Baji, P., García-Goñi, M., Gulácsi, L., Mentzakis, E. and Paolucci, F. (2016) Comparative analysis of decision maker preferences for equity/efficiency attributes in reimbursement decisions in three European countries. The European Journal of Health Economics, 17 (7). pp. 791-799.

The final version of the manuscript was published as: Baji P, García-Goñi M, Gulácsi L, Mentzakis E, Paolucci F.: Comparative analysis of decision maker preferences for equity/efficiency attributes in reimbursement decisions in three European countries. Eur J Health Econ. Online first: 2015 Aug 22. pp.1-9 Available at: http://link.springer.com/article/10.1007%2Fs10198-015-0721-x

Comparative analysis of decision maker preferences for equity/efficiency attributes in reimbursement decisions in three European countries

Authors:

Petra Baji*, Department of Health Economics, Corvinus University of Budapest, Hungary, Affiliate Fellow at CERGE-EI, Prague, The Czech Republic. Address: Fővám tér 8. Budapest 1093, Hungary. E-mail: petra.baji@uni-corvinus.hu. Phone: +36 1 482-5147.

Manuel García-Goñi, Departamento de Economía Aplicada II; Universidad Complutense de Madrid, Spain. E-mail: mggoni@ccee.ucm.es

László Gulácsi, Department of Health Economics, Corvinus University of Budapest, Hungary. Address: Fővám tér 8. Budapest 1093, Hungary. E-mail: laszlo.gulacsi@uni-corvinus.hu

Emmanouil Mentzakis, Economics Department, School of Social Sciences, University of Southampton, UK. Address: University of Southampton, Southampton, SO17 1BJ, United Kingdom. E-mail: e.mentzakis@soton.ac.uk

Francesco Paolucci, University of Bologna, Italy, & Murdoch University, Australia. Address: 90 South Street, Murdoch, Western Australia 6150. E-mail: F.Paolucci@murdoch.edu.au

*Correspondent author

Acknowledgement: The authors are grateful for Georg Rubiko, University of Innsbruck, Austria, Prof. Terje P. Hagen, Department of Health Management and Health Economics, University of Oslo, Norway. Dr. Márta Péntek, Department of Health Economics, Corvinus University of Budapest, Hungary, Dr. Valentin Brodszky, Department of Health Economics, Corvinus University of Budapest, Hungary for their assistance in the data collection.

Petra Baji was supported by the Hungarian Scientific Research Fund OTKA (PD 112499). Manuel García-Goñi's research was supported by the research project Evaluating Preferences for Equity and Efficiency among National/Regional Health Policy Makers" financed by the Spanish Instituto de Estudios Fiscales.

Abstract

Background: In addition to cost-effectiveness, national guidelines often include other factors in reimbursement decisions. However, weights attached to these are rarely quantified, thus decisions may strongly depend on decision-maker preferences.

Objective: To explore the preferences of policymakers and healthcare professionals involved in the decision-making process for different efficiency and equity attributes of interventions and analyse cross-country differences.

Method: Discrete choice experiments (DCEs) were carried out in Austria, Hungary, and Norway with policymakers and other professionals working in the health industry (N=153 respondents). Interventions were described in terms of different efficiency and equity attributes (severity of disease, target age of the population and willingness to subsidize others, potential number of beneficiaries, individual health benefit, and cost-effectiveness). Parameter estimates from the DCE are used to calculate the probability of choosing a healthcare intervention with different characteristics, and to rank different equity and efficiency attributes according to their importance.

Results: In all three countries, cost-effectiveness, individual health benefit and severity of the disease are significant and equally important determinants of decisions. All countries show preferences for interventions targeting young and middle age population compared to those targeting population over 60. However, decision-makers in Austria and Hungary show preferences more oriented to efficiency than equity, while those in Norway show equal preferences for equity and efficiency attributes.

Conclusion: We find that factors other than cost-effectiveness seem to play an equally important role in decision-making. We also find evidence of cross-country differences in the weight of efficiency and equity attributes.

Key words: priority setting, equity-efficiency trade-off, discrete choice experiment, reimbursement

JEL codes: D63, D71, I18

1. Introduction

In most developed countries reimbursement decisions are based on national guidelines, where cost-effectiveness of interventions (usually measured as the incremental cost-effectiveness ratio, ICER) plays a central role. However, in real-life reimbursement decisions, factors other than cost-effectiveness are also considered in an effort to better reflect societal preferences. Based on an analysis of past reimbursement decisions of the National Institute for Health and Care Excellence (NICE) in the UK, a recent study showed that the actual cost-effectiveness threshold for reimbursement is higher than the stated threshold of £20K–£30K per QALY due to other factors entering the decision making process. [1]. Attributes, such as the potential number of beneficiaries, the severity of disease, the individual health benefit of the intervention are explicitly specified in some reimbursement regulations or recommendations [2,3]. Recently, the WHO has proposed a check-list, i.e. Priority Setting in Health Care (GPS-Health), for the incorporation of various equity criteria in decision making [4]. However, clear guidance of the relative importance of such factors, and the weights attached to them, are rarely quantified [1,5].

In the absence of rational and transparent approaches to priority setting, decisions are partly made based on ad-hoc priority settings [6-9]. With the preferences of decision makers playing an important role in decisions, several studies have attempted to elicit policy makers' preferences in recent years [10-15]. The novel aspect of the present paper is a comparative analysis of European countries which has been missing from the literature.

The aim of this study is to explore and compare preferences of health care actors involved in the decision making process (policy makers, professionals and researchers), for different attributes of health care interventions in Austria, Hungary and Norway. These countries differ in their level of economic development, and in the organization of their health care systems. Data from OECD Health Data (2014) place Norway and Austria among the countries with the highest health expenditure per capita and health expenditures as a proportion of GDP (Norway 4,810 USD PPP and 9.3% of GDP; Austria 4,033 USD PPP and 11.1% of GDP), whereas Hungary spends much less on health care in both absolute and relative terms (1358 USD PPP and 8.0% of GDP). Regarding the participation of the public sector, Norway has the most expanded public healthcare system, with 88% of total healthcare expenditures being public, followed by Austria (76%) and Hungary (63%). Furthermore, Norway has a decentralized tax-based national health care system with universal coverage under the responsibility of both municipalities (primary care) and national governance (specialist care), while Austria follows a universal social health insurance (SHI) model, and similar to Hungary's mandatory social health insurance mechanism. However, with respect to financing, Hungary is closer to an NHS model, as health insurance contributions are administered by a single health insurance payer, the Health Insurance Fund Administration (NHIFA).

According to Austrian Social Insurance Law (Allgemeines Sozialversicherungsgesetz, 1955), the reimbursement decisions of the Main Association of Austrian Social Security Institutions and the reimbursement recommendations of the Pharmaceutical Evaluation Board should be based on: (a) a pharmacological analysis (comparison with therapeutic alternatives and perceived degree of innovation), (b) a medical-therapeutic evaluation (target patient group, effectiveness, expected duration and treatment frequency) and (c) economic considerations (including budget impact and PE evidence) [16]. Furthermore, to prescribe drugs, which fall in the category of "subsidized only under certain conditions"[1], physicians need to receive a reimbursement approval from the "head physician" of the sickness fund [17,16].

In Hungary, reimbursement decisions are made by the NHIFA based on the recommendation of the Health Technology Assessment Committee [3]. Drug-related reimbursement decisions should be based on evidence-based effectiveness and safety, budget impact and cost-effectiveness of the intervention, the size and distribution of the target population and the severity of the disease. In 2010, the former Ministry of Health developed an explicit priority scoring system for use by the NHIFA in the evaluation of new hospital medical technologies. The list, described in the decree of Ministry of Health Nr. 28/2010 (released 12/05/2010), includes quantified weights for 15 items classified in six categories[2] [18,3,19]. Technologies are eligible for financing if they receive at least 60 points out of a possible 100 and at least 40% of the achievable points in all six categories. However, the recommendations and results of the appraisals are not publicly available, making it difficult to evaluate whether the official criteria are consistently used during decision making [20,3].

In Norway, the Norwegian Patient Rights Act of 2001 identifies three prioritizing rules for reimbursement decisions, (a) the severity of the condition (most need first), (b) expected health outcome, and (c) proportionality between need and treatment (using cost-effectiveness analysis) [10]. In 2007, the Council for Quality Improvement and Priority Setting was established with advisory function in issues pertaining to quality and priorities in the health services [10,21].

Through a comparative analysis of the three countries, we explore decision maker preferences for different equity and efficiency attributes of health care interventions using a discrete choice experiment (DCE). DCE enable us to quantify the weights of different attributes of health care interventions in decision making. The complexity of the DCE reflects the multi-dimensional real life decisions that policy makers face in their daily practice.

2. Method

2.1 Discrete choice experiment and design

DCE is a frequently used stated preference method to value health care programs [22]. Respondents must choose between pairs of hypothetical health care interventions. Based on their choices, one can elicit preferences, predict probabilities of choosing a given intervention, and hence examine the effect that changes in intervention characteristics have on choices. In this study, interventions were described in terms of different efficiency and equity characteristics (i.e. attributes) that were defined in past studies [8,23,24]. Attributes were selected through two literature reviews [25,26] and adaptations proposed in focus groups of health programmers and experts. Use of a standardized and validated framework ensured consistency and cross-country comparability. Equity attributes consisted of the severity of disease (severe, not severe), the target age of the population (young, middle, elderly) and willingness to subsidize others (less or more than 70% of the costs covered by public resources). Efficiency attributes involved the potential number of beneficiaries (less or more than 100,000), the individual health benefit

[1] The Main Association of Austrian Social Security Institutions) based on the recommendations of the Pharmaceutical Evaluation Board classify the drugs into three different reimbursement categories: red, green and yellow boxes.

[2] a, Priorities of the health care system b, severity of the disease, c, equity (size of the target population, accessibility)d, cost-effectiveness and quality of life (ICER, health gain per patient) e, budget impact, f, opinions from Hungary and abroad.

of the intervention (less or more than 5 years of full health) and the cost-effectiveness of the intervention (cost-effective, not cost-effective with the cost per DALY threshold of one time GDP per capita)[3]. The definitions of attributes and attribute levels are presented in Table 1. Sawtooth Software was used to select 32 alternatives from the full fractional design (96 profiles) which led to 16 pair-wise choices ensuring level balance and near orthogonality.

2.2 Data collection

The same type of survey was conducted in all three countries.[4] The questionnaires were translated into the respective native languages (and back translated to verify accuracy) and administered online with potential respondents invited to participate either through personal communication, open invitation emails or snowballing. In all three countries policy makers were primarily targeted: 1) senior staff members at various political and legislative decision making levels, and executives of national research and planning institutions for health care in Austria; 2) policy makers and professionals at national and regional institutions in Hungary[5] and 3) senior members of the Norwegian Directorate of Health and senior public health academic officials in Norway. In addition, the target population also involved leaders of individual health care providers, professionals working in the pharmaceutical industry or consultancy field as well as researchers and health care academics, whose opinion is potentially or indirectly considered in reimbursement decisions. For Austria, only direct invites were sent, resulting in a response rate of 15%. For Hungary (directed open invites with a target of 50 respondents) and Norway (directed open invites and snowballing) make response rate calculation impossible. In total 153 questionnaires were returned (Austria: 69, Hungary: 52 and Norway: 32), providing a sufficiently large sample for estimation and validity purposes [27].

2.3 Model

DCEs are based on random utility theory. Respondents choose the intervention that maximizes their utility, with utility weights attached to the attributes characterizing the intervention. Assuming a linear additive utility and extreme value type I errors, conditional logits were estimated [28] in the same way as in previous studies [24]. First, a heteroskedastic conditional logit is fitted to test for the equality of error variances (or scale parameters), in order to ensure comparability of estimated preference weights across the three samples. [29]. Second, conditional logit models are estimated separately for the three countries and also for the pooled sample. Observed heterogeneity is included in the models through two-way interactions of all attributes with individual characteristics. The final model specifications are determined through backwards selection (at 0.10 significance level). Third, the significance of unobserved heterogeneity is tested by specifying mixed logits with random normally distributed parameters and by comparing their fit against conditional logit models [30].

Following the estimation of coefficients, marginal effects of attributes are calculated to allow for meaningful comparisons of preferences across attributes and countries [31]. To examine the efficiency/equity trade-offs present in decision making and to obtain a measure of their magnitude,

[3] DALY was chosen to define the cost-effectiveness threshold in this study, since the same standardized questionnaire was used previously in lower and middle income countries such as Brazil, Cuba, Nepal, and Uganda [24], where cost-effectiveness thresholds are mostly set by DALYs [32].
[4] Norwegian and Austrian data were presented separately in previous studies [10,12]. Norwegian data was also used in Mirelman et al., in a cross-country comparison of Brazil, Cuba, Nepal Norway and Uganda.
[5] E.g. National Health Insurance Fund, Ministry of Human Resources, National Institute for Quality and Organizational Development in Healthcare and Medicines.

purely equitable and purely efficient[6] hypothetical interventions are formed and their selection probabilities calculated. Taking the ratio of such probabilities and subtracting one provides an efficiency/equity ratio with a natural interpretation (i.e. the percentage increase in utility from choosing an efficient over an equitable intervention) [12]. The three mutually exclusive levels of age of target group necessitate different calculations for each of its levels.

3. Results

Descriptive statistics for each sample and overall are presented in Table 2. Correlations between variables were tested. Correlations between most pairs of attributes are zero (or close to it) as the DCE design was developed to ensure level balance and near orthogonality. Regarding correlations between individual socio-economic characteristics (i.e. gender, age, profession) again they were relatively low (i.e. <0.2). As such, multicollinearity would not seem to be a concern for our analysis.

The results from the heteroskedastic logit[7] regression revealed that the assumption of homoscedasticity across the three samples was valid and that separability was therefore possible. Similarly, conditional logit models outperformed mixed logit models according to BIC values.[8] Table 3 presents the conditional logit results, while predicted probabilities and ratios of predicted probabilities are given in Table 4.

Severity of disease was one of the most important factors (based on marginal effects presented in Table 4) in all three countries with interventions targeting severe diseases having increased probabilities of selection by 6.9% (95% CI: 3.7 – 10.1), 8.2% (95% CI: 5.0 – 11.4) and 12.1% (95% CI: 5.5 – 18.6) for Hungary, Austria and Norway, respectively. Interventions targeting young and middle age population are highly preferred over interventions targeting elderly population (over 60), a result that holds across all countries. Compared to the base scenario interventions targeting populations over 60 are less likely to be chosen by 16.5%, 14.0% and 19.0% in Austria, Hungary and Norway, respectively, while the coefficients for interventions targeting middle aged population are all statistically nonsignificant. Willingness to subsidize others is significant for Norway, where the high levels of subsidization have a positive and significant effect of 7.2%, whereas the corresponding parameter is insignificant for Austria and Hungary.

Regarding efficiency attributes, Individual health benefits and Cost-effectiveness of interventions strongly influence decisions in all three countries. Marginal effects were 13.7%, 8.0%, and 8.9% for Austria, Hungary and Norway, while the corresponding values for cost-effective interventions were 8.1%, 8.5%, and 6.9%, respectively. The average effect of the number of potential beneficiaries is positive and significant for Austria (6.8%), but not significant for Hungary and Norway.

Looking at the interactions with individual characteristics (Table 3), we find significant differences between preferences of different socio-demographic groups. Cross-country patterns do not emerge with the exception of cost effectiveness having a relatively higher influence on the decisions of researchers compared to those of other stakeholders. Overall, men tend to place a reduced weight for some attributes in Austria and Hungary. Respondent age is found to be influential only for Norway, where severity and willingness to subsidize others are less important in decision making for respondents under 40. Moving onto respondents' occupation, we find significant heterogeneity in preferences. In Hungary, respondents

[6] Purely equitable and purely efficient interventions are those where all equity attributes are set to one (with all efficiency attributes to zero) and those where all efficiency attributes are set to one (with all equity attributes to zero), respectively.
[7] Results are available from the authors upon request.
[8] Results are available from the authors upon request.

from the pharmaceutical industry and consultancy field value cost-effectiveness, and subsidized interventions targeting high number of potential beneficiaries more than policy makers. Researchers place more weight on severity in Hungary and less weight on willingness to subsidize others in Norway, while healthcare professionals assign less weight on severity than policy makers in Austria.

Regarding the pooled model (last column in Table 3), findings remain the same with signs and magnitudes largely comparable. Results suggest that preferences are consistent across the countries, while most interaction terms maintain their significance.

The lower half of Table 4 presents the efficiency/equity ratios. Austria and Hungary have a clear preference for efficiency over equity while for Norway the two are almost equally important for healthcare actors. For example, in Austria and Hungary the probability of choosing the "purely efficient profile" is 47.7% and 37.4% higher than choosing the "purely equitable profile" for interventions targeting young population, while in Norway there is a nonsignificant difference of 7.4%. The same is true for interventions targeting middle-aged populations. Furthermore, equity seems to be more important when considering interventions for young populations than it is for elderly population in all three countries. The probability of choosing the purely efficient profile compared to the purely equitable profile is higher for interventions targeting the elderly populations than for interventions targeting the young population (i.e. 90.4% vs. 47.7% in Austria, 71.8% vs. 37.4% in Hungary and 16.9% vs. 7.4% in Norway). However, the equity/efficiency ratio for the elderly targeting interventions is estimated with a lot of uncertainty implying insignificant differences.

4. Discussion and conclusion

The need for achieving efficiency gains (either due to scarcity of resources or to control increasing health expenditure) has underlined the need for priority setting even in developed high-income countries. Although national guidelines may recommend considering various attributes during the decision making process, no methodology is currently available to order preferences and help policy makers to choose the interventions that are most highly regarded by society. The weights attached to different intervention attributes are rarely quantified in guidelines, which results in ad-hoc decisions [8,1]. This paper offers a comparative analysis of efficiency and equity preferences of decision makers from three European countries (Austria, Hungary and Norway) with different health care systems.

European cross-country comparisons have been missing from the literature, with most studies focusing on a single country and league table of interventions [10,12]. Although the results obtained for each country in our study, some generalizable results also emerge. Interventions targeting the elderly are favoured less than interventions targeting young and middle-aged populations. Similar conclusions were reached in previous studies focusing on both general population or policy makers as well, e.g. [8,33]. Further, for all three countries, equity attributes seem to be more important when considering interventions targeting the young population than interventions targeting elderly.

Cost-effectiveness, individual health benefit and severity of disease are significant and equally important determinants of decisions, justifying the need for factors other than cost-effectiveness to be taken into account in reimbursement decisions. On the other hand, the size of the target population has a relatively small influence on choices, in contrast to priority setting guidelines which often consider this as an important factor. Willingness to subsidize others was a significant attribute only for Norway, where the share of public financing in total health care expenditure is the highest among the three countries.

Furthermore, there is some heterogeneity in preferences according to the respondents' profession, with policy makers in Hungary and Norway placing lower weight on the cost-effectiveness of an intervention than other healthcare actors. Such discrepancies in preferences are important to consider, since they might lead to a lack of consensus in reimbursement decisions.

Finally, we quantified the preference for equity attributes over efficiency amongst healthcare actors. Although more research is needed in this area, significant relationships between health care systems and preferences for efficiency and equity were observed. With Austria and Hungary closer culturally, geographically and in terms of health systems structure showing preference towards efficiency, whereas Norway, with a tax-based national health care system displays a balanced preferences for both, efficiency and equity. Our findings confirm recent Hungarian guidelines which put relatively more weight on attributes considered as 'efficiency attributes' (e.g. incremental cost-effectiveness ratio, individual health benefit and size of target patient population together represent 38% of the maximum attainable score compared to severity of the disease, which represents only the 15% of the total scores) [3].

Our study targeted decision makers, professionals in the health care system, who are directly or indirectly involved in reimbursement decisions. The text of the questionnaire was formulated accordingly. However, several previous studies have shown, policy maker preferences do not necessary reflect the preferences of the general public [34]. It is possible that policy makers have a stronger efficiency orientation than the general population due to a strong cost-effectiveness orientation in policy debates. Although, we found that even for policy makers, other factors than cost-effectiveness, such as disease severity and individual benefit of interventions, were equally considered in decision making.

Our analysis is not without its limitations. Our samples are potentially not representative of decision makers in the three countries. The aim was to incorporate different health care actors, who are involved in decision making, but this results in some heterogeneity across the samples. However, systematic variation in underlying preferences was examined by including heterogeneity (by age, sex and occupation) in the model. Secondly, study population in Hungary did not include healthcare professionals but professionals from the pharmaceutical industry and consultancy, which might explain the stronger preferences for efficiency attributes seen in Hungary; the observed differences between countries may be related to this differences in the composition of study population. Small differences in the data collection methods in the three countries (snowball technique in Hungary and Norway vs direct invitations in Austria) might weaken comparability across samples, although formal testing revealed no evidence of heteroscedasticity. It is possible that the use of small samples (relevant for the whole sample, but especially for Norway) might have reduced the statistical power (i.e., the ability to identify relationships that truly exist). However, the problems of low power are only relevant when significant effects cannot be identified, which does not seem to be the case in our study. Lastly, our design required some necessary assumptions of independence, comprehensiveness and exclusiveness of the selected attributes, which might not be satisfied in real-life settings.

In conclusion, it is crucial to explore decision maker preferences, since, in the absence of explicit priority setting guidelines, implicit preferences might strongly influence reimbursement decisions. We find that factors other than cost-effectiveness (e.g. the severity of the disease, the target age of the population, or the size of the individual health) play an equally important role in decision making. We also find evidence of some cross-country differences in the weight of efficiency and equity attributes. However further research is needed to compare decision maker preferences with the societal ones.

References

1. Dakin, H., Devlin, N., Feng, Y., Rice, N., O'Neill, P., Parkin, D.: The Influence of Cost-Effectiveness and Other Factors on Nice Decisions. Health Econ (2014).
2. Sabik, L.M., Lie, R.K.: Priority setting in health care: Lessons from the experiences of eight countries. Int J Equity Health **7**, 4 (2008).
3. Gulacsi, L., Rotar, A.M., Niewada, M., Loblova, O., Rencz, F., Petrova, G., Boncz, I., Klazinga, N.S.: Health technology assessment in Poland, the Czech Republic, Hungary, Romania and Bulgaria. Eur J Health Econ **15 Suppl 1**, S13-25 (2014).
4. Norheim, O.F., Baltussen, R., Johri, M., Chisholm, D., Nord, E., Brock, D., Carlsson, P., Cookson, R., Daniels, N., Danis, M., Fleurbaey, M., Johansson, K.A., Kapiriri, L., Littlejohns, P., Mbeeli, T., Rao, K.D., Edejer, T.T., Wikler, D.: Guidance on priority setting in health care (GPS-Health): the inclusion of equity criteria not captured by cost-effectiveness analysis. Cost Eff Resour Alloc **12**, 18 (2014).
5. Rawlins, M., Barnett, D., Stevens, A.: Pharmacoeconomics: NICE's approach to decision-making. Br J Clin Pharmacol **70**(3), 346-349 (2010).
6. Green, C., Gerard, K.: Exploring the social value of health-care interventions: a stated preference discrete choice experiment. Health Econ **18**(8), 951-976 (2009).
7. Baltussen, R., Niessen, L.: Priority setting of health interventions: the need for multi-criteria decision analysis. Cost Eff Resour Alloc **4**, 14 (2006).
8. Baltussen, R., Stolk, E., Chisholm, D., Aikins, M.: Towards a multi-criteria approach for priority setting: an application to Ghana. Health Econ **15**(7), 689-696 (2006).
9. Marsh, K., Lanitis, T., Neasham, D., Orfanos, P., Caro, J.: Assessing the value of healthcare interventions using multi-criteria decision analysis: a review of the literature. Pharmacoeconomics **32**(4), 345-365 (2014).
10. Defechereux, T., Paolucci, F., Mirelman, A., Youngkong, S., Botten, G., Hagen, T.P., Niessen, L.W.: Health care priority setting in Norway a multicriteria decision analysis. BMC Health Serv Res **12**, 39 (2012).
11. Koopmanschap, M.A., Stolk, E.A., Koolman, X.: Dear policy maker: have you made up your mind? A discrete choice experiment among policy makers and other health professionals. Int J Technol Assess Health Care **26**(2), 198-204 (2010).
12. Mentzakis, E., Paolucci, F., Rubicko, G.: Priority setting in the Austrian healthcare system: results from a discrete choice experiment and implications for mental health. J Ment Health Policy Econ **17**(2), 61-73 (2014).
13. Watson, V., Carnon, A., Ryan, M., Cox, D.: Involving the public in priority setting: a case study using discrete choice experiments. J Public Health (Oxf) **34**(2), 253-260 (2012).
14. Ratcliffe, J., Bekker, H.L., Dolan, P., Edlin, R.: Examining the attitudes and preferences of health care decision-makers in relation to access, equity and cost-effectiveness: a discrete choice experiment. Health Policy **90**(1), 45-57 (2008).
15. Lim, M.K., Bae, E.Y.: Eliciting stated preferences for drugs reimbursement decision criteria in South Korea. Korean Journal of Health Policy and Administration, **19**(4), 98-120 (2009)
16. Buchholz, P.: ISPOR Global Health Systems Road Map. http://www.ispor.org/htaroadmaps/Austria.asp (2009). Accessed 15-10-2014
17. Räpple, T.: Pricing and Reimbursement Handbook. Baker & McKenzie. http://www.bakermckenzie.com/files/Uploads/Documents/Germany/LifeSciences/EuropeanPricingReimbursement.pdf (2011) 15-10-2014
18. Endrei, D., Molics, B., Agoston, I.: Multicriteria decision analysis in the reimbursement of new medical technologies: real-world experiences from Hungary. Value Health **17**(4), 487-489 (2014).
19. Dankó, D.: Health technology assessment in middle-income countries: recommendations for a balanced assessment system. Journal of Market Access & Health Policy **2**(23181), 1-10 (2014).
20. Gulacsi, L., Orlewska, E., Pentek, M.: Health economics and health technology assessment in Central and Eastern Europe: a dose of reality. Eur J Health Econ **13**(5), 525-531 (2012).

21. Ringard, A., Morland, B., Larsen, B.I.: Quality and priorities in the health services. Tidsskr Nor Laegeforen **132**(3), 312-314 (2012).
22. Ryan, M., Gerard, K.: Using discrete choice experiments to value health care programmes: current practice and future research reflections. Appl Health Econ Health Policy **2**(1), 55-64 (2003).
23. Baltussen, R., ten Asbroek, A.H., Koolman, X., Shrestha, N., Bhattarai, P., Niessen, L.W.: Priority setting using multiple criteria: should a lung health programme be implemented in Nepal? Health Policy Plan **22**(3), 178-185 (2007).
24. Mirelman, A., Mentzakis, E., Kinter, E., Paolucci, F., Fordham, R., Ozawa, S., Ferraz, M., Baltussen, R., Niessen, L.W.: Decision-making criteria among national policymakers in five countries: a discrete choice experiment eliciting relative preferences for equity and efficiency. Value Health **15**(3), 534-539 (2012).
25. Noorani, H.Z., Husereau, D.R., Boudreau, R., Skidmore, B.: Priority setting for health technology assessments: a systematic review of current practical approaches. Int J Technol Assess Health Care **23**(3), 310-315 (2007).
26. Youngkong, S., Kapiriri, L., Baltussen, R.: Setting priorities for health interventions in developing countries: a review of empirical studies. Trop Med Int Health **14**(8), 930-939 (2009).
27. Hensher, D.A., Rose, J.M., Greene, W.H.: Applied Choice Analysis: A Primer. Cambridge University Press, Cambridge (2005)
28. McFadden: Conditional logit analysis of qualitative choice behavior. In: Zarembka, P. (ed.) Frontiers in econometrics. pp. 105-142. Academic Press, New York (1974)
29. DeShazo, J.R., Fermo, G.: Designing Choice Sets for Stated Preference Methods: The Effects of Complexity on Choice Consistency. Journal of Environmental Economics and Management **44**(1), 123-143 (2002).
30. Hensher, D., Greene, W.: The Mixed Logit model: The state of practice. Transportation **30**(2), 133-176 (2003).
31. Lancsar, E., Louviere, J., Flynn, T.: Several methods to investigate relative attribute impact in stated preference experiments. Soc Sci Med **64**(8), 1738-1753 (2007).
32. Shillcutt, S.D., Walker, D.G., Goodman, C.A., Mills, A.J.: Cost effectiveness in low- and middle-income countries: a review of the debates surrounding decision rules. Pharmacoeconomics **27**(11), 903-917 (2009).
33. Whitty, J.A., Lancsar, E., Rixon, K., Golenko, X., Ratcliffe, J.: A Systematic Review of Stated Preference Studies Reporting Public Preferences for Healthcare Priority Setting. Patient (2014).
34. Whitty, J.A., Scuffham, P.A., Rundle-Thielsee, S (2009): Public and decision maker stated preferences for pharmaceutical subsidy decisions, in: Applied Health Economics and Health Policy, 9(2): 73-79

Table 1 DCE Attributes and levels

Attribute	Level	Definition
Severity of disease	Not severe	Life expectancy without the intervention **> 2 years** without intervention
	Severe	Life expectancy without the intervention **< 2 years** without intervention
Number of potential beneficiaries	Few	Intervention would reach **< 100,000** individuals
	Many	Intervention would reach **> 100,000** individuals
Age of target group	Young	Intervention target age group between **0 and 14 years old**
	Middle-age	Intervention target age group between **15 and 59 years old**
	Elderly	Intervention target age group **older than 60 years old**
Individual health benefits	Small	Intervention produces **< 5 years** of healthy life per individual
	Large	Intervention produces **> 5 years** of healthy life per individual
Willingness to subsidize	< 70%	**< 70%** of healthcare services expenditures covered through subsidies
	> 70%	**> 70%** of healthcare services expenditures covered through subsidies
Cost-effectiveness	Not C-E	cost per DALY > GDP per capita
	C-E	cost per DALY < GDP per capita

Table 2 Descriptive statistics

	Austria	**Hungary**	**Norway**	**Total**
Male	45 (65.2%)	21 (40.4%)	14 (43.8%)	80 (52.3%)
Age				
Below 40	12 (17.4%)	21 (40.4%)	15 (46.9%)	48 (31.4%)
40 or older	57 (82.6%)	31 (59.6%)	17 (53.1%)	105 (68.6%)
Group				
Policy maker	34 (49.3%)	22 (42.3%)	13 (40.6%)	69 (45.1%)
Researcher	19 (27.5%)	6 (11.5%)	12 (37.5%)	37 (24.2%)
Health care worker	16 (23.2%)	-	7 (21.9%)	23 (15.0%)
Industry	-	24 (46.2%)	-	24 (15.7%)
# of individuals	69 (45.1%)	52 (34.0%)	32 (20.9%)	153 (100.0%)

Table 3 Conditional logit estimation results with individual characteristics interactions

Attributes\countries	**Hungary**	**Austria**	**Norway**	**Pooled**
Equity criteria				
Severity of disease (Severe)	0.753***	0.721***	1.09***	0.753***
	(0.183)	(0.135)	(0.215)	(0.183)
Age of target group: Middle	0.184	0.239	-0.266	0.184
	(0.135)	(0.154)	(0.171)	(0.135)
Age of target group: High	-0.760***	-0.725***	-1.080***	-0.760***
	(0.171)	(0.134)	(0.277)	(0.171)
Willingness to subsidize others (High level)	-0.244*	-0.033	0.606**	-0.244*
	(0.128)	(0.079)	(0.237)	(0.128)
Efficiency criteria				
Number of potential beneficiaries (Many)	0.263*	0.589***	0.249**	0.263*
	(0.156)	(0.091)	(0.119)	(0.156)
Individual health benefits (Large)	0.901***	1.308***	0.766***	0.901***
	(0.133)	(0.199)	(0.199)	(0.133)
Cost-effectiveness (Cost-effective)	0.959***	0.713***	0.581***	0.959***
	(0.196)	(0.102)	(0.208)	(0.196)
Interactions				
Severity of disease * Male	-0.394*	-	-	-0.394*
	(0.226)			(0.226)
Age of target group: Middle * Male	-	-0.555***	-	
		(0.173)		
Individual health benefits * Male	-	-0.660***	-	
		(0.214)		
Number of potential beneficiaries * Male	-0.521***	-	-	-0.521***
	(0.197)			(0.197)
Cost-effectiveness * Male	-0.859***	-		-0.859***
	(0.261)			(0.261)
Severity of disease * Age(respondent)<40	-	-	-0.640***	
			(0.245)	
Willingness to subsidize others * Age(respondent)<40	-	-	-0.434*	
			(0.259)	
Number of potential beneficiaries * Industry	0.519***	-	-	0.519***
	(0.187)			(0.187)
Willingness to subsidize others *Industry	0.561***	-	-	0.562***
	(0.175)			(0.171)
Cost-effectiveness * Industry	0.625**	-	-	0.625**
	(0.285)			(0.285)
Severity of disease * Researcher	0.968**	-	-	0.968**
	(0.385)			(0.385)
Willingness to subsidize others * Researcher	-	-	-0.459*	
			(0.235)	
Cost-effectiveness * Researcher	1.093***	-	1.184***	1.093***
	(0.381)		(0.389)	(0.381)
Severity of disease * Health care worker	-	-0.623***		
		(0.174)		
Number of respondents	52	69	32	153
Number of observations	1658	2208	1024	1658
LogLikelihood	-400.51	-578.46	-249.89	-400.51
Pseudo-R^2	0.3030	0.244	0.296	0.303
Wald Chi^2	118.97***	120.88***	63.68***	118.97***

Clustered standard errors (clustered on individual level) in parentheses; *** p<0.01. ** p<0.05. * p<0.1

Table 4 Predicted probabilities and marginal effects on predicted probabilities

	Hungary		**Austria**		**Norway**	
	Pr (st.err)	**%Δ to base [95% CI]**	**Pr (st.err)**	**%Δ to base [95% CI]**	**Pr (st.err)**	**%Δ to base [95% CI]**
Base case (at mean)	79.5% (4.1%)	-	74.9 (3.5)%	-	74.4% (4.4%)	-
Equity attributes						
Severity of disease	85.0% (3.4%)	**6.9% [3.7 10.1]**	81.1% (3.1%)	**8.2% [5.0 11.4]**	83.4% (3.5%)	**12.1% [5.5 18.6]**
Age of target group: Middle	84.7% (3.9%)	**6.6% [3.7 9.5]**	81.4% (3.1%)	**8.7% [3.9 13.5]**	77.4% (6.1%)	-4.0% [-3.7 11.7]
Age of target group: High	68.3% (6.9%)	**-14.0% [-22.7 -2.0]**	62.5% (6.1%)	**-16.5% [-25.7 -7.3]**	60.3% (8.1%)	**-19.0% [-33.5 -4.5]**
Willingness to subsidize others (High level)	77.4% (5.3%)	-2.6% [-6.9 1.7]	74.6% (4.4%)	-0.4% [-4. 3.4]	79.8% (4.2%)	**7.2% [0.2 14.1]**
Efficiency attributes						
Number of potential beneficiaries (Many)	81.6% (3.8%)	2.6% [-0.9 6.1]	80.2% (3.2%)	**6.8% [4.3 9.4]**	76.7% (4.7%)	3.1% [-0.7 6.8]
Individual health benefits (Large)	85.9% (2.8%)	**8.0% [4.0 12.1]**	85.2% (2.6%)	**13.7% [9.4 18.0]**	81.0% (3.5%)	**8.9% [4.2 13.5]**
Cost-effectiveness (Cost-effective)	86.2% (3.3%)	**8.5% [4.2 12.7]**	81.0% (3.3%)	**8.1% [6.4 9.9]**	79.6% (5.0%)	**6.9% [3.4 10.4]**
Equity/efficiency trade-off	**Pr (st.err)**	**Pr(eff)/Pr(eq)-1 [95% CI]**	**Pr (st.err)**	**Pr(eff)/Pr(eq)-1 [95% CI]**	**Pr (st.err)**	**Pr(eff)/Pr(eq)-1 [95% CI]**
Young						
Equity profile	65.5% (6.5%)		62.1% (4.6%)		79.0% (%)	
Efficiency profile	90.0% (2.1%)	**37.4% [13.6% 61.2%]**	91.6% (1.6%)	**47.7% [27. 68.2]**	84.9 % (3.4%)	7.4% [-4.5 19.3]
Middle-aged						
Equity profile	69.6% (9.2%)		67.5% (6.5%)		74.3% (7.7%)	
Efficiency profile	91.6% (2.5%)	**31.7% [3.2% 60.1%]**	93.2% (1.3%)	**38.2% [14.1 62.3]**	81.1% (6.8%)	9.2% [-8.9 27.4]
Elderly						
Equity profile	47.1% (10.7%)		44.2% (7.0%)		56.1% (7.9%)	
Efficiency profile	80.9% (4.8%)	71.8% [-5,8% 149,5%]	84.2% (4.0%)	**90.4% [19.0 161.8]**	65.6% (10.9%)	16.9% [-21.8 55.5]

Note: Significant variables (p value < 0.10) are in bold. Standard errors were calculated by bootstrapping. The effect of changing on attribute level on the probablilites of choosing a profile is calculated compared to the base scenario, where all attribute levels are set to the mean, while in the alternative scenario, the given attribute level is set to 1, while the others kept at mean. For the calculation of equity-efficiency ratio we compare the probability of choosing the pure efficient scenario (where all efficiency attributes are set to 1 and all equity attributes are set to 0) to the probability of choosing the pure equity scenario (where all efficiency attributes are set to 0 and all equity attributes are set to 1).