the baseline intervention is taken by simple subtraction and then the percentage change is calculated with respect to the baseline predicted probability. Using this approach, the magnitude of the contribution of the equity and efficiency components is assessed, indicating the implicit willingness to trade-off equity and efficiency. To ease the interpretation of this trade-off, we present an equity-efficiency frontier by plotting the extreme values {1,0} and {0,1}, and fit a logarithmic curve for the frontier [35].

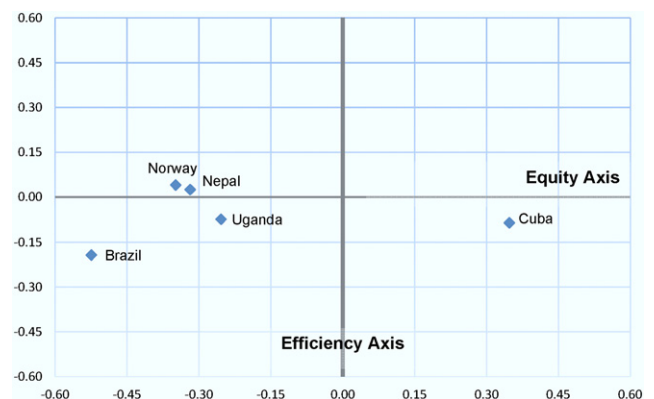
**Results**

On the basis of the heteroskedastic multinomial logit and the subsequent likelihood ratio test, we find that variance scale is not a problem in the sample of countries, and we can safely ignore its effects. The results for one country—China—did not pass this test and were excluded from the comparison. Table 2 presents the estimation results by country. The results show that preferences appeared relatively consistent across the diversity of country health systems. Significant decision-making criteria (at P = 0.05 or below) in Brazil were disease severity, total beneficiaries, middle age group, individual benefits, and cost-effectiveness. Cuba selected criteria for total beneficiaries, middle age group, individual benefit, and willingness to subsidize as important. Uganda showed significant preferences for disease severity, total beneficiaries, upper age group, and cost-effectiveness. All criteria except middle age group and willingness to subsidize were significant in Norway, while all criteria weights were significant in Nepal.

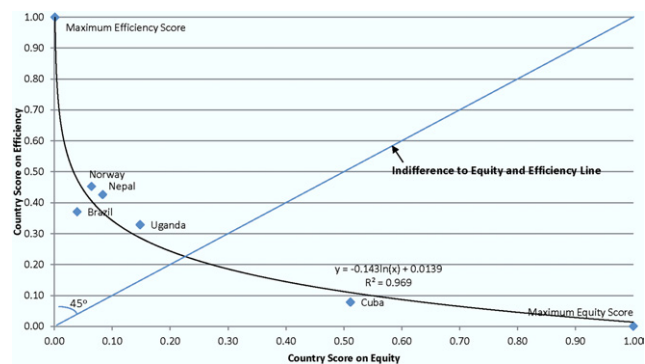
Some notable findings are the large positive preferences for cost-effective interventions in Brazil and Norway, which contrib-

ute to the preference for efficiency in these countries. Cuba showed large positive preferences for the middle age group and willingness to subsidize and negative preferences for total beneficiaries and individual benefit, all contributing to the preference for equity. Nepal gave positive weights for all factors except for the upper age group criterion, which was negative. The most important criteria preferences that this group prefers were disease severity and individual health gains. By the nature of the scaling method, one cannot directly compare the country results in Table 2 across countries; however, we can make conclusions on the preferences for equity compared with efficiency within each country.

Table 3 shows the predicted probabilities by country when comparing baseline probability values with the equity-only and efficiency-only interventions and the percentage differences. The absolute differences are depicted in Figure 1 and give the marginal preference levels for interventions with either all-equity or all-efficiency criteria compared with the baseline. This figure shows that Cuba exhibits a highly positive preference for equity and is ready to give up on efficiency when doing so, as shown by the placement in the southeast quadrant of Figure 1. Among the other countries, Norway shows a trade-off for efficiency over equity, shown by the placement in the northwest quadrant. Brazil, Nepal,



**Fig. 1 – Country differences in probability of selection for interventions of efficiency and equity.**



**Fig. 2 – Efficiency-equity country frontier of maximum sum scores on efficiency (y-axis) and equity (x-axis).**

and Uganda all show that the baseline intervention is the most preferred, being placed in the southwest quadrant; however, the small distances from the efficiency axis for all three countries means that efficiency is only slightly preferred over equity.

In Figure 2, the equity and efficiency probabilities of selection from Table 3 were mapped onto an equity–efficiency frontier [35]. The country scores show that all the countries exhibit stronger preferences for efficiency over equity, except for Cuba, where the opposite is true. This is visualized by noting that all the countries except Cuba are located above the 45° line, where the line represents an indifferent preference between equity and efficiency. The curve shows the maximum levels of equity and efficiency that are achievable given the measured preferences for each country group.

## Discussion

Four of the five countries that we studied demonstrated a preference for efficiency over equity. While there can be many reasons for this, it likely relates to the characteristics, in particular the attitudes, of the included groups of policymakers and how they perceived existing levels of efficiency and equity within their existing national health systems. Our results suggest that in addition to the efficiency criteria examined here, further criteria of fairness seem to play an additional but varying role in health decisions in these countries.

The past 10 years have shown methodological progress in addressing these trade-offs in specific policy decisions as exemplified by the role of NICE in the United Kingdom [11,18]. Ongoing debates are taking place on the relative balance between fairness and equity, as we reported for Norway [36]. Up to this point, the importance of achieving efficiency at the national level often overrides concerns for equity and other policy imperatives at the regional and local levels. Our study presents insights into the minds of a diversity of decision makers, presented to formalize the weighing of criteria in a deliberation process. Further studies of other countries are required to expand the data set and to analyze it in terms of income, relevant socioeconomic characteristics, and geography. As future work is conducted, we recommend that decision-making prioritization approaches present a balance between equity and efficiency. Balancing on these two characteristics, as we have done, would ensure that an optimal level of equity and efficiency is achieved when making decisions related to health provision.

The limitations of our methodology come primarily from the aggregation of individual country scores and the inevitably limited sample of countries. These stem from conducting choice experiments in a uniform manner between countries, which may have

varying interpretations of attribute definitions. There are naturally going to be variations in the time, space, and procedure for conducting this experiment in diverse settings that limit the ability to draw robust generalizable comparisons. This is inherent to the nature of this type of study and limits the direct comparability of the results between countries. There is also evidence that suggests that health decisions may take into account more factors beyond equity and efficiency [26,36]. Our study focuses on criteria classified into either equity or efficiency; however, if other operational factors influence decision making in a significant manner, then our model will be underspecified. Future work should build on our approach and measure preferences for other system-level characteristics that may be identified as important to decision makers [17,26,37]. Another limitation may be that our methodological approach used a *post hoc* classification of attributes and changes in the predicted probabilities of simulated interventions to account for heterogeneity in the data. In future work, explicit concepts of equity and efficiency can be directly calibrated among the interview participants at the beginning of the study to ensure congruence of definitions and alternative preference elicitation methods such as best-worst scaling method, which can address scaling problems of both the variance and the levels, should be attempted [38].

Given our consistent findings across the national groups of policymakers and their face validity, one could argue in favor of a more explicit use of MCDA in policymaking, while aiming at a more transparent process. This may also be the case for older nationalized health systems such as the United Kingdom, especially at local commissioning levels, where decisions are taken with regard to multiple criteria and where MCDA is now under wider consideration at a national level [11]. When a country decides to design packages for health interventions or to evaluate health system efforts in terms of equity and efficiency, an MCDA may be a valuable tool within the formal context of a deliberative process. Explicitly stated preferences may assist stakeholders at all levels to make difficult decisions by considering various trade-offs. DCE results provide an insightful point for further studying and formalizing the rationales of decision makers and, in addition, may contribute to further development of a rational policy process.

Our results confirm that there are measurable preference differences in relation to equity and efficiency criteria across countries. While this may seem like an obvious result, it is worth exploring where commonalities and differences exist. Many global health initiatives operate across the globe in support of countries that cannot yet support their own health systems and may apply the same assumptions and processes across countries. Better understanding of local preferences with respect to equity and efficiency may improve the acceptability and performance of international health programs. Monitoring these preferences over time, perhaps at 5- to 10-year intervals, may also help reflect the relationships between health, economic growth, and preferences. Although this will vary to some degree, those with leading roles in the political system in place in a certain time period will moderate the outcomes; the explicit approach may provide greater clarity on the stability and validity of these preferences. Greater use of MCDA in health priority setting would likely make national decisions more transparent and perhaps more rational and allow countries to characterize their efficiency and equity trade-offs in a manner that is consistent with their level of development and societal preferences.

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## Supplemental Materials

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