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Does age matter for the value of life?

- Evidence from a choice experiment in rural Bangladesh[*]

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Abstract

Using a random sample of individuals in rural Bangladesh, this paper investigates people's preferences regarding relative values of lives when it comes to different ages of the individuals being saved. By assuming that an individual has preferences concerning different states of the world, and that these preferences can be described by an individual social welfare function, the individuals' preferences for life-saving programs are elicited using a pair-wise choice experiment between different life-saving programs. In the analyses, we calculate the social marginal rates of substitution between saved lives of people of different ages. We also test whether people have preferences for saving more life-years rather than only saving lives. In particular, we test and compare the two hypotheses that only lives matter and that only life-years matter. The results indicate that the value of a saved life decreases rapidly with age and that people have strong preferences for saving life-years rather than lives per se. Overall, the results clearly show the importance of the number of life-years saved in the valuation of life.

Key words: social preferences; life-saving programs; choice experiment; relative value of life.

JEL Code: D63, I18, J17.

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1. Introduction

Large variations in the value of a statistical life (VSL) have been observed based on revealed and stated preference approaches for a long time; see, e.g., Weinstein et al. (1980), Viscusi (1993), Hammitt and Graham (1999), and Viscusi and Aldy (2003). This is partly due to sample differences with respect to important explanatory variables such as average income, real underlying differences in values, and measurability problems related to cognitive difficulties in translating small risk reductions into monetary benefits (Kahneman et al., 1999). However, policy makers quite often work under specific budget constraints, such that a specified amount of money should be used in the best way to improve health in a certain area. To make such priorities, it is sufficient to know the *relative* values of the various health improvements; thus the absolute monetary values of saving for example young and old people do not need to be estimated but only the relative values of young and old people. Based on a normative claim, Sunstein (2004) argues that it is appropriate to focus on the value of life-years rather than the value of statistical lives when making life-saving priorities.

Empirical studies quantifying the trade-offs between saving lives of people of different ages observe that people place more weight on saving younger people's lives than on saving the lives of older people; see Cropper et al. (1994), Johannesson and Johansson (1997), and Johansson-Stenman and Martinsson (2008), where the latter study obtained a less extreme age-dependency than the two former. Age-weighting has been discussed in other contexts as well. For example, the 1993 World Development Report endorses that life-saving benefits should be based on disability-adjusted life years (DALYs), implying that the value of a life decreases rapidly with age (e.g., Murray, 1994; 1996, and Murray and Acharya, 1997). However, DALY age weights

have been questioned for having unclear theoretical and empirical foundations (e.g., Anand and Hanson, 1997, and Williams, 1997; 1999; 2000). As an alternative, yet qualitatively rather similar, approach, quality-adjusted life years (QALYs) can be used as the basis for the benefit measure; see, e.g., Weinstein and Stason (1997), Dolan (2000), Hammitt (2002, 2007), and Dolan et al. (2005). The main difference compared to the DALY approach when valuing saved lives of different ages is in the way the age-related weight for each life-year is calculated. People's attitudes toward saving lives of different ages have been investigated in several studies. Most available empirical evidence suggests that people on average prefer that the young should be given priority over the old when it comes to health care; see Tsuchiya (1999), Tsuchiya et al. (2003), and Dolan and Tsuchiya (2005).

However, most of these findings are based on developed countries. Exceptions include Kapiriri and Norheim (2004), who, based on a questionnaire distributed to personell at different levels of the Ugandian health care system as well as people from the general public, investigated the acceptance of a large number of criteria for priority setting. A clear majority accepted that age should play a role for priorities in the health care system. Similarly, Baltussen et al. (2006) conducted a choice experiment among health policy makers in Ghana and concluded that interventions that target the young had a higher probability of being chosen. However, as far as we know, no previous study has, based on people's preferences with respect to public priorities, attempted to quantify the relative values of statistical lives of different ages in a developing country.

In the present paper, we estimate people's ethical preferences for saving lives (while ignoring other health improvements) of different ages in rural Bangladesh. Such estimates are important for at least three reasons: (i) they may guide policy makers in

their priorities, (ii) they may be valuable to policy makers for political economy reasons (e.g., gaining better information about people's preferences may improve the odds of winning the next election), and (iii) people's ethical preferences regarding saving people of different ages may constitute important elements in order to understand different social phenomena, such as distribution of resources within a household and discrimination. Following an approach similar to Johansson-Stenman and Martinsson (2008), the individuals' preferences for relative values of lives are elicited using pair-wise choice experiments. We also test whether people have preferences for saving life-years rather than saving lives per se.

The rest of the paper is organized as follows: Section 2 outlines the theoretical and empirical model, Section 3 presents the design of the choice experiment, Section 4 discusses the econometric results and the analysis of responses from the follow-up questions asked after the choice experiment, and Section 5 concludes the paper.

2. The Model

Assume that an individual has social preferences concerning different states of the world that can be described by an individual social welfare function (ISWF). Let us also assume that individuals maximize their own ISWF, by acting as social planners, with regards to choosing life-saving programs. Following Johansson-Stenman and Martinsson (2008), we consider a general ISWF (henceforth the general model) that includes the number of saved lives in different age groups. Based on the ISWF and the assumption of no discounting, one can calculate the individual social marginal rates of substitution (SMRS) between saved lives of people of different ages. We also test a more restrictive model (denoted the restricted model) where the ISWF depends only on

the total number of saved lives (irrespective of age) and the total number of life-years saved. The restricted model allows us to test and compare the hypotheses that *only lives matter* and that *only life-years matter* respectively.

Let us begin with the general model. Considering small changes in the number of saved people of different ages, and a corresponding local linearization in these variables, implies that we can write

$$W_i = \hat{W}_i + \alpha_i^1 s^1 + ... + \alpha_i^n s^n \,, \qquad (1)$$

where $\hat{W}_i$ denotes *i*'s social welfare, according to *i*'s ISWF, at status quo, i.e., without any lives saved as a result of the programs, s^j is the number of saved people in group *j* (e.g., corresponding to a certain age), and α_i^j is the coefficient associated with the saved number of people in group *j* for individual *i*. The SMRS between group *j* and group *k* for individual *i* is expressed as

$$SMRS_i^{jk} = \frac{\partial W_i}{\partial s^j} \Big/ \frac{\partial W_i}{\partial s^k} = \frac{\alpha_i{}^j}{\alpha_i{}^k} \,. \qquad (2)$$

Thus, $SMRS_i^{jk}$ measures, based on individual *i*'s ethical preferences, the relative value of a saved life belonging to age group *j* in terms of saved lives belonging to group *k*. An SMRS equal to 1 then means that only the number of lives matters, i.e., equal relative values are assigned to all age groups. In other words, the more lives saved the better, irrespective of the ages of the saved individuals.

According to the random utility approach (McFadden, 1974), it is assumed that the true ISWF is not directly observable and hence consists of both an observable and a non-observable (stochastic) part. By introducing a random error term, ε_i, to reflect unobservable characteristics, equation (1) can be re-written as

$$W_i = \hat{W}_i + \alpha_i^1 s^1 + ... + \alpha_i^n s^n + \varepsilon_i \ . \quad (3)$$

An ISWF-maximizing individual prefers a project *A* over a project *B* if $W_i(A) > W_i(B)$. Based on the observable information, one can then model the probability that project *A* is chosen as follows:

$$\Pr(A \text{ is chosen}) = \Pr(W_i(A) > W_i(B)) = \Pr\left(\alpha_i^{\ 1} \Delta s^1 + ... + \alpha_i^{\ n} \Delta s^n > \phi_i\right), \quad (4)$$

where $\Delta s^k = s^k(A) - s^k(B)$ and $\phi_i = \varepsilon_i(A) - \varepsilon_i(B)$. Given that ϕ_i is standard normal distributed, equation (4) can be estimated by a standard probit regression.

The alternative, restricted model is when the ISWF depends on a linear combination of saved lives (irrespective of ages) and the total number of life-years saved, assuming in the latter case that the individuals have the information necessary to estimate this. We can then write individual *i*'s individual social welfare function as follows:

$$W_i = \hat{W}_i + \beta_i l + \delta_i y + \varepsilon_i \ , \quad (5)$$

where *l* is the total number of lives saved, *y* is the total number of life-years saved, and where β_i and δ_i are the associated coefficients to be estimated. This model facilitates a direct test between the "only-lives-matter-hypothesis" (the *l*-hypothesis) and the "only-life-years-matter-hypothesis" (the *y*-hypothesis). According to the *l*-hypothesis, one would expect that $\beta_i > 0,\ \delta_i = 0$, whereas the *y*-hypothesis implies that $\beta_i = 0, \delta_i > 0$. Some intermediate alternatives of course also exist, where then $\beta_i > 0$ and $\delta_i > 0$. The probability that individual *i* chooses project *A* can be estimated as

$$\Pr(A \text{ is chosen}) = \Pr(W_i(A) > W_i(B)) = \Pr\left(\beta_i \Delta l + \delta_i \Delta y > \varphi_i\right) \ , \quad (6)$$

where $\Delta l = l(A) - l(B),\quad \Delta y = y(A) - y(B)$ and $\phi_i = \varepsilon_i(\mathrm{A}) - \varepsilon_i(B)$.

The relative value of saving a life in one age group rather than in another is then estimated as

$$SMRS_i^{jk} = \frac{\beta_i + \delta_i y^j}{\beta_i + \delta_i y^k}, \qquad (7)$$

where y^j and y^k denote the total remaining expected life-years of the saved individual in age group j and *k*, respectively.

3. The Choice Experiment

In a choice experiment, respondents make repeated choices between different alternative goods or projects that are described by their attributes (see Louviere et al., 2000; Alpizar et al., 2003). The choice experiment approach is now increasingly applied in eliciting preferences for health and health care (see, e.g., Ryan and Gerard, 2003; Ryan et al., 2006). Some of the advantages of using a choice experiment rather than a single question experiment are that it is easier to estimate the marginal impact of different attributes on the decision and that more information is provided per respondent. However, there are also negative aspects, e.g., it is cognitively more demanding for the respondents and the complexity of the task can affect the respondents' decision. The design of a choice experiment involves defining attributes and levels of attributes, experimental design, questionnaire development, and designing a sample and sampling strategy. In our case, the attributes of life-saving programs are the age of the life saved and the number of lives saved. The experimental design involves creating the choice sets in an efficient way by combining attribute levels into alternatives in the choice sets. One important issue here is to minimize task complexity and obtain a manageable number of choice sets. The choice sets were created using the

software SAS by only considering main effects. Hence, we are only considering the direct effects of each attribute on utility, by using a D-optimal design approach.[1] Forty-two choice sets were created and then blocked into seven groups. The blocks were randomly distributed among the respondents. To facilitate the design (choice of attributes, attribute levels, and the choice scenario), focus groups and two pilot studies were conducted in order to test the choice experiment in the field. The attributes and the levels used in the final choice experiment are presented in Table 1.

>>> TABLE 1

The choice experiment and a subsequent household survey were conducted among a random sample of 390 rural households in Bangladesh in November 2003;[2] descriptive statistics are provided in Table 2. In the final analyses, we dropped four surveys since they were incomplete. In addition to the socioeconomic questions, the survey included questions on the respondents' health and risk perceptions, plus contingent valuation questions on risk reduction. The enumerators conducting the survey were trained beforehand regarding the purpose of the experiment and how to conduct it practically, and on how to present the choice scenario and the choice sets. The choice scenario was translated back to English from Bengali to ensure the exact meaning of the original English version. Each choice set was presented by the

[1] D-optimal design considers the importance of the levels of the attributes in the choice sets and ensures that the alternatives give more information about the trade-off between the different attributes; see Carlsson and Martinsson (2003).

[2] The survey was conducted in the selected villages and hence the sample is not representative of the Bangladesh population. Moreover, 33 percent of the respondents are of Hindu religion as opposed to the national average of 11 percent; the remaining 67 percent are of Muslim religion. The sample consists of 23 % replacement households due to unavailability of the particular household heads during repeated visits by the enumerators.

enumerators using a small card to which they pointed while explaining the choice situation to the respondents.

The scenario description used in the choice experiment (see Appendix 1) explains that financial constraints often necessitate setting priorities in conducting life-saving programs, and people's preferences regarding such priorities are of essential importance for policy makers. Moreover, the respondents were told that it is possible to target people within certain age groups for these life-saving programs. To be more realistic, saved lives were presented in terms of groups spanning a range of ages rather than in terms of specific ages, i.e., 0-1 year, 1-10 years, 10-20 years, 20-30 years, 20-40 years, 40-60 years, and 60-80 years. Respondents were presented with six pairs of life-saving programs that differed with respect to the number of lives saved and the age group of the saved persons; however, the programs were similar in other aspects, including their costs. It was specifically mentioned that the life-saving programs would not change the total amount of suffering among the ill or injured people so that the respondents would not assume different diseases/injuries (and their associated sufferings) in the different age groups. This implies that the programs if implemented would save the life (lives) but not affect the quality of life of the saved person(s).[3] Finally the respondents were asked to choose their preferred alternative in each of the six choice sets assuming that each choice set was the same in all aspects, including cost, except for the attributes included. The respondents were presented with two life-saving

[3] Here we assume that a saved person would expect to live his/her remaining expected years based on average life expectancy. As different ages are targeted, the quality of a saved life might well be different for persons saved from different causes of death. The respondents hence are not expected to make assumptions about, or focus on, the quality of life of the saved person when choosing between alternative programs.

programs at a time, each containing information on the number of individuals saved and the ages of the saved persons.

After the choice experiment, the respondents were asked follow-up questions regarding priority setting in terms of saving lives. As noted earlier, World Bank (1993) observes that most societies in practice seem to attach higher values to a year of life of young and middle-aged adults than to a year of life of a child or an elderly person. Following this, the respondents were explicitly asked if they wanted to prioritize saving the younger people over the older. Given that they expressed that the younger should be prioritized, the respondents were then asked qualitative questions about their preferences for prioritizing the younger. For example, it might be relevant to think that it is fair to save younger individuals so that they can live, all else going well, as many years as an old person has already lived. Moreover, as an older person has fewer expected life years left, by saving a considerably younger person, more life-years could be saved to achieve more societal welfare. Another important aspect is that young adults could contribute to society both in terms of production and child rearing, and could also shoulder the responsibility of the older people. This aspect is related to productivity ageism. Appendix 2 presents the exact wordings of the follow-up questions and the responses.

>>> TABLE 2

4. Econometric analysis and results

As the choice experiment involves only two choice alternatives, a binary probit model is employed to estimate the choice parameters. Given that each respondent made six choices providing six observations for analysis, these observations may be correlated at

the individual level. Hence, to account for a possible overestimation of the statistical significance of the attributes, clustering at the individual level is used, implying that observations are allowed to be independent across individuals (clusters), but not necessarily independent between responses for an specific individual.

>>> TABLE 3a and 3b

Tables 3a and 3b present the estimated probit coefficients for the general model. A positive coefficient implies that if we increase the number of saved individuals in a specific alternative, say alternative A, in a given choice set, then the probability that alternative A will be chosen also increases; a larger coefficient implies a larger probability increase. Let us start by interpreting the results for the full sample, i.e., the first column of Table 3a. As can be observed, the coefficients are positive and (typically) highly significant up to the age of 30, insignificant for the age of 50, and negative and significant for the age of 70. The latter thus implies that an alternative is less likely to be chosen if the number of 70-year olds saved in this alternative increases, *ceteris paribus*, implying a negative value of saving additional 70-year olds. If we then consider the different sub-sample, divided according to religion, literacy, age and income,[4] we observe roughly the same pattern for each of the sub-samples.

The negative value of saving 70-year olds appears unintuitive. One possible interpretation is that some respondents have adopted a simplified choice strategy of always choosing the alternative where more people younger than 70 were saved irrespective of the number of saved 70-year olds. The design of the choice sets may also be a potential issue. However, we obtained basically the same result in two pilot studies, after which we adjusted the choice sets in order to avoid what we initially believed was

[4] Since the fraction of female respondents is only 9 percent, we do not investigate gender effects.

flawed results due to an inappropriate design. Yet, we regret that we did not include a choice set where the number of younger people was the same in both alternatives and the number of 70-year olds was different, since this would have enabled a more clear test of whether people really put a negative value on saving additional old people. Nevertheless, as pointed out by a referee, a possible explanation behind the negative coefficient is that many respondents believe that the current number of 70-year olds in society is not sustainable. It is also possible that some respondents simply do not want to prolong an older life considering their apparent old-age related sufferings due to economic hardship, socio-economic insecurity, and poor health care facilities. It moreover appears unlikely that one would have obtained a similar age pattern when focusing on health rather than on life saving. This may also reflect an expression of attitude, which is not related to trade-offs in the choice experiment or preferences of the individual (Kahneman et al., 1999). However, given the results of the previous pilot studies, it can certainly not be ruled out that the responses reflect true preferences, related to, e.g., a perceived society sustainability concern or the suffering of old people.[5]

However, we are not primarily interested in the probit coefficients, but in the implied relative values of lives of different ages. As was demonstrated theoretically in Section 3, these relative values are basically obtained from the random utility model by the ratios of the estimated probit coefficients; the standard errors are calculated based on the delta method.

>>> TABLE 4a and 4b

[5] For example, Johri et al. (2005) found in a study conducted in Canada that the intervention type seems to matter for age preference; responses for a life-saving scenario favored younger age groups while those for palliative care scenarios showed no age preference.

The results indicate that the relative value of life decreases rapidly with age. For example, based on the full data set, saving one 1-year old is judged equivalent to saving 2.14 (1/0.468) 30-year olds. Tables 4a and 4b also presents the ratios of life expectancy for the relevant ages; the ratios are calculated by dividing the average remaining life expectancy for a person of the given age by the average remaining life expectancy for a 1-year old (Column 2). From the second and the third columns of Table 4a it follows that both the life expectancy ratio and the relative value, as expressed in terms of the SMRS, decrease strongly with age, and where morevove the relative value decreases particularly sharply at higher ages. Consistent with the coefficients of the probit estimations, the results also indicate that the relative value of life (SMRS) is significantly negative for the oldest group (60-80 years old).

Regarding observed preference heterogeneity, we can observe that respondents of the Hindu religion, i.e., the minority, on average assigned relatively lower (i.e., more negative) values to 70-year olds. We have no clear explanation for this result and feel that such heterogeneity warrants further investigation. Perhaps Hindus experience a higher degree of stress, making older people appear more burdensome. Yet, perhaps surprisingly, we do not find the corresponding result that people with less than median income value old people less, but rather the opposite. Moreover, by comparing the literate and the illiterate subsamples, we can rule out that the results are largely driven by the large fraction of illiterate responses, since the age pattern is fairly similar in the two groups. It is also interesting to note that also the older half of the respondents indicate a negative value for saving a 70-year old, although this effect is somewhat smaller than for the younger sub-sample. This is consistent with the findings of Johansson-Stenman and Martinsson (2008) who found that older respondents tend to

value older saved lives somewhat higher (in relative terms) than younger respondents do, while Cropper et al. (1994) and Johannesson and Johansson (1997) found no preference effects of age. .

Regarding the parameters of the restricted model (equation 5), we consistently for all subsamples obtain a negative coefficient for the number of lives saved and a positive coefficient for the number of life-years saved; both being significant at the 1 % level (see Tables 5a and 5b). This result is not fully consistent with any of our hypotheses, but does indicate, again, that the relative value of life decreases rapidly with age.

>>> TABLE 5a and 5b

The resulting SMRS patterns, i.e., patterns of relative value of life, following equation 7 (with a 1-year old saved as the base case) are reported in Tables 6a and 6b, for the full samples and different sub-samples. As can be observed, we again consistently obtain negative values for the oldest group in the choice experiment, where the magnitudes are quite similar to the results of the general model as reported in Tables 4a and 4b.

>>> TABLE 6a and 6b

On the whole, the results here clearly show the importance of the number of life-years saved when valuing life, i.e., they support the *y*-hypothesis rather than the *l*-hypothesis.

Follow-up questions

We asked verbal follow-up questions about whether the respondents agreed with a number of statements concerning priorities in life saving. Almost everybody agreed with the statement that society should give higher priority to saving younger people. Out

of these, about 80% supported the view that society could save more life-years by saving a younger individual rather than an older, and 66% thought that younger individuals should be given priority as they have not lived as many years as older individuals have. Almost all respondents supported the view that society should give higher priority to saving younger people primarily because they can be expected to contribute more to society in terms of production and raising children. Although one cannot rule out the possibility of "yea saying" in these responses, i.e., that some respondents may have answered yes because they believed either that this answer would please the enumerator or that they themselves would be seen in a better light by the enumerator, the findings are consistent with the estimated choice experiment results.

5. Conclusions

The choice experiment results strongly indicate that the respondents have preferences for life-saving projects that save younger people, and a model where people simply value the total number of saved life-years appears to explain the choice data reasonably well. The rather surprising results regarding the negative relative value of saved older people may be related to measurement problems due to the choice experiment design. The respondents may also have expressed a view that is not related to the trade-offs in the choice experiment presented to them. However, it cannot be ruled out that the responses do reflect true preferences, related to, e.g., a perceived society sustainability concern or the suffering of old people. The responses to follow-up questions after the choice experiments are also broadly consistent with the choice experiment results, indicating again that society should prioritize saving younger people. On the whole, the results here clearly show the importance of the number of life-years saved in the

valuation of life. The main findings are also remarkably robust for the different subsamples analyzed in terms of age, literacy, religion, and income. The main results are also broadly consistent with the recent empirical finding by Johansson-Stenman and Martinsson (2008) as well as with the normative claim by Sunstein (2004) that it is appropriate to focus on the value of statistical life-years rather than the value of statistical lives when making life-saving priorities.

The findings in this paper further contribute to the more general debate about whether relative values of lives should be used in public decision making. In terms of our results, incorporating relative values of life in an economic evaluation could clearly yield substantially different policy recommendations regarding life-saving investments and regulations. Disregarding any methodological issues, the results here convey important information for policies concerning public health, particularly infant and child health, in developing countries. Finally, a word of caution is warranted: Priorities regarding life saving clearly involve fundamental ethical principles, and one cannot readily suggest what should be done based on how people act, whether in real life or when answering hypothetical questions; i.e., one cannot derive an "ought" from an "is." It is therefore not our intention to directly influence priority setting in practice. In particular, we want to be perfectly clear that we do not recommend any negative weights to be used in practice.

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Table 1. Attributes and levels used in the choice experiment.

Attribute	Levels
Number of people saved	200, 400, 700, 1000, 1300, and 1700
Age group of people saved	0 - 1, 1 - 10, 10 - 20, 20 - 30, 20 - 40, 40 – 60, and 60 - 80

Table 2. Sample Characteristics.

Characteristics	Mean	Min	Max
Male	0.91	0	1
Married	0.95	0	1
Age in years	44.28	19	87
Illiterate (cannot read and write)	0.32	0	1
Hindu religion [a] (base case Muslim)	0.33	0	1
Per capita household income [b] (TK)	1648	139	24071

[a] Hindu is overrepresented in our sample compared to the national average of 11 percent.
[b] Yearly household income per-capita adjusted with equivalent and economies of scale, calculated as follows: Total yearly household income is divided by (number of adults + 0.5× number of children)$^{0.75}$, where an individual becomes an adult above the age of 16. 1 US $ = 59.4 TK, as of October 2004.

Table 3a. Probit regressions for the total sample and different sub-samples based on religion and literacy.

	All (n=386)		Muslim (n=257)		Hindu (n=129)		Literate (n=262)		Illiterate (n=124)	
	Coeff.	Std. error	*Coeff.*	Std. error	*Coeff.*	Std. error	*Coeff.*	Std. error	*Coeff.*	Std. error
1-year old saved	0.907*	0.116	1.305*	0.140	0.677*	0.209	0.808*	0.136	1.113*	0.217
5- year old saved	0.715*	0.152	0.764*	0.182	0.639	0.278	0.638*	0.176	0.870*	0.298
15-year old saved	0.515*	0.169	0.636*	0.201	0.283	0.312	0.346	0.198	0.846*	0.320
25-year old saved	0.437	0.178	0.498	0.213	0.336	0.326	0.415	0.208	0.474	0.342
30-year old saved	0.425*	0.116	0.521*	0.141	0.241	0.205	0.337	0.140	0.600*	0.211
50-year old saved	-0.006	0.077	0.114	0.093	-0.249	0.137	-0.060	0.092	0.108	0.143
70-year old saved	-0.361*	0.069	-0.250*	0.082	-0.605*	0.129	-0.380*	0.084	-0.319*	0.122
Number of observations	2316		1542		774		1572		744	

Note: In the estimations we divided all variables by 1,000. Superscript * denotes significance at the 1% level.

Table 3b. Probit regressions for different sub-samples based on age and income.

	Age below 40 (n=196)		Age 40 and above (n=190)		Income below (n=166)		Income above (n=220)	
	Coeff.	Std. error	*Coeff.*	Std. error	*Coeff.*	Std. error	*Coeff.*	Std. error
1- year old saved	0.919*	0.171	0.909*	0.158	0.940*	0.174	0.871*	0.156
5-year old saved	0.653*	0.222	0.807*	0.210	0.755*	0.227	0.670*	0.207
15-year old saved	0.487	0.244	0.570	0.237	0.529	0.252	0.490	0.230
25-year old saved	0.411	0.254	0.480	0.255	0.383	0.270	0.456	0.240
30-year old saved	0.261	0.168	0.598*	0.159	0.467*	0.167	0.381	0.163
50-year old saved	-0.144	0.110	0.116	0.110	0.000	0.107	-0.017	0.108
70- year old saved	-0.479*	0.098	-0.244	0.099	-0.281*	0.100	-0.432*	0.096
Number of observations	1176		1140		996		1320	

Note: In the estimations we divided all variables by 1,000. Superscript * denotes significance at the 1% level.

Table 4a. Social marginal rate of substitution (*SMRS*) in the total sample and different sub-samples based on religion and literacy. Saved 1-year olds constitute the base case.

	Actual life expectancy	Life expectancy ratio	All (n=386)		Muslim (n=257)		Hindu (n=129)		Literate (n=262)		Illiterate (n=124)	
			SMRS	*Std. error*	*SMRS*	*Std. error*	*SMRS*	*Std. error*	*SMRS*	*Std. error*	*SMRS*	*Std. error*
1-year old saved	64.95	1	1		1		1		1		1	
5-year old saved	67.70	0.977	0.788	0.091	0.738*	0.101	0.944	0.187	0.790	0.118	0.774	0.147
15-year old saved	68.75	0.840	0.567*	0.135	0.615*	0.139	0.418	0.364	0.428*	0.194	0.753	0.181
25-year old saved	69.65	0.698	0.481*	0.154	0.481*	0.162	0.497	0.375	0.514	0.201	0.422	0.244
30-year old saved	70.20	0.628	0.468*	0.086	0.503*	0.089	0.356*	0.223	0.417*	0.124	0.534*	0.112
50-year old saved	73.25	0.363	-0.007*	0.085	0.110*	0.082	-0.367*	0.273	-0.074*	0.121	0.096*	0.118
70-year old saved	80.15	0.158	-0.398*	0.112	-0.241*	0.101	-0.894*	0.408	-0.470*	0.163	-0.284*	0.145
Number of observations			2316		1542		774		1572		744	

Note: The P-value refers to the null hypothesis that the *SMRS* is the same for a specific age group as it is for 1-year-olds, i.e., if *SMRS* is equal to 1.
This hypothesis is tested by applying a Wald test. Life expectancy is defined as the average number of years to be lived by a cohort, if mortality at each age remains constant in the future. Life expectancy figures are adapted from the Bangladesh Bureau of Statistics (BSS, 2001). Superscript * denotes significance at the 1% level.

Table 4b. Social marginal rate of substitution (*SMRS*) for different sub-samples based on age and income. Saved 1-year olds constitute the base case.

	Age below 40 (n=196)		Age 40 and above (n=190)		Income below (n=166)		Income above (n=220)	
	SMRS	*Std. error*	*SMRS*	*Std. error*	*SMRS*	*Std. error*	*SMRS*	*Std. error*
1 year-old saved	1		1		1		1	
5 year-old saved	0.710	0.133	0.887	0.124	0.803	0.130	0.796	0.131
15 year-old saved	0.529	0.193	0.627	0.190	0.563	0.192	0.562	0.195
25 year-old saved	0.448	0.216	0.528	0.222	0.408	0.237	0.524	0.210
30 year-old saved	0.284*	0.142	0.658*	0.104	0.496*	0.113	0.437*	0.131
50 year-old saved	-0.157*	0.138	0.128*	0.110	0.001*	0.114	-0.019*	0.126
70 year-old saved	-0.521*	0.179	-0.268*	0.140	-0.299*	0.143	-0.496*	0.177
Number of observations	1176		1140		996		1320	

Note: The P-value refers to the null hypothesis that the *SMRS* is the same for a specific age group as it is for 1-year-olds, i.e. if *SMRS* is equal to 1. This hypothesis is tested by applying a Wald test. Superscript * denotes significance at the 1% level.

Table 5a. Probit regressions for the total sample and different sub-samples based on religion and literacy, for the restricted model.

	All (n=386)		Muslim (n=257)		Hindu (n=129)		Literate (n=262)		Illiterate (n=124)	
	Coeff.	*Std. error*	*Coeff.*	*Std. error*	*Coeff.*	*Std. error*	*Coeff.*	*Std. error*	*Coeff.*	*Std. error*
Life saved	-0.487*	0.068	-0.361*	0.080	-0.763*	0.127	-0.503*	0.081	-0454*	0.122
Life year saved	0.222*	0.002	0.023*	0.002	0.022*	0.003	0.021*	0.002	0.026*	0.003
Number of observations	2316		1542		774		1572		744	

Note: In the estimations we divided all variables by 1,000. Superscript * denotes significance at the 1% level.

Table 5b. Probit regressions for different sub-samples based on age and income, for the restricted model.

	Age below 40 (n=196)		Age 40 and above (n=190)		Income below (n=166)		Income above (n=220)	
	Coeff.	*Std. error*	*Coeff.*	*Std. error*	*Coeff.*	*Std. error*	*Coeff.*	*Std. error*
Life saved	-0.661*	0.095	-0.333*	0.095	-0.424*	0.101	-0.537*	0.091
Life year saved	0.025*	0.002	0.020*	0.002	0.022*	0.003	0.022*	0.002
Number of observations	1176		1140		996		1320	

Note: In the estimations we divided all variables by 1,000. Superscript * denotes significance at the 1% level.

Table 6a. Social marginal rate of substitution (*SMRS*) in the total sample and in sub-samples based on religion and literacy. Saved 1-year olds constitute the base case.

	Actual life expectancy	Life expectancy ratio	All (n=386)		Muslim (n=257)		Hindu (n=129)		Literate (n=262)		Illiterate (n=124)	
			SMRS	*Std. error*	*SMRS*	*Std. error*	*SMRS*	*Std. error*	*SMRS*	*Std. error*	*SMRS*	*Std. error*
1-year old saved	64.95	1	1		1		1		1		1	
5-year old saved	67.70	0.980	0.953*	0.003	0.959*	0.003	0.934*	0.011	0.951*	0.004	0.957*	0.004
15-year old saved	68.75	0.840	0.748*	0.016	0.778*	0.015	0.645*	0.062	0.735*	0.024	0.770*	0.020
25-year old saved	69.65	0.698	0.535*	0.030	0.591*	0.027	0.345*	0.114	0.510*	0.044	0.575*	0.038
30-year old saved	70.20	0.629	0.431*	0.037	0.499*	0.034	0.198*	0.139	0.400*	0.053	0.480*	0.046
50-year old saved	73.25	0.364	0.034*	0.062	0.149*	0.057	-0.362*	0.236	-0.018*	0.091	0.118*	0.078
70-year old saved	80.15	0.159	-0.273*	0.082	-0.121*	0.075	-0.794*	0.311	-0. 342*	0.119	-0.163*	0.102
Number of observations			2316		1542		774		1572		744	

Note: The P-value refers to the null hypothesis that the *SMRS* is the same for a specific age group as it is for 1-year-olds, i.e., if *SMRS* is equal to 1.
This hypothesis is tested by applying a Wald test. Life expectancy is defined as the average number of years to be lived by a cohort, if mortality at each age remains constant in the future. Life expectancy figures are adapted from the Bangladesh Bureau of Statistics (BSS, 2001). Superscript * denotes significance at the 1% level.

Table 6b. Social marginal rate of substitution (*SMRS*) in the total sample and in sub-samples based on age and income. Saved 1-year olds constitute the base case.

	Age below 40 (n=196)		Age 40 and above (n=190)		Income below (n=166)		Income above (n=220)	
	SMRS	*Std. error*	*SMRS*	*Std. error*	*SMRS*	*Std. error*	*SMRS*	*Std. error*
1-year old saved	1		1		1		1	
5-year old saved	0.948*	0.005	0.958*	0.004	0.956*	0.004	0.951*	0.005
15-year old saved	0.718*	0.027	0.775*	0.020	0.764*	0.021	0.735*	0.025
25-year old saved	0.479*	0.049	0.585*	0.037	0.564*	0.038	0.510*	0.046
30-year old saved	0.362*	0.060	0.492*	0.045	0.466*	0.047	0.400*	0.056
50-year old saved	-0.083*	0.102	0.138*	0.077	0.093*	0.079	-0.019*	0.096
70-year old saved	-0.426*	0.134	-0.135*	0.101	-0.194*	0.104	-0.342*	0.126
Number of observations	1176		1140		996		1320	

Note: The P-value refers to the null hypothesis that the *SMRS* is the same for a specific age group as it is for 1-year-olds, i.e., if *SMRS* is equal to 1. This hypothesis is tested by applying a Wald test. Superscript * denotes significance at the 1% level.

Appendix 1: The choice scenario.

Governmental policy makers can prevent or postpone many deaths by increasing the financial resources for different kinds of life-saving programs. However, since the government's budget is limited, it has to choose which programs to prioritize. The purpose of this part of the survey is to gather information about people's preferences regarding such priorities.

Appropriate life-saving programs can prevent many causes of death. Many people die each year due to contaminated water, contaminated food, polluted air, smoking, and road accidents. More and better life-saving programs could reduce the number of deaths from each of these causes.

Suppose that there are two different life-saving programs and that they target different age groups of the population. Both programs save a different number of lives in different age groups. Both programs cost the same.

[Enumerator: Show Figure EXAMPLE and POINT to the attribute levels when they are mentioned]

As an example, assume that you were to choose between two available life-saving programs, A and B. The effects of the programs differ with respect to the number of lives saved and the age of those saved. The cost of both life-saving programs is the same. Program A saves 200 lives of people who are 20-40 years old, and program B saves 250 lives of people who are 40-60 years old. The programs do not change the total amount of suffering experienced by ill or injured people.

	Program A	Program B
Age-group of lives saved	20-40 years	40-60 years
Number of lives saved	200	250
Your choice		

QUESTION: If both programs cost the same, which life-saving program would you choose?

[Enumerator: Let the respondent mark (X) the blank box for the chosen program]

We will now present you with 6 different pairs of life-saving programs and each time we will ask you to choose the one you think would be the best for society. The effects of the programs differ with respect to the number of lives saved and their age group, but they are similar in all other respects. The programs do not change the total amount of suffering experienced by ill or injured people.

Appendix 2: Follow-up questions on priority setting in saving lives.

Question/Statement
1. Society should give higher priority to saving younger people. Agree (go to question 2 [a]) Disagree
2. Why do you think that society should give higher priority to saving younger people?
a) A younger individual has a longer time left to live, hence society saves more life-years by saving a younger individual compared to an older.
b) It is fairer that younger individuals are saved since they have not lived as many years as older individuals have.
c) It is better from a social point of view to save younger individuals since they will contribute more to society in terms of production and raising children.

[a] The respondents could choose more than one response.