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Comparing the validity of the payment card and structured haggling willingness to pay methods: The case of a diabetes prevention program in rural Kenya

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ABSTRACT

Background: The objective of this study was to compare the theoretical validity of two willingness-to-pay (WTP) methods, the commonly used payment card (PC) and the recently developed structured haggling (SH), for estimating the potential benefits of a diabetes prevention program in rural Kenya.
Methods: A convenience sample of adult residents from a rural county in Kenya (Kiambu), with no history of diabetes, was randomly assigned to one of two WTP methods, PC or SH, using structured face-to-face interviews from December 2011 to February 2012.
Results: A total of 376 respondents completed the interviews using PC (n = 185) or SH (n = 191). More than 95% of respondents were willing to pay something for program access. The study showed that both methods were feasible in rural Kenya. SH resulted in a higher annual mean WTP than PC, Ksh504.05 (US$7.25) versus Ksh619.95 (US$5.90), respectively ($p < 0.01$). Based on theory, it was hypothesized that certain predisposing factors would result in greater WTP. Greater socio-economic status (measured using income proxies) resulted in greater unconditional WTP for both the PC and SH groups (t-tests and bivariate correlations) and conditional WTP (GLM models). GLM for PC showed being male, employed and having distant relatives with diabetes were significant predictors for WTP, while for SH being educated, employed and owning a vehicle were significant predictors.
Conclusion: Both PC and SH showed theoretical validity in rural Kenya. However, the use of SH over PC in rural Kenya may be the better choice given that SH more closely mirrors marketplace transactions in this setting and the use of SH resulted in more significant variables in the GLM models.

1. Introduction

Type 2 diabetes, an inability to produce or efficiently use insulin, is one of the most common non-communicable diseases (NCDs) globally, the fourth or fifth leading cause of death in developed countries, and ranks as one of the top 10 causes of disability. Diabetes is a global health crisis. In 2014, 382 million people globally were estimated to have diabetes, resulting in 4.9 million deaths. Yet only half of those with diabetes are diagnosed (IDF, 2013). Patients with poorly controlled diabetes are at risk for serious complications, including macrovascular (cardiovascular disease and chronic kidney disease) and microvascular (foot problems and visual impairment) (Mitka, 2007; WHO, 2010). The global economic burden of diabetes is also substantial and unsustainable, totaling USD$548 billion or 11 percent of total health expenditures(IDF, 2013).

Type 2 diabetes is no longer a Western disease: 70 percent of persons diagnosed reside in low- to middle- income countries with the indigent being at greatest risk (Lancet, 2010). Sub-Saharan Africa is a region expected to endure one of the highest increases in diabetes prevalence, attributed to urbanization and lifestyle changes, similar to Western countries (Gill et al., 2009; Smith, 2011). Diabetes affects approximately 19.8 million people in the African region and accounts for 8.6% of deaths in adults (IDF, 2013). Ten percent of diabetes cases are type 1, while the overwhelming majority, 90 percent, is type 2 (IDF, 2015; Kirigia et al., 2009).

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Although communicable diseases, including HIV, malaria and TB presently dominate mortality in sub-Saharan Africa, it is predicted that by 2020, NCDs will supersede communicable diseases in mortality rates (Gill et al., 2009). Kenya is one of the largest sub-Saharan African countries with a population of 44 million. Economically Kenya is regarded as the most developed country in east and central Africa, but is still regarded as a developing country of the world, with 38% living in poverty (Irungu, 2013). There is little difference in the prevalence of diabetes globally. The diabetes prevalence in Kenya is on par with Western countries (2.2% in rural areas and 12.2% in urban centers) (IDF, 2011; Mbanya et al., 2010). However healthcare in developing countries is compounded by scarcity of resources, including healthcare personnel and essential medicines, and lack of access to healthcare facilities, especially in rural areas. In developing countries treatment costs exceed income. Given that type 2 diabetes and its complications can essentially be prevented or delayed with lifestyle modifications, focus must be prevention over treatment (IDF, 2015; Smith, 2011; Suri et al., 2009). However, it is unknown how rural residents in Kenya will value a diabetes prevention program that is not currently unavailable in rural Kenya. The present study aims to assess community preferences for a newly developed diabetes prevention program, including diabetes education, screening and referral of at risk individuals consistent with the World Health Organization guidelines (WHO, 2010), in rural Kenya using the stated preference, willingness to pay (WTP) approach.

Willingness to pay (WTP) is a survey method that values programs in terms of small risk changes in morbidity and mortality in newly developed or hypothetical markets. In other words, WTP can be used to value programs that have never been traded in an actual market. Individuals are asked the amount they are willing to pay for a small risk reduction in death or to improve their quality of life (Gafni, 1991). The quantification of risk is important because there is no guarantee in outcomes (O'Brien and Gafni, 1996). An alternative to the stated preference is the revealed preference approach. Revealed preferences measure value by using actual choices people make in the market. As a result this method requires that the behavior of interest to the analyst be observable, which may not be the case. In such cases, the WTP method can be used to elicit preferences for a program based on a hypothetical scenario, and is the most common approach reported in the literature (Adamowicz et al., 1994; Heywood and Stephens, 2010; Mitchell and Carson, 2005).

There is no theoretical justification for preferring one WTP elicitation method in healthcare over another. Different WTP methods, dichotomous choice (DC), direct open-ended (OE), bidding game (BG), and payment card (PC) have different strengths and weakness and may yield different values (Smith, 2000), DC, also known as, binary, referendum, or take-it-or-leave-it, is a closed-ended question approach and involves only asking respondents one yes/no question and was recommended by the US National Oceanic Atmospheric Administration's (NOAA) Blue Panel for environmental contingent valuation studies in preference to the open-ended format (Arrow et al., 1993). DC was selected by the Blue Panel as it was considered to be more realistic, reflecting the market place where people are provided with prices and either do, or do not, make a purchase; respondents would answer honestly – there being no reason for strategic responses; and as a result provide more conservative responses. However, there is empirical evidence to show that DC is inefficient requiring a larger sample size for the same level of precision which is problematic as this would increase the time and cost for data collection. DC does not provide conservative WTP estimates, consistently provides higher bids than other methods, and is prone to acquiescence bias or yea saying (Chestnut et al., 1996; Kanninen, 1995; Loomis et al., 1997; Mitchell and Carson, 2005) where respondents answer positively to questions independent of its content. The simplest OE question involves directly asking respondents their maximum WTP. However, respondents can find this question difficult to answer. This direct approach lacks reliability, is prone to nonresponse and is not recommended (Arrow et al., 1993).

Alternative open-ended approaches are the BG and PC. The BG is designed to resemble an auction; the bid is increased or decreased depending on previous responses to the WTP bid in order to elicit the respondent's maximum WTP. The BG is regarded as more efficient than DC – requiring a smaller sample size compared with other methods for the same level of precision. BG is engaging and the repeated questions provide time for respondents to consider their answers providing more thoughtful responses, i.e., increased construct or theoretical validity. However, the BG is subject to starting point bias, where WTP estimates can be influenced by the first bid, and has been criticized in sub-Saharan Africa due to its underlying philosophy of bidding up after the respondent has agreed to a bid, which is inconsistent with purchasing transactions in this culture (Heinzen and Bridges, 2008; Onwujekwe, 2004). PC was developed by Mitchell and Carson in 1981, in response to limitations of the BG, principally, starting point bias (Mitchell and Carson, 2005). PC offers respondents more context for the bid than DC by providing a specified range of values. They are then asked to indicate which values they would pay (Donaldson et al., 1995; Smith, 2000). PC is regarded to be more reflective of real life where respondents can similarly compare prices for the same good in the marketplace (Donaldson et al., 1997; Mitchell and Carson, 2005). PC is also well suited for small contingent valuation studies (Bayoumi, 2004). Although the Blue Panel's 1993 guidelines were designed for environmental interventions, it appears to have had a significant impact on the WTP elicitation method employed in healthcare. Prior to the publication of the blue panel report (<1990: ≥1990), OE (75%:29%) questions dominated in Western healthcare contingent valuation studies, while after its publication OE studies substantially declined with DC (0:36%) and BG (0%: 35%) being the prevailing methods, and PC (13%:21%) gaining momentum (Diener et al., 1998).

An alternative WTP approach designed to address BG criticisms is the more recently developed structured haggling (SH). SH can be regarded as a variation on the open-ended approach that more closely mirrors the rural Nigerian marketplace than the BG or DC (Onwujekwe, 2004). SH is similar to the BG, but differs in that the interviewer cannot offer a higher bid once the respondent has agreed to an offered bid. This is important because in the rural African marketplace, similar to a flea market transaction, once a price is agreed upon, it is considered unacceptable for the seller to haggle the price upwards. To date, SH has only been published in a limited number of contingent valuation studies by its developer from 2003 to 2008, where it has been directly compared to the BG in malaria treatment (Onwujekwe et al., 2004b) and with the BG and DC with follow up (DCFU) in malaria prevention (Onwujekwe, 2004; Onwujekwe et al., 2003, 2004a, 2005a, 2005b, 2008). In summary, these studies showed SH: had a mean bid lower than DCFU but approximately 10% greater than BG, and greater theoretical validity than BG and DCFU. SH regression models had better fit and more significant explanatory variables, and when comparing stated to actual WTP, SH was a better predictor of observed behavior over BG and DCFU methods. As a result researchers reported that further investigation of the SH in different settings and goods was warranted (Onwujekwe, 2004). To date, SH method studies have only been conducted in rural Nigeria, a lower middle income country (LMIC) (Onwujekwe, 2004; Onwujekwe et al., 2003, 2004a, 2004b, 2005a, 2005b, 2008), and have not been directly compared to the PC method in sub-Saharan Africa