Demographic and Socioeconomic Factors Influencing Public Attitudes Toward a Presumed Consent System for Organ Donation Without and With a Priority Allocation Scheme

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Abstract: The influence of demographic and socioeconomic factors on the public’s attitude towards a presumed consent system (PCS) of organ donation was estimated in 2 scenarios: without and with a priority allocation scheme (PAS). Self-administered questionnaires were completed by 775 respondents. Using multiple logistic regressions, respondents’ objections to donating organs in both scenarios were estimated. In total, 63.9% of respondents would object to donating under a PCS, whereas 54.6% would object under a PCS with a PAS. Respondents with pretertiary education were more likely to object than were respondents with tertiary education, in both the first (adjusted odds ratio [AOR] = 1.615) and second (AOR = 1.728) scenarios. Young respondents were less likely to object than were middle-aged respondents, in both the first (AOR = 0.648) and second (AOR = 0.572) scenarios. Respondents with mid-ranged personal monthly income were more likely to object than were respondents with low income, in both the first (AOR = 1.994) and second (AOR = 1.519) scenarios. It does not seem that Malaysia is ready to implement a PCS. The educational level, age, and income of the broader public should be considered if a PCS, without or with a PAS, is planned for implementation in Malaysia.

(Observational Study)

INTRODUCTION

Malaysia suffers from a chronic shortfall in organs for transplantation. Its organ-donation rates are low, at 0.5 and 1.87 donations per million people (PMP) in 2013 for deceased and living donations, respectively. As of December 2014, >18,000 patients in Malaysia were awaiting kidney transplants, whereas on average, only 26 transplants (sourced from deceased donors) have been performed yearly over the past decade. As living donation has led to organ trading and tourism around the world, enhancing deceased donation rates seems to be the only efficient remedy to address this shortfall in organs. The Declaration of Istanbul states firmly that the “therapeutic potential of deceased organ donation should be maximized [and] efforts to initiate or enhance deceased donor transplantation are essential to minimize the burden on living donors.”

There is evidence that a presumed consent system (PCS), in which everyone is a donor unless he or she objects during his or her lifetime, yields higher rates of organ donation than an informed consent system (ICS), in which only those who registered during their lifetime are considered for organ donation. Some policy analysts have argued that the increase in deceased donation rates achieved in some countries after implementing a PCS actually results from the successful organization of the donation process. In fact, some countries have not reported any substantial increase in deceased donation rates after shifting from an ICS to a PCS. In Chile, for instance, average deceased donations declined from 8.08 PMP (2004–2008) to 6.78 PMP (2009–2013) after implementing a PCS in 2009.

Nevertheless, PCS are increasingly gaining ground. Starting in 2015, a PCS will take force in Wales, with a similar transition expected in Northern Ireland.

Some people might be willing to receive an organ transplant, should they need it, and yet be unwilling to donate their own organs upon their deaths. This behavior biases the equal allocation of organ transplantation among willing and unwilling people, a bias that can be minimized by giving those who want to donate a preferred position on the waiting list for an organ transplant, should they need it, over those who do not want to donate. Recently, Israel—which adopts an ICS—introduced a priority allocation scheme (PAS), granting registered donors and their families preferred positions on the waiting lists for organ transplantation. This strategy has significantly increased the number of registered donors in Israel.

Demographic and socioeconomic factors have been associated with attitudes toward organ donation. In Malaysia, a survey showed that about 34% of Malaysians are willing to donate their organs upon death. The same study reported a significant association between ethnicity and willingness to donate. Furthermore, a study in Europe and 2 in Malaysia have found that willingness to donate is positively associated with higher levels of education. Moreover, personal income was found to have an inverse association with willingness to donate organs after death in Malaysia. Nevertheless, previous studies in Malaysia have not taken into account the legislative system—that is, PCS versus ICS—when analyzing people’s willingness to donate organs. Thus, no study has yet estimated the
correlations between Malaysians’ attitudes toward organ donation and demographic and socioeconomic factors if a PCS was to be implemented.

The main objectives of this study are to investigate:

1) The public attitudes toward a PCS and toward a PCS with a PAS, along with any differences between these attitudes.
2) The influence of demographic and socioeconomic factors on public attitudes toward deceased organ donation under a PCS and a PCS with a PAS for organ allocation.

METHODS

To meet these research objectives, a set of questionnaires was prepared in collaboration between social scientists and medical experts. Initially, 75 questionnaires were distributed as a pilot study. Based on the analyzed results, we made some modifications, producing a revised questionnaire. The questionnaire was self-administered, and we anticipated a lack of knowledge among the public regarding the legislative systems of organ donation. Therefore, we provided respondents with a written explanation of both systems, PCS and ICS.

To assure high-quality responses and a high response rate, our enumerators were trained to explain to respondents the importance of the study for the future of national health. All respondents were assured that their responses would be treated with complete confidentiality and used only for research purposes.

Based on previous research in Malaysia regarding organ donation, we expected that the probability of objection to donating organs would be about 0.5. Malaysia’s population comprises roughly 15 million adults aged 18 to 65 years. Therefore, for a confidence level of 95% and a 5% precision level, a sample of 400 respondents was needed to meet the study objectives. Although a bigger sample size is always preferable, the investment required in both money and time for data collection is a concern for all researchers. Therefore, given available resources, we distributed 900 questionnaires of which 775 were completed and returned, a response rate of 86.1% (Table 1). The study was conducted from October to December 2013. The public were approached in 4 types of locations: homes, public places, offices, and religious venues.

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The questionnaire first asked respondents for their demographic and socioeconomic information. Then, they were presented with the following question: “If the Malaysian government implements the policy of PCS in which you are automatically registered as a deceased donor, would you sign the form to register your objection?” The questionnaire gave respondents 2 mutually exclusive options: “Yes, I will sign the form to register my objection”, and “No, I will not sign the objection form.” Next, respondents were presented with following question: “Would you still want to sign the form declaring your objection form.” Next, respondents were presented with following question: “Would you still want to sign the form declaring your objection if you refuse to donate your organs under a PCS with a PAS? If a respondent would object to donating organs, the dependent variable was assigned a value of “1,” whereas the value “0” was assigned wherein a respondent stated that he or she would not object to donating organs after death. To avoid overfitting estimates, we regrouped some of the subgroups of the independent variables to assure a minimum of 10 outcome events per predictor variable. Several statistical analyses were performed using SPSS 20.0 (SPSS Inc, Chicago, IL). During the first stage, a bivariate analysis (Pearson χ² test) tested the association between “objection to donating organs” (dependent variable) and several demographic and socioeconomic factors (independent variables). In the next stage, the significantly associated demographic and socioeconomic variables were regressed against the dependent variable by applying a multiple logistic regression. A 5% significance level was used as the rejection criterion for the independent variables. We performed this statistical technique for 2 models. The first model was used as a dependent variable respondents’ objection to donating organs under a PCS without a PAS, whereas the second model was used as a dependent variable respondents’ objection to donating organs under a PCS with a PAS. If a respondent would object to donating organs, the dependent variable was assigned a value of “1,” whereas the value “0” was assigned wherein a respondent stated that he or she would not object to donating organs after death. To avoid overfitting estimates, we regrouped some of the subgroups of the independent variables to assure a minimum of 10 outcome events per predictor variable. Several statistical analyses were performed using SPSS 20.0 (SPSS Inc, Chicago, IL). During the first stage, a bivariate analysis (Pearson χ² test) tested the association between

| TABLE 1. Respondents’ Profile |
|-------------------------------|
| Characteristic                | N       (%) |
| Ethnicity                     |          |
| Malay                         | 522 (67.4)|
| Chinese                       | 191 (24.6)|
| Indian and others             | 62 (8.0) |
| Sex                           |          |
| Male                          | 396 (51.1)|
| Female                        | 379 (48.9)|
| Age                           |          |
| <31 years                     | 484 (62.5)|
| 31–50 years                   | 205 (26.5)|
| >50 years                     | 86 (11.1) |
| Marital status                |          |
| Single                        | 438 (56.5)|
| Married                       | 311 (40.1)|
| Divorced                      | 26 (3.4)  |
| Education                     |          |
| Pre-tertiary education        | 428 (55.2)|
| Tertiary education            | 347 (44.8)|
| Monthly personal income       |          |
| ≤2000 MYR                     | 465 (60.0)|
| 2001–4000 MYR                 | 268 (34.6)|
| >4000 MYR                     | 42 (5.4)  |
| Monthly household income      |          |
| ≤3000 MYR                     | 392 (50.6)|
| 3001–6000 MYR                 | 271 (35.0)|
| >6000 MYR                     | 112 (14.5)|
| Job type                      |          |
| Government employee           | 146 (18.8)|
| Private-sector employee       | 285 (36.8)|
| Self-employed                 | 86 (11.1) |
| Housewife/Not working/Student/Volunteer | 258 (33.2)|
| Total                         | 775 (100) |

* MYR, Malaysian Ringgit (1 USD = 3.26 MYR as of January 1, 2014).
education (n = 403) in one group tagged “pre-tertiary education.” Finally, volunteers (n = 7) were added to the housewife/not working/students group (n = 251).

All human studies were reviewed by the University of Malaya Research Ethics Committee (Reference Number: UM.TNC2/RC/H&E/UMREC-35). All respondents gave their informed consent prior to their inclusion in the study.

RESULTS

Table 2 reports the breakdown of respondents’ objections to donating organs under a PCS without and with a PAS. Overall, 36.1% of respondents recorded no objection under a PCS. The remaining 63.9% originally stated that they would refuse to donate organs if a PCS was to be implemented in Malaysia. The overall rate of objection then declined to 54.6% after respondents considered the scenario in which a PAS for organ transplant would be implemented along with a PCS.

The last column of Table 2 reports the reduction in objections to organ donation by demographic and socioeconomic characteristics. Declines in objections may be observed in all subcategories. Bivariate analysis reveals that age, marital status, education, monthly personal income, and monthly household income are significantly associated with objection to donating organs in both models (P < 0.05).

Table 3 reports the results of the logistic regressions for respondents’ attitudes toward organ donation in both models. In the first model (without a PAS), respondents with pretertiary education were approximately one and a half times more likely to object to deceased donation than were respondents with tertiary education (adjusted odds ratio [AOR] = 1.615, P < 0.01). In the second model (with a PAS), the differences

| Variable                        | Model 1 | Model 2 |
|---------------------------------|---------|---------|
|                                | Objection Under a PCS | Objection Under a PCS and a PAS | Change in Objection |
|                                | N (%)   | P       | N (%)   | P       | N (%)   |
| Ethnicity                      |         |         |         |         |         |
| Malay                          | 342 (65.50) | 0.221   | 286 (54.70) | 0.424   | 56 (16.40) |
| Chinese                        | 112 (58.60) |         | 99 (51.80) |         | 13 (11.60) |
| Indian and Others              | 41 (66.10)  |         | 38 (61.20) |         | 3 (7.30)   |
| Sex                            |         |         |         |         |         |
| Male                           | 246 (62.10) | 0.300   | 216 (54.50) | 0.984   | 30 (12.20) |
| Female                         | 249 (65.70) |         | 207 (54.60) |         | 42 (16.90) |
| Age, y                         |         |         |         |         |         |
| <31                            | 283 (58.50) | 0.000   | 226 (46.70) | 0.000   | 57 (20.10) |
| 31–50                          | 152 (74.10) |         | 138 (67.30) |         | 14 (9.20)  |
| >50                            | 60 (69.80)  |         | 59 (68.60)  |         | 1 (1.70)   |
| Marital status                 |         |         |         |         |         |
| Single                         | 257 (58.70) | 0.001   | 205 (46.80) | 0.000   | 52 (20.20) |
| Married                        | 217 (69.80) |         | 198 (63.70) |         | 19 (8.80)  |
| Divorced                       | 21 (80.80)  |         | 20 (76.90)  |         | 1 (4.80)   |
| Education                      |         |         |         |         |         |
| Pre-tertiary education         | 292 (68.20) | 0.005   | 260 (60.70) | 0.000   | 32 (11.00) |
| Tertiary education             | 203 (58.50) |         | 163 (46.90) |         | 40 (19.70) |
| Monthly personal income        |         |         |         |         |         |
| ≤2000 MYR                      | 271 (58.30) | 0.000   | 229 (49.20) | 0.000   | 42 (15.50) |
| 2001–4000 MYR                  | 198 (73.90) |         | 173 (64.60) |         | 25 (12.60) |
| >4000 MYR                      | 26 (61.90)  |         | 21 (50.00)  |         | 5 (19.20)  |
| Monthly household income       |         |         |         |         |         |
| ≤3000 MYR                      | 227 (57.90) | 0.001   | 187 (47.70) | 0.000   | 40 (17.60) |
| 3001–6000 MYR                  | 194 (71.60) |         | 174 (64.20) |         | 20 (10.30) |
| >6000 MYR                      | 74 (66.10)  |         | 62 (55.40)  |         | 12 (16.20) |
| Total                          | 495 (63.90) | 0.413   | 423 (54.60) | 0.158   | 72 (14.50) |

*Percentages are taken based on the total number of respondents in the respective subcategories shown in Table 1.

MYR, Malaysian Ringgit (1USD = 3.26 MYR as of January 1, 2014).
TABLE 3. Demographic and Socioeconomic Predictors of Objection to Deceased Organ Donation; Multiple logistic Regressions

| Independent Variable | Coefficient (β) | 95% CI for AOR | Model 1: Objection Under a PCS | Model 2: Objection Under a PCS and a PAS |
|----------------------|-----------------|----------------|-------------------------------|----------------------------------------|
| Education            |                 | 95% CI for AOR |                 |                                        |
| Pre-tertiary         | 0.479***        | 1.523          | 1.615            | 1.161                                   | 2.248                                  | 0.004                                   |
| Tertiary (Ref)       |                 | 1              | 1                |                                        |                                        |                                        |
| Age, y               |                 | 95% CI for AOR |                 |                                        |
| <31                  | −0.437**        | 0.491          | 0.648            | 0.431                                   | 0.975                                  | 0.037                                   |
| 31–50 (Ref)          |                 | 1              | 1                |                                        |                                        |                                        |
| >50                  | −0.147          | 0.805          | 0.863            | 0.488                                   | 1.526                                  | 0.613                                   |
| Monthly personal income |               | 95% CI for AOR |                 |                                        |
| ≤2000 MYR (Ref)      | 0.691***        | 2.025          | 1.994            | 1.385                                   | 2.873                                  | 0.000                                   |
| 2001–4000 MYR        |                 | 1              | 1                |                                        |                                        |                                        |
| >4000 MYR            |                 | 0.106          | 1.163            | 1.112                                   | 0.535                                   | 2.313                                  | 0.776                                   |
| Monthly household income |              | 95% CI for AOR |                 |                                        |
| ≤3000 MYR            |                 | —              | —                | —                                      | —                                      | —                                      |
| 3001–6000 MYR        |                 | —              | —                | —                                      | —                                      | —                                      |
| >6000 MYR            |                 | —              | —                | —                                      | —                                      | —                                      |
| Constant             | −0.052          | 0.949          | 0.706            | 0.666                                   | 0.514                                   | 0.000                                   |

AOR = adjusted odds ratio, Ref = reference, MYR = Malaysian Ringgit (1USD = 3.26 MYR as of January 1, 2014), Ns = not significant, UOR = unadjusted odds ratio, VIF = variance inflation factor.

**P < 0.05.
***P < 0.01.

DISCUSSION

Implementing a PCS

The majority of recent studies suggest that a PCS yields higher donation rates than an ICS.3–8 However, most if not all of these studies concerned the developed world. By contrast, experience with PCSs in the developing world is not encouraging. For instance, Brazil abolished its PCS after noting lower donation rates and high rates of public objection under the system.20 Chile adopted a PCS, in 2009, and the average deceased donations PMP declined over the subsequent years.21 These cases suggest that the success of the PCS model in many developed countries, such as Spain, may be attributed not only to the PCS, but also to the well-organized donation process.24 However, the failure in the developing world to achieve higher donation rates under a PCS has been widely attributed to the absence of public trust in the medical system and the absence of a well-established donation and transplant infrastructure.20,21

Malaysia has used an ICS since 1974,22 and its donation rates are among the lowest in the world.1,15,23 Calls to implement a PCS in Malaysia to increase deceased donations have recently gathered attention and momentum.24 However, our results show that about two-thirds of the Malaysian public would object to donating under a PCS, a figure that does not encourage a transition toward this system. The picture becomes even gloomier if family consent were to be required before
procuring organs from potential donors under a PCS. Another study in Malaysia found that about 70% of the families of eligible Malaysian deceased donors refused to consent to their relatives’ deceased donation.5 In addition, the Chilean experience indicates that family refusal may be expected to increase after shifting from an ICS to a PCS.24

As mentioned above, global experiences have given rise to 2 more considerations that are vital to address for the successful implementation of a PCS. First, public trust in medical systems and government institutions is essential. One study found that such a lack of trust accounts for 30% of the Malaysian public’s refusal to register as deceased donors.15 Second, a well-established infrastructure to host donation and transplant activities is required. Lela Yasmin Mansor, the head of the Malaysia National Transplant Resource Center, stated recently that Malaysian infrastructure is not ready for a transition toward a PCS. These are 2 barriers making it more difficult for a PCS to succeed in Malaysia, so such a transition may not be the right step at the present time.

However, implementing a PAS for organ transplants may increase deceased donations.26 Our results suggest that such a scheme in Malaysia could reduce the general negative attitude toward organ donation (see Table 2). As in Israel, an allocation scheme could be applied under the ICS currently used in Malaysia.12,13 Notwithstanding the evidence from Israel that this could increase rates of deceased donations, the expected implications of such a step in Malaysia require further investigation.

CONCLUSION

The Influence of Social Characteristics

Guy and Aldridge27 argued that a successful marketing campaign for organ donation requires a good understanding of the social factors that may influence donation decisions. Hence, it is imperative to understand the public’s potential reactions toward a proposed organ-donation policy given various demographic and socioeconomic characteristics. Recent studies in Malaysia have found that willingness to donate organs is positively associated with educational level and age, but negatively with personal income11,14; however, these studies did not consider the legislative setting. Studies in the United States and Europe found that positive attitudes toward deceased organ donation are associated with higher educational level, age, and income.28,29 Our results here show that objection to donating organs under a PCS with and without a PAS is negatively associated with higher educational level and age and positively associated with personal income for those earning <4000 MYR (<1226 USD).

Under a PCS, our findings indicate that ethnicity, sex, and job type are not significant predictors of people’s attitudes toward deceased organ donation. Similarly, studies in China, Turkey, and Germany found that sex does not correlate with attitudes toward deceased donation.30–32 Without accounting for legislative setting, however, some studies have found that ethnicity, sex, and job type are associated with people’s attitudes toward deceased organ donation in Malaysia11,14,33 and in other countries.28,29,34,35 These different findings imply that the demographic and socioeconomic predictors of people attitude toward organ donation may differ when considering the legislative settings of organ donation.

Earlier studies suggested that the Malaysian public’s attitudes toward organ donation should be improved through educational campaigns that enhance awareness of organ donation and increase the public’s trust in the medical system and in government institutions.15,23 The results of this study suggest that if a PCS was to be implemented in Malaysia, such educational campaigns should foremost target people with lower educational levels, age 31 to 50 years, and middle incomes.

Limitations

The sample in this study was only drawn from Kuala Lumpur and its suburbs. However, we believe that this area, as a focal metropolitan region that attracts people from all Malaysian states, mirrors, by and large, the demographic profile of the Malaysian population. Similar to other studies in this area of research, association between variables does not necessarily establish causation. Future studies using a time-variant sample may be able to establish causality.

REFERENCES

1. IRODaT. International registry of organ donation and transplantation. 2014. http://www.irodat.org/. [Accessed October 28, 2014].
2. NTRC. National Transplant Resource Centre, Ministry of Health Malaysia. 2014. http://www.dermorgan.gov.my/en/statistics/. [Accessed December 31, 2014].
3. Yahya R, Goh BL, Fan KS, et al. Renal transplantation. In: Goh BL, Ong LM, Lim YN, eds. 21th Report of the Malaysian Dialysis and Transplant Registry 2013. Kuala Lumpur: National Renal Registry, Malaysian Society of Nephrology; 2014:171–197.
4. Steering Committee of the Istanbul Summit. Organ trafficking and transplant tourism and commercialism: the Declaration of Istanbul.- Lancet. 2008;372:5–6. doi:10.1016/S0140-6736(08)60967-8.
5. Gimbel RW, Strosberg MA, Lehrman SE, et al. Presumed consent and other predictors of cadaveric organ donation in Europe. Prog Transplant. 2003;13:17–23.
6. Abadie A, Gay S. The impact of presumed consent legislation on cadaveric organ donation: A cross-country study. J Health Econ. 2006;25:599–620. doi:10.1016/j.jhealeco.2006.01.003.
7. Mossialos E, Costa-Font J, Rudisill C. Does organ donation legislation affect individuals’ willingness to donate their own or their relative’s organs? Evidence from European Union survey data. BMC Health Serv Res. 2008;8:48. doi:10.1186/1472-6963-8-48.
8. Van Dalen HP, Henkens K. Comparing the effects of defaults in organ donation systems. Soc Sci Med. 2014;106:137–142. doi:10.1016/j.socscimed.2014.01.052.
9. Willis BH, Quigley M. Opt-out organ donation: on evidence and public policy. J R Soc Med. 2014;107:56–60. doi:10.1177/014076113507707.
10. Fabre J. Presumed consent for organ donation: a clinically unnecessary and corrupting influence in medicine and politics. *Clin Med.* 2014;14:567–572.

11. Loch A, Hilmı IN, Mazam Z, et al. Differences in attitude towards cadaveric organ donation: observations in a multiracial Malaysian society. *Hong Kong J Emerg Med.* 2010;17:236–243.

12. Lavee J, Ashkenazi T, Stoler A, et al. Preliminary marked increase in the national organ donation rate in Israel following implementation of a new organ transplantation law. *Am J Transplant.* 2013;13:780–785. doi:10.1111/aaj.12001.

13. Lavee J, Ashkenazi T, Gurman G, et al. A new law for allocation of donor organs in Israel. *Lancet (London, England).* 2010;375:1131–1133. doi:10.1016/S0140-6736(09)61795-5.

14. Rasiah R, Manikam R, Chandarsekaran SK, et al. The influence of socioeconomic and demographic variables on willingness to donate cadaveric human organs in Malaysia. *Medicine (Baltimore).* 2014;93:e126. doi:10.1097/MD.0000000000000126.

15. Tumin M, Noh A, Jajri I, et al. Factors that hinder organ donation: religio-cultural or lack of information and trust. *Exp Clin Transplant.* 2013;11:207–210. doi:10.6002/ect.2012.0194.

16. Population Distribution and Basic Demographic Characteristics. Kuala Lumpur: Department of Statistics Malaysia; 2010. www.statistics.gov.my/portal/download_Population/files/census2010/Taburan_Penduduk_Kuala_Lumpur: Department of Statistics Malaysia; 2010. www.statistics.gov.my/portal/download_Population/files/census2010/Taburan_Penduduk_ _dan_Ciri-ciri_Asas_Demografi.pdf.

17. Dattalo P. Determining Sample Size: Balancing Power, Precision, and Practicality: Balancing Power, Precision, and Practicality USA: Oxford University Press; 2008.

18. Peduzzi P, Concato J, Kemper E, et al. A simulation study of the number of events per variable in logistic regression analysis. *J Clin Epidemiol.* 1996;49:1373–1379. doi:10.1016/S0895-4356(96)00236-3.

19. Babyak MA, et al. What you see may not be what you get: a brief nontechnical introduction to overfitting in regression-type models. *Physhosom Med.* 2004;66:411–421 http://www.ncbi.nlm.nih.gov/pubmed/15184705. [Accessed August 26, 2015].

20. Csillag C. Brazil abolishes ‘presumed consent’ in organ donation. *Lancet.* 1998;352:1367.

21. Dominguez J, Rojas JL. Presumed consent legislation failed to improve organ donation in Chile. *Transplant Proc.* 2013;45:1316–1317. doi:10.1016/j.transproceed.2013.01.008.

22. Rosenblum AM, Horvat LD, Siminoff L, et al. The authority of next-of-kin in explicit and presumed consent systems for deceased organ donation: An analysis of 54 nations. *Nephrol Dial Transplant.* 2012;27:2533–2546 (November 2011): doi:10.1093/ndt/gfr619.

23. Tumin M, Noh A, Mohd Satar N, et al. Organ donation in Muslim countries: the case of Malaysia. *Ann Transplant.* 2013;18:671–676. doi:10.12659/AOT.889194.

24. Goh L. Organ donation: Opt-in vs Opt-out. 2013. http://www.thesstar.com.my/News/Nation/2013/03/17/Organ-donation-Optin-vs-Opt-out. [Accessed November 11, 2014].

25. Chen TP, Teo SM, Tan JCK, et al. Cadaveric organ donation at University Hospital Kuala Lumpur. *Transplant Proc.* 2000;32:1809–1810. doi:10.1016/S0041-1345(00)01364-6.

26. Li D, Hawley Z, Schnier K. Increasing organ donation via changes in the default choice or allocation rule. *J Health Econ.* 2013;32:1117–1129. doi:10.1016/j.jhealeco.2013.09.007.

27. Guy BS, Aldridge A. Marketing organ donation around the globe. *Mark Health Serv.* 2001;21:30–35 http://europepmc.org/abstract/med/11763650. [Accessed February 27, 2015].

28. Padela Al, Rasheed S, Warren GJW, et al. Factors associated with positive attitudes toward organ donation in Arab Americans. *Clin Transplant.* 2011;25:800–808. doi:10.1111/j.1399-0012.2010.01382.x.

29. McNamara P, Guadagnoli E, Evanisko MJ, et al. Correlates of support for organ donation among three ethnic groups. *Clin Transplant.* 1999;13 (1 Pt 1):45–50. doi:10.1034/j.1399-0012.1999.011-2-130107.x.

30. Ge F, Kaczmarczyk G, Biller-andorno N. Attitudes toward live and postmortem kidney donation: a survey of Chinese medical students. *Exp Clin Transplant.* 2014;506–509. doi:10.6002/ect.2014.0078.

31. Naqar M, Çetinkaya F, Baykan Z, et al. Attitudes and behaviours of students from the faculty of theology regarding organ donation: a study from Turkey. *Transplant Proc.* 2009;41:4057–4061. doi:10.1016/j.transproceed.2009.09.084.

32. Schaeffner ES, Windsch W, Freidel K, et al. Knowledge and attitude regarding organ donation among medical students and physicians. *Transplantation.* 2004;77:1714–1718. doi:10.1097/00007890-200406150-00015.

33. Abidin ZLZ, Ming WT, Loch A, et al. Are health professionals responsible for the shortage of organs from deceased donors in Malaysia? *Transplant Int.* 2013;26:187–194. doi:10.1111/tri.12019.

34. Moore SA, Myers O, Comfort D, et al. Effects of ethnicity on deceased organ donation in a minority-majority state. *Crit Care Med.* 2014;42:1386–1391. doi:10.1097/CCM.0000000000002115.

35. Regalia K, Zheng P, Sillau S, et al. Demographic factors affect willingness to register as an organ donor more than a personal relationship with a transplant candidate. *Dig Dis Sci.* 2014;59:1386–1391. doi:10.1007/s10620-014-3053-2.