DO STATUS-QUOS BIAS RESULTS? EVIDENCE FROM A HOUSEHOLD WATER SURVEY IN SOUTH AFRICA

Genius Murwirapachena¹ and Johane Dikgang²

ABSTRACT

Including the status-quo in choice experiments has received mixed views in literature. Scholars against its inclusion suggest that it biases results while those in the affirmative argue that it makes sure respondents are not forced to choose between two hypothetical alternatives. Using choice experiments, this study seeks to achieve two fundamental objectives. First, the study elicits household preferences for water service packages in South Africa. Second, it examines the role of the status-quo in choice experiments by testing whether the inclusion of applicable status-quo bias results. A sample of 1002 households from the eThekwini metropolitan municipality is stratified into suburban and township households. Two separate experiments with different status-quo are presented to households in each stratum. Choice-sets have varying levels of five attributes - position of pipe, reliability, pressure, quality, and monthly cost. Estimation is done using the conditional logit model and several findings are revealed. First, township households do not prefer increases in water costs. Second, households in both strata do not prefer changes in the way they access piped water services. Third, households in both strata prefer changes in reliability. Fourth, suburban households do not prefer any changes in water pressure whereas township households prefer changes in pressure. Fifth, households in both strata are happy with the current water quality. Furthermore, we find that the status-quo played a role in determining choices in the township stratum. The same did not apply in the suburban stratum.

Keywords: choice experiments, status-quo, suburban, township, water

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1. INTRODUCTION

The best way to develop consumer oriented water policies is through assessing whether current water service packages provided to consumers meet their expectations. Establishing consumer preferences and comparing them to the available water service packages is important in policy formulation. A number of studies exist on consumer preferences for agricultural water services (see Cook and Rabotyagov, 2014; Loch et al., 2014), consumer preferences for water quality (see Ahtiainen, Pouta and Artell 2015; Martin-Ortega et al., 2012) and households’ water preferences (see Rungie, Scarpa and Thiene, 2014; Bjornlund, Parrack, and De Loe, 2012). In South Africa, some few attempts have been made to elicit consumer preferences for water services (see Snowball, Willis and Jeurissen, 2008; Kanyoka, Farolfi and Morardet, 2008). The scarcity of literature on water services preferences in South Africa makes it imperative for researchers to conduct studies that provide a pool of knowledge for policymakers in the water sector.

Although the private sector is involved in providing water services in some parts of the world, public utilities provide water services in most parts of the world. In South Africa, all the water supply services are currently in the public sector. The country constitutionally considers access to water a basic human right, making water both a social and economic good. In light of this constitutional requirement, municipalities have a responsibility to provide water services at affordable tariffs for all citizens. The increasing block tariff (IBT) structure is used by all municipalities to charge for water services. As the household water usage increases, the tariff moves to the next higher block of consumption. There is provision for free basic water for poorer households that cannot afford to pay for water services. Municipalities set the criteria for qualification for free basic water and these criteria vary between municipalities.

Water service provision is associated with a lot of operational costs stemming from bulk water purchases, treatment, storage, transportation and disposal (Eberhard, 2003; EUWI-FWG, 2012). Raising revenue from consumers is central to cost recovery and future up-scaling of water services (Goldblatt, 1999). Statistics reveal that most municipalities in South Africa struggle to raise enough revenue to cover the costs of providing water services. Critics suggest municipalities fail to generate enough revenue from water services because of very low tariffs (see Tsegai, Linz and Kloos, 2009) and inefficiencies (see Westhuizen and Dollery, 2009) while
others suggest that municipalities do not properly consult consumers on their preferences. In most areas, households receive “one-size-fit-all” water services and do not get value for their money. Differently, some scholars blame backlogs created by the exclusive policies of the apartheid era (see Nleya, 2008). Despite all these possible reasons, the lack of proper consultations on consumer preferences is key to the poor service deliveries that cause persistent protests in South African communities.

This study uses choice experiments to elicit household preferences for water service packages in South Africa. Due to the reason that it has both urban and rural components which capture the South African dynamics, the eThekwini metropolitan municipality is used as a case study. In addition to establishing household preferences for water service packages, the study examines the role of the status-quo in choice experiments by testing whether the inclusion of applicable status-quo bias results. The inclusion of the status-quo in choice experiments has received mixed views in literature. Scholars against its inclusion suggest that status-quo bias results while those in affirmative argue that including status-quo make sure that respondents are not forced to choose between two hypothetical alternatives (see Viscusi and Huber, 2012; Lanz and Provins, 2012; Meyerhoff and Liebe, 2009; Scarpa, Willis and Acutt, 2007).

Considering this background, two fundamental questions can be asked. The first question is “do South African water service packages satisfy demand?” and the second methodological question is “does the inclusion of a status-quo bias results?” Using choice experiments conducted in the eThekwini metropolitan municipality in South Africa, this study attempts to address these two questions. Precisely, the study seeks to achieve two main objectives. First, the study aims to establish households’ preferences for water service packages in South Africa using the eThekwini metropolitan municipality as a case study. Second, the study aims to test whether the inclusion of a status-quo in choice experiments biases the results.

The study is relevant to both the water sector and the choice experiment methodological discourse. In the water sector, the study is vital as it contributes to the limited knowledge about how municipalities are performing as far as water provision is concerned. The household’s assessment of whether the water services they receive from municipalities satisfy their demand is used as a proxy for measuring municipal performance. Since households play a key role in water
consumption, it is essential to establish how they prefer to receive water services. Establishing households’ preferences and comparing them to the available water services packages is essential for improving water services provision. Since South Africa is a water scarce country, tailoring water service packages to the preferences of households helps in sustainable water resources management and also improves water services revenue for municipalities.

Methodologically, the study brings in some innovation by stratifying the sample into suburbs and townships and then present two distinct experiments to each stratum. The first experiment in each stratum has a status-quo applicable to the stratum whereas the second experiment in each stratum includes a status-quo that is not applicable to the particular stratum. Comparing results from each block enables us to see the role of the status-quo in choice experiments. Our findings will contribute to the ongoing debate on whether the inclusion of the status-quo would bias results. Additionally, unlike other studies imposing the same status-quo on a rather diverse sample, this study is one of the few studies that take note of diversity in the targeted population, stratify the sample according to the prevalent dynamics, and subsequently use status-quo applicable to each stratum.

Subsequent to this section, the study is organised into five (5) sections. Section 2 gives a brief overview of the study area. Section 3 reviews some of the empirical literature related to the study. Section 4 discusses the methodology. Section 5 details the survey. Section 6 presents and discusses results. Section 7 concludes the study.

2. STUDY AREA

Located in the KwaZulu-Natal (KZN) province, the eThekwini metropolitan municipality is the third largest metropolitan in South Africa with a population of about 3.60 million people (eThekwini Municipality, 2015b) that live either in the suburbs, townships, informal settlements or rural areas. Young people (0-14 years) constitute 25.2% of the population while the working age (15-64 years) make up to 70% of the population with the elderly (65+ years) constituting 4.8% of the population (National Census, 2011). A large number of people in the municipality fall between poor and middle class with just a few in the high income groups. In 2015, the official (strict) unemployment rate in the municipality was 16.5% with an expanded unemployment rate of 26.3% (eThekwini Municipality, 2015c). The municipality is one of the
fastest growing municipalities in South Africa and generates most of KZN’s gross domestic product (GDP). Most non-residents have the perception that the municipality only covers the city of Durban. Even though Durban is the main economic hub, the municipality extends beyond Durban. To understand the full jurisdiction of the eThekwini metropolitan municipality, Figure 1 gives a map of the municipality.

Figure 1: Map of the eThekwini metropolitan municipality

Our study surveyed several areas in the municipality. In Durban, households from Morningside, Musgrave and Overport were surveyed. The survey was also conducted in other suburban areas outside Durban, namely, La Lucia, Umhlanga, Verelum and New Germany. For townships, respondents interviewed were from Inanda, Ntuzuma, Phoenix, Verelum, Westville, Chesterville, Chatsworth and Umlazi. Respondents from informal settlements in Bhambayi (Inanda) and some sections of Umlazi were also interviewed. Rural households were also surveyed in Umbumbulu.
An exploration of all these diverse areas gave us a clear picture of how households receive water in the municipality.

The municipality is the main source of water, providing 90.5% of all the water consumed by households while the rest use other sources such as boreholes, springs, and rivers or streams (National Census, 2011). The minimum standard of water service provided by the municipality is a standpipe provided to serve a community where the maximum distance from the furthest dwelling to the standpipe is 200 metres (eThekwini Municipality, 2014).

Like in most African water utilities (see Espey et al., 1997) the eThekwini municipality uses the IBT structure to charge for water services. Currently, five successive blocks are distinguished and the property value based targeting is used to determine households that receive free basic water services. Households living in properties valued at less than R250,000 do not pay for any consumption in the first block (up to 9,000 litres of water per month). Statistics show that a sizeable number of households in the municipality do not have piped water inside dwelling. This is commonly found in townships, informal settlements and rural areas. The 2011 national census revealed that only 60.2% of households have access to water inside their dwellings.

3. LITERATURE REVIEW

There is a scarcity of literatures that uses choice experiments (CE) to value water resources in South Africa. A few studies exist on water preferences for farmers (Speelman and Veetil, 2013; Saldías, Speelman, Huylenbroeck and Vink, 2016), willingness to pay (WTP) for recreational fishing (Lee, Hosking and du Preez, 2014) and water values in different use sectors (Nieuwoudt and Backeberg, 2011). Studies that actually estimate households’ preferences for water services are quite scarce. The few available studies were conducted in rural parts of South Africa (Kanyoka et al., 2008), middle-income urban areas (Snowball, Willis and Jeurissen, 2008) and informal settlements (Goldblatt, 1999). Our study adds to this gap in literature by looking at household preferences for water services in South African suburbs and townships. This section reviews some of the literature that use CE to elicit household water preferences. Additionally, the section looks at how existing studies make use of the status-quo in their experiments.
CEs are a powerful tool in eliciting consumer preferences. However, there is a debate in literature regarding the role of the status-quo in choice experiments (see Viscusi and Huber, 2012; Lanz and Provins, 2012). According to Meyerhoff and Liebe (2009) the inclusion of the status-quo would bias the results due to protest attitude, attitude towards the good, and perceived choice task complexity. Additionally, Scarpa, Willis and Acutt (2007) argue that the status-quo is experienced by respondents making them biased against the utility associated with experimentally designed hypothetical alternatives which they can only imagine.

Lanz and Provins (2015) use CE to examine the determinants of status-quo choices in CEs in the regulation of the water industry in England and Wales. Results from the study show that the perception of the status-quo plays an important role in explaining status-quo choices. This suggests that the status-quo is valuable to many respondents because they are satisfied with current service levels or because they neither feel nor are directly affected by changes in the provision of service attributes.

A number of studies in literature exclude the status-quo and include the opt-out option in CEs. Hensher, Shore and Train (2005) use choice sets of two alternatives with no status-quo to investigate households’ WTP for drinking water and wastewater service attributes in Canberra, Australia. Respondents were allowed to opt out by refusing the provided alternatives. Similarly, Saldías et al. (2016) use CE with three choice options and without the status-quo to examine farmers’ preferences for wastewater reuse frameworks in agricultural irrigation in Cape Town, South Africa. The study preferred an opt-out option over the status-quo because there was no common status-quo for the respondents since some used treated wastewater and others did not. The exclusion of the status-quo in these studies raises more questions on the role of the status-quo option in choice experiments.

However, in examining the local residents' preferences for water quality management in France, Poirier and Fleuret (2010) asked respondents to choose their preferred alternative between two improvement options and a status-quo. Determining the status-quo in this study was not complex as there were current water quality issues in the targeted sample. In the Khorezm region of Uzbekistan, Bhaduri and Kloos (2013) examine whether water pricing can be implemented by the bundling of water services with additional non-water-related community services in order to increase farmers’ willingness to pay for water. Farmers were presented with three choice options.
and a status-quo. A baseline was assumed in the study and used as a status-quo applicable to all farmers. Using the same baseline as the applicable status-quo for all farmers means that the status-quo did not capture diversity in the farmers.

Vasquez, Franceschi and van Hecken (2011) use CE to investigate households’ preferences for improved water services and decentralisation levels in urban Matiguas in Nacaragua. Results revealed that households preferred the existing departmental administration to municipal water service provision, but believed that the municipality would improve service delivery. The issue of the status-quo was not of much concern in the study since all water services were currently administered by a water utility and the proposal was for the municipality to administer the water services.

However, the status-quo is important in studies like Anand (2001) where water service preferences for Chennai residents is stratified into Chennai city and the other party of the Chennai metropolitan. Unlike in our current study, the stratification in Anand (2001) was to allow for the inclusion of attributes that did not exist in the other stratum. Our study stratifies the sample as a measure to avoid imposing the same status-quo on a rather diverse sample. Attributes and levels in our study are consistent across the two strata. The only difference in the two strata is the status-quo because this is what differs in the way South African communities receive potable water services.

In South African household water preferences, Snowball et al. (2008) use CE to elicit the WTP for water service improvements for 71 households in Grahamstown West, a middle-income urban area. Bacteria count, discolouration, water pressure, supply interruption, water meter problems, and price are used as attributes and results reveal that bacteria count, discolouration, supply interruptions and price to be statistically significant determinants of choice. In rural South Africa, Kanyoka et al. (2008) use CE to elicit households’ preferences and willingness to pay for multiple-use water services in seven villages from Sekororo-Letsoalo in the Limpopo Province. Water quantity, supply frequency, quality, price, productive uses, and source are used as attributes and results show that distance, reliability and quality are more important than the quantity. Like in our current study, Kanyoka et al. (2008) stratify the sample, however, based on the villages’ access to private taps. Despite the differences in access to piped water in Kanyoka et al. (2008), the study could actually use the same status-quo because the diversity in the sample
was minimal. This also applies to Snowball et al. (2008) where all respondents were middle-income urban residents.

The role of the status-quo in choice experiments is widely contested in literature. In this current study, we examine the role of the status-quo by presenting households with two distinct experiments, one with the most applicable status-quo and the other with the less applicable status-quo. Results from these two distinct questionnaires will be compared to test if households’ choices change when presented with different status-quo. The subsequent section discusses the theoretical framework of choice experiments.

4. METHODOLOGY

Theoretical framework of choice experiments

To elicit households’ preferences for water services packages in the eThekwini metropolitan municipality, the study uses choice experiments. CE are stated preference surveys that give respondents a series of alternatives, differing in attributes and levels (Hanley, Mourato and Wright, 2001). Respondents compare the available alternatives and choose the one that maximises their utility. The CE method is suitable when the researcher intends to establish the value of individual attributes of an environmental good (Anand, 2001). By presenting respondents with a hypothetical setting and asking them to choose their preferred alternatives, CE clarifies the attributes that determine the value people place on non-market goods (Vloerbergh et al., 2007).

The theoretical foundations of CE are coined from the random utility theory which hypothesises that an individual makes choices based on the characteristics of the good along with a random component (McFadden, 1973). The random component could emerge from the uniqueness embodied in the individual’s preferences or due to the researcher having incomplete information about the individual observed (Ben-Akiva and Lerman, 1985). Given this, the random utility theory hypothesises that the utility $U_{ij}$ of individual $i$ obtained from alternative $j$ is not known but can be decomposed into a deterministic component $V_{ij}$ and an unobserved random component, $\epsilon_{ij}$. Therefore, the individual utility function will be presented as:

$$U_{ij} = V_{ij} + \epsilon_{ij}$$ (1)
Alternatively, the utility function in Equation 1 could be expressed by decomposing the indirect utility function for each individual \( U_{ij} \) into two components. These are the deterministic component \( V \) normally specified as a linear index of the attributes \( X \) of the \( j^{th} \) alternative in a choice set, and a stochastic component \( e \) representing the error term. Therefore, the function assumes the form:

\[
U_{ij} = V_{ij}(X_{ij}) + e_{ij} = bX_{ij} + e_{ij}
\]  

Equation 2 shows that socio-economic variables can be included together with the attributes of each choice set. However, because socio-economic variables remain the same for choice sets of a particular individual, Hanley et al. (2001) suggest that they should be entered as interaction terms or by way of splitting the dataset. Any rational individual \( i \) would be assumed to choose alternative \( j \) over alternative \( k \) if \( U_{ij} > U_{ik} \). The deterministic component \( V_{ij} \) can be assumed to be a linear function of the explanatory variables, \( V_{ij} = x_{ij}' \beta \). In this case \( \beta \) is a vector of coefficients associated with the vector \( x' \) of explanatory variables, which are attributes of alternative \( j \) of individual \( i \) (Greene, 2000).

Discrete choice theory suggests that the assumptions placed on the random component of the utility determine the statistical model to be used. The statistical models that can be used to analyse choice experiment responses are conditional logit model (CLM), multinomial logit (MNL) model, random utility model (RUM), mixed logit model (MLM), and the latent class model (LCM). Since attributes are used as explanatory variables in estimation, the CLM gives clear estimates of attributes that are most preferred by respondents. Therefore, this study uses the CLM to analyse household choices.

CLM is also known as a fixed-effects logit model for panel data because it fits a conditional logistic regression model for matched case-control data. The model assumes that the random components (error terms) are independently and identically distributed with an extreme value type I distribution, the variance of which is:

\[
var(\varepsilon) = \pi^2 \tau^2 / 6
\]  

In this context, \( \tau \) is a scale parameter used to normalise the model. Therefore, the choice probability of an alternative in the CLM is expressed as:
\[ P_{ij} = \frac{\exp \left( \frac{v_{ij}}{\tau} \right)}{\sum_{k=1}^{K} \exp \left( \frac{v_{ik}}{\tau} \right)} \]  

(4)

When the CLM is applied to \( n \) choice sets, the probability that individual \( i \) will choose alternative \( j \) is:

\[ P_i(j) = P \left[ x_{ij}' \beta + \epsilon_{ij} \geq \max_k \epsilon_{ci} (x_{ik}' \beta + \epsilon_{ik}) \right] = \frac{\exp \left( x_{ij}' \beta \right)}{\sum_k \epsilon_{ci} \exp \left( x_{ik}' \beta \right)} \]  

(5)

Equation 5 implies that the probability that individual \( i \) chooses alternative \( j \) is equal to the probability that the utility derived from \( j \) is greater than the utility derived from other possible alternatives (Whittington, Mu and Roche, 1990).

The study also estimates the marginal willingness to pay (MWTP) of respondents. MWTP is a welfare measure that shows the marginal rate of substitution (MRS) for attributes. Precisely, MWTP gives average estimates of what households are prepared to pay for or against the improvement of each attribute. Assuming a linear utility function with the cost \( C \) component:

\[ U_{ij} = \beta a_j + \mu (C_i - p_j) + \epsilon_{ij} \]  

(6)

The MRS between an attribute and cost is:

\[ MRS = - \frac{\partial U_{ij}}{\partial a_j} / \frac{\partial U_{ij}}{\partial C_i} = - \frac{\beta_j}{\mu} = MWTP \]  

(7)

Equation 7 is a simple ratio of the coefficients which can be compared across models because the scale parameters are cancelled. Compared to other stated preference methods, choice experiments establish values for each attribute, rather than for the whole good (Snowball et al., 2008). Despite having a lot of advantages, choice experiments are not a substitute of other stated preference methods like CVM but rather complement them.
Survey design

The first step in modelling a choice experiment is selecting relevant attributes and realistic attribute levels (Hanley et al., 2001). When conducting household surveys, Statistics South Africa collects information on how households access water in terms of the main source of water (inside or outside dwelling) and other important aspects like pressure, reliability and quality. This is because South African laws governing the water sector prescribe some minimum standards of water provision to households in terms of pressure, distance and quality. These attributes make collectively make up a typical water service package. In this study, we investigate the most preferred attributes in the package. A water service package in this context is defined as one consisting of varying levels of five attributes, namely, access to piped water, reliability of water supply, water pressure, water quality, and the monthly water cost.

Two focus groups were established and a series of discussions conducted to refine the attributes and levels of the experiment. Assigning levels to the chosen attributes was done after a thorough consultation of literature and revelations gathered from the two focus groups. Levels for piped water were deduced from the 2011 national census which shows that households in the eThekwini municipality access water either inside dwelling, in the yard, from a community tap, or from other sources. In assigning levels to the cost attribute, the current domestic water tariffs structure published by the eThekwini municipality was used. The water tariff structure has five successive blocks (IBT structure) and the average costs for consumption in each block were used as levels for the cost attribute. Levels for water pressure, reliability, and quality were established following some thorough focus group discussions. The water services attributes and levels used in the study are presented in Table 1.
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
<th>Attribute Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piped water</td>
<td>Access to piped- or tap-water in the dwelling, on-site or off-site. This shows how piped water is delivered to households.</td>
<td><strong>Level 1:</strong> Inside dwelling</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 2:</strong> In yard</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 3:</strong> Community tap: less than 200m from dwelling</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 4:</strong> Community tap: greater than 200m from dwelling</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 5:</strong> No access to piped water</td>
</tr>
<tr>
<td>Reliability of supply</td>
<td>Whether the household had any interruption in piped water supply in the last one month.</td>
<td><strong>Level 1:</strong> Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 2:</strong> No</td>
</tr>
<tr>
<td>Water pressure</td>
<td>Pressure is the force that pushes water through pipes. Water pressure determines the flow of water from the tap.</td>
<td><strong>Level 1:</strong> High water pressure</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 2:</strong> Low water pressure</td>
</tr>
<tr>
<td>Water quality</td>
<td>A measure of the suitability of water for a particular use based on selected physical, chemical and biological characterises.</td>
<td><strong>Level 1:</strong> Safe to drink</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 2:</strong> Has colour</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 3:</strong> Has a taste</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 4:</strong> Has a smell</td>
</tr>
<tr>
<td>Cost</td>
<td>Cost per month.</td>
<td><strong>Level 1:</strong> R120</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 2:</strong> R220</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 3:</strong> R400</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 4:</strong> R680</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Level 5:</strong> R980</td>
</tr>
</tbody>
</table>

Most studies in literature traditionally use the orthogonal design to populate the hypothetical choice situations shown to respondents (see Willis et al., 2005; Snowball et al., 2008; and Katyoka et al., 2008). Even though orthogonal designs allow for the effects to be estimated...
independently in linear models, this is no longer true for nonlinear models such as discrete choice models (Bliemer and Rose 2006 cited in Bliemer, Rose and Hess, 2008). Critics of the orthogonal design argue that even though the design may be orthogonal, often the data used in estimation is not orthogonal as a result of many things that go wrong when researchers attempt to maintain orthogonality in stated choice data (see Bliemer, Rose, and Chorus, 2015). In recent years, researchers have been using efficient designs. The problem with efficient designs is that they are only efficient if the prior parameters are correct. If the prior parameters are wrong, an efficient design can become inefficient (Bliemer and Rose, 2011). Studies suggest that Bayesian D-efficient designs are more robust because their efficiency are less sensitive to misspecification of the priors (Bliemer et al., 2008).

In this study, the Bayesian D-efficient design is used to create the hypothetical choice-sets presented to households. The problem of prior parameters associated with efficient designs does not exist in a Bayesian efficient design because the later assumes prior parameter random distributions. Six (6) choice-sets with two (2) alternatives were designed. The number of draws for Bayesian priors was determined by five (5) Gaussian draws. Using the Bayesian approach, the efficiency of a design is evaluated over numerous different draws taken from the prior parameter distributions assumed in generating the design (Bliemer et al., 2008). Bliemer et al. (2008) recommend the Gaussian method as the best approximation method when calculating the Bayesian efficiency of choice-sets.

A number of choice experiment studies in literature impose the same status-quo on respondents (see Poirier and Fleuret, 2010; Bhaduri and Kloos, 2013; Vasquez et al., 2011; Snowball et al., 2008). South African cities typically consist of suburban and township areas. The former are higher income areas while the latter are low income areas. Therefore, the samples in these two areas are distinct, implying different status-quaos. As a result, this study stratifies the sample into two strata, one for suburban households and the other for township households. In the context of this study, township households refer to all non-suburban households in the municipality, these are, households from townships, informal settlements and rural areas. These groups of households were grouped together under townships because in most cases, the water service packages they receive are almost similar. Two distinct questionnaires were developed for each stratum with each having a status-quo applicable to the specific stratum.
In an attempt to test the role of the status-quo in choice experiments, an additional choice experiment with a status-quo that is less applicable to each stratum was conducted. The status-quo presented to each stratum in this regard did not reflect the water service packages currently received by each particular stratum. In doing this, we were able to test if households’ preferences would differ given less applicable status-quo. Therefore, this implies that each stratum in our sample was presented with two questionnaires, one with the status-quo most applicable to the stratum and the other with a status-quo less applicable to the stratum. An example of the choice sets presented to respondents is given in Table 2.

Table 2: Example of the choice-sets used

<table>
<thead>
<tr>
<th>STATUS-QUO</th>
<th>ALTERNATIVE 1</th>
<th>ALTERNATIVE 2</th>
<th>NONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piped water</td>
<td>In yard</td>
<td>In yard</td>
<td>Inside dwelling</td>
</tr>
<tr>
<td>Reliability</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Water pressure</td>
<td>Low pressure</td>
<td>Low pressure</td>
<td>High pressure</td>
</tr>
<tr>
<td>Water quality</td>
<td>Safe to Drink</td>
<td>Has colour</td>
<td>Has a smell</td>
</tr>
<tr>
<td>Cost per month</td>
<td>R0</td>
<td>R120</td>
<td>R680</td>
</tr>
</tbody>
</table>

Table 2 shows an example of one of the choice-sets presented to township households. Respondents were given six choice-sets followed by general and biographical questions. In each choice-set, respondents were asked to choose between the two alternatives 1 and 2 or rather opt out by choosing the status-quo. Where respondents preferred neither the two alternatives nor the status-quo, they would choose “none”. Electronic questionnaires where enumerators carried only a tablet to respondents were used. Enumerators would go through the electronic questionnaire with the respondent, and the latter chose their most preferred options in the process. Captured data was stored electronically using the ONA server immediately after each interview and retrieved later for cleaning and analysis. To avoid sample selection bias, respondents were randomly selected across the municipality.
5. THE SURVEY

The survey was conducted in the eThekwini metropolitan municipality during the period September to November 2016. Four trained enumerators who are fluent in both English and isiZulu were employed to collect data. A total of 1002 respondents (500 from townships and 502 from suburbs) were interviewed. Each stratum was presented with the two sets of questionnaires (one with the most applicable status quo and the other with a less applicable status quo). For the township stratum, 250 responses where collected using the questionnaire with the applicable status-quo and the other 250 using the questionnaire with the inapplicable status-quo. These figures were respectively, 250 and 252 in the suburban stratum.

As alluded earlier under the study area section, the survey took place in several locations around the eThekiwni metropolitan municipality. Townships households surveyed were from Inanda, Ntuzuma, Phoenix, Verelum, Westville, Chesterville, Chatsworth, Umlazi, Bhambayi and Umbumbulu. Suburban households surveyed were from Morningside, Musgrave, Overport, La Lucia, Umhlanga, Verelum and New Germany. While township respondents were easy to access, very welcoming and keen to respond to questions, the reception was not the same in the suburb stratum.

In most cases, we struggled to access suburban households who in most cases would be at work, have tight security barriers around their homes or will simply be not interested. To solve this problem, we resolved to visit areas where such households spend their leisure time for example parks, shopping malls, beaches and other places such as car washes. As a measure to avoid interviewing non-suburban residents, respondents were asked their place of residence before each interview. The enumerators also took cognisance of the possibility of surveying the same household more than once. To avoid this possibility, respondents were asked if they were aware of any member of their family taking part in any water service survey in the recent past. The descriptive statistics of the surveyed sample are presented in Table 3.
Table 3: Descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Townships</th>
<th>Suburbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of respondents</td>
<td>500</td>
<td>502</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>72%</td>
<td>41%</td>
</tr>
<tr>
<td>Male</td>
<td>28%</td>
<td>59%</td>
</tr>
<tr>
<td>Household head</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>53%</td>
<td>42%</td>
</tr>
<tr>
<td>No</td>
<td>47%</td>
<td>58%</td>
</tr>
<tr>
<td>Household size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mean</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Maximum</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>67%</td>
<td>49%</td>
</tr>
<tr>
<td>Married</td>
<td>31%</td>
<td>48%</td>
</tr>
<tr>
<td>Other</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African</td>
<td>81%</td>
<td>42%</td>
</tr>
<tr>
<td>Indian</td>
<td>16%</td>
<td>44%</td>
</tr>
<tr>
<td>Coloured</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td>White</td>
<td>1%</td>
<td>9%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-24 years</td>
<td>18%</td>
<td>13%</td>
</tr>
<tr>
<td>25-34 years</td>
<td>24%</td>
<td>34%</td>
</tr>
<tr>
<td>35-44 years</td>
<td>21%</td>
<td>25%</td>
</tr>
<tr>
<td>45-54 years</td>
<td>15%</td>
<td>14%</td>
</tr>
<tr>
<td>55-64 years</td>
<td>11%</td>
<td>9%</td>
</tr>
<tr>
<td>65+ years</td>
<td>11%</td>
<td>5%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never attended school</td>
<td>6%</td>
<td>1%</td>
</tr>
<tr>
<td>Primary</td>
<td>11%</td>
<td>1%</td>
</tr>
<tr>
<td>High school</td>
<td>62%</td>
<td>24%</td>
</tr>
<tr>
<td>Certificate</td>
<td>11%</td>
<td>21%</td>
</tr>
<tr>
<td>Diploma</td>
<td>7%</td>
<td>27%</td>
</tr>
<tr>
<td>Degree</td>
<td>3%</td>
<td>23%</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>-</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>-</td>
<td>1%</td>
</tr>
</tbody>
</table>

Table 3 shows that the average household size for the two samples is almost the same. Africans are dominant in townships while Indians slightly dominate the suburb sample. This is consistent with the actual dynamics in the municipality and most South African cities where Africans make most of the township dwellers. In both samples, the majority of the respondents were in the 25-44 age group. Those with high school education formed the bulk of township respondents.
Unlike in the townships where quite a significant number of respondents either had primary education or never attended formal schooling at all, most of suburban respondents had a minimum of high school education. To further understand the socio-economic characteristics of the respondents, information on their income, source of income, and whether they receive free basic water were asked. Respondents were also asked how they access portable water, their experiences of water supply interruptions and the quality of portable water they receive. Table 4 presents statistics for these socio-economic characteristics.

**Table 4: Other important socio-economic statistics**

<table>
<thead>
<tr>
<th></th>
<th>Townships</th>
<th>Suburbs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income per month</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; R2500</td>
<td>71%</td>
<td></td>
</tr>
<tr>
<td>R2500 &lt; R5000</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>R5000 &lt; R10000</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>&gt; R10000</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td><strong>Source of income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salary/wages</td>
<td>34%</td>
<td>72%</td>
</tr>
<tr>
<td>Government grants</td>
<td>27%</td>
<td>1%</td>
</tr>
<tr>
<td>Pension</td>
<td>23%</td>
<td>6%</td>
</tr>
<tr>
<td>Investments</td>
<td>0.2%</td>
<td>17%</td>
</tr>
<tr>
<td>Hand-outs</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Other sources</td>
<td>12%</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Receive free basic water</strong></td>
<td>Yes</td>
<td>64%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>36%</td>
</tr>
<tr>
<td><strong>Access to portable water</strong></td>
<td>Inside dwelling</td>
<td>74%</td>
</tr>
<tr>
<td></td>
<td>In yard</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>Community tap</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Water supply interruptions</strong></td>
<td>Very often</td>
<td>65%</td>
</tr>
<tr>
<td></td>
<td>Once in a while</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td>Not at all</td>
<td>12%</td>
</tr>
<tr>
<td><strong>Water quality</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not clear</td>
<td>32%</td>
<td>29%</td>
</tr>
<tr>
<td>Bad taste</td>
<td>1%</td>
<td>3%</td>
</tr>
<tr>
<td>Bad smell</td>
<td>0</td>
<td>1%</td>
</tr>
<tr>
<td>Has colour</td>
<td>2%</td>
<td>9%</td>
</tr>
<tr>
<td>Good quality</td>
<td>65%</td>
<td>57%</td>
</tr>
</tbody>
</table>
Table 4 shows that the majority of township respondents earn below R2,500 per month. The income statistics are completely different in the suburban sample where the majority of the respondents earn up to R15,000 and quite a number of respondents earn between R15,000 and R30,000 per month. Income statistics are essential because they show the ability of households to pay for water services. Township respondents receive income mainly from salaries, pension and government grants. Other sources of income in the township sample include informal trading where households are involved in small businesses as vendors. In the suburban sample, salaries and wages form the main source of income for most of the respondents. Up to 64% of the township respondents receive free basic water services, suggesting that they live in properties valued at less than R250,000. Even though the majority of the township respondents access portable water inside the dwelling, 22% of them access water from the yard and 4% get water from community taps. These dynamics do not exist in the suburbs where all the respondents access potable water services inside their dwellings.

The majority of township respondents indicated that they experience water supply interruptions very often whereas this is different in the suburban sample where most of the respondents suggested they experience water interruptions once in a while. In terms of the quality of potable water received, most of the respondents from both samples indicated that they receive water of good quality. However, quite a considerable number of respondents from both samples revealed that the portable water they receive is not clear. In nutshell, these statistics are essential in shading some light on the characteristics and experiences of the respondents which can likely determine their choices for water service packages in the choice experiments.

Additionally, respondents were asked to indicate the attribute that mostly influenced their decisions when making choices. The most influential attribute was elicited for both strata, across all the four blocks. Figure 2 shows the frequency distribution of the attributes influencing household choices. The values presented in the figure are expressed as a percentage of the respondents.
Figure 2: Frequency distribution of attributes influencing choices

Across both blocks in the suburban stratum, water quality is consistently the most dominant attribute followed by water supply reliability. In the township stratum, the same attributes are the most important however, water supply reliability is the dominating attribute followed by quality. The monthly cost of water services also has a relatively greater influence across the two blocks of the township stratum. Just like in the second block of suburbs, water pressure is the least influencing attribute in the two township blocks. These revelations show that the majority of suburban households are concerned with water quality and reliability, and are relatively less concerned with how they access piped water, water pressure and cost. On the other hand, township households are relatively concerned with water supply reliability, quality and cost, and are less concerned with water pressure and how they access piped water services.

6. RESULTS AND DISCUSSION

CLM is used to estimate the value placed by households on each attribute presented in the choice experiment. In its simplistic nature, CLM captures taste variations of respondents while their unobserved heterogeneity is captured via the error term in a simple fashion. Also called a fixed-effects logit model for panel data, CLM fits a conditional logistic regression model for matched case-control data. CLM can compute robust and cluster-robust standard errors and adjust results for complex survey designs. In this study, consumer choices are estimated as a function of five
water services attributes (cost, pipe, reliability, pressure and quality). Subsequently, choices are also estimated as a function of the various attribute levels.

Analysis is done in four steps. First, Block 1 results are analyzed. Data for this block was collected using choice-sets that had the most applicable status-quo for each stratum. Second, the section analyses Block 2 results. Data for the second block was collected using choice-sets that had status-quo less applicable to each stratum. The rationale for this is to test whether consumer preferences differ if a different status-quo is presented to respondents, that is, in this step we test whether including a status-quo biases results. Subsequently, results on household preferences for the attribute levels are presented. This is performed in order to give a clearer insight on preferences suggested in the first and second steps mentioned above. Finally, the WTP figures for each attribute in each block and stratum are presented. Each block in this study contains both the suburban and township strata. In discussing the results, we compare the strata both in each block and across blocks. Estimation results for Block 1 are presented in Table 5.

Table 5: CLM estimation results for Block 1

<table>
<thead>
<tr>
<th></th>
<th>Suburbs</th>
<th>Townships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>0.00024</td>
<td>-0.00124***</td>
</tr>
<tr>
<td></td>
<td>(0.00029)</td>
<td>(0.00017)</td>
</tr>
<tr>
<td>Pipe</td>
<td>-0.30920***</td>
<td>-0.10838***</td>
</tr>
<tr>
<td></td>
<td>(0.08623)</td>
<td>(0.04461)</td>
</tr>
<tr>
<td>Reliability</td>
<td>2.63901***</td>
<td>0.79756***</td>
</tr>
<tr>
<td></td>
<td>(0.14333)</td>
<td>(0.10236)</td>
</tr>
<tr>
<td>Pressure</td>
<td>-1.69193***</td>
<td>0.30286***</td>
</tr>
<tr>
<td></td>
<td>(0.14910)</td>
<td>(0.10505)</td>
</tr>
<tr>
<td>Quality</td>
<td>-2.11380***</td>
<td>-0.88100***</td>
</tr>
<tr>
<td></td>
<td>(0.21858)</td>
<td>(0.06044)</td>
</tr>
</tbody>
</table>

\[ LL \] -1925.239 -2514.970
\[ N \] 5976 5974
\[ p^2 \] 0.34 0.16
Results in Table 5 are interpreted according to the sign and significance of the coefficients. A negative and significant coefficient suggests that changes in the attribute reduce the likelihood that the alternative will be chosen whereas a positive coefficient indicates that changes in the attribute increase the likelihood that the alternative will be chosen. In other words, negative coefficients mean households do not prefer changes while positive coefficients entail that households do prefer changes in the particular attribute. Rational choice theory assumes that respondents make choices based on the attributes and would choose an alternative that maximizes their utility, implying that besides the attributes and their levels, there are no other factors systematically determining respondents’ choices (Meyerhoff and Liebe, 2009).

In the suburban stratum, all the attributes are statistically significant except for COST, indicating that the monthly cost of water services is not important to suburban households. Practically, suburban households are high income earners and can afford to pay higher water tariffs. However, in the township stratum COST has a significant and negative coefficient suggesting that township households do not prefer increases in monthly water costs. The township result is consistent with reality as the majority of township households receive free basic water. In literature, most studies find a negative cost coefficient (see Brouwer et al., 2015; Vasquez et al., 2011; Hensher et al., 2005). The discrepancies in the sign and significance of the cost attribute between suburban and township households explain findings from South African water literature that suggest the demand for water to be more inelastic for higher income groups that lower income groups (see Jansen and Schulz 2006; Bailey and Buckley 2005; Vuuren et al., 2004).

How households access potable water (PIPE) is important to both suburban and township households. Earlier studies by Kanyoka et al. (2008) in rural South Africa and Anand (2001) in India reveal that distance and access to a yard tap are more important attributes. The negative coefficient for PIPE found in this study indicates that households in both strata do not prefer any changes in the way they access piped water services. Several households from both suburbs and townships access water either inside dwelling or from the yard. As such, they would be reluctant to accept any regressive changes to community taps or the lack of piped water at all.

Water supply reliability (RELIABILITY) is important to both suburban and township households. Results show that households in both strata prefer changes in the reliability of water
supply. This result can be a true reflection of the dynamics in the municipality because at the time of our survey, the municipality was experiencing a drought and water supply was rationed and restricted in some areas. Snowball et al. (2008) and Hensher et al. (2005) respectively find water supply reliability to be important in South Africa and Australia, making our findings consistent. Findings in our study reveal that both suburban and township households depend on piped water that is supplied by the municipality hence they would prefer it to be reliable. This is an indication that even though suburban households have the financial capacity to supplement supply through alternative water sources such as rain water harvesting and boreholes, such secondary avenues are not existent and households depend on municipal water.

The coefficient for PRESSURE is negative for suburban households and positive for township households. These distinctive results suggest that suburban households do not prefer any changes in the pressure of the water they receive whereas township households prefer an improvement in water pressure. Such findings are consistent with reality because water pressure is generally high in suburban areas and low in some townships. The low water pressure experienced in townships is due to a wide range of reasons that include restrictions due to drought, restrictions when households exceed allocated free basic water units, restrictions to manage demand, among others. In a study conducted in Grahamstown, Snowball et al. (2008) find water pressure not important to suburban households which is contrary to our findings.

QUALITY has significant and negative coefficients for both suburban and township households suggesting that households in both strata do not prefer any changes in the current water quality. This result is consistent with descriptive statistics revelations in Table 4 where the majority of households from both strata indicated that they receive water of good quality. Generally, the eThekwini municipality is one of the municipalities with the best water quality in terms of its chemical and physical characteristics and has been winning top awards based on the Blue Drop benchmarking initiative. In literature, water quality is consistently important to households. The importance of water quality to households across all income levels is also confirmed in Vasquez et al. (2011); Kanyoka et al. (2008) and Snowball et al. (2008).

There have been discussions in literature on the role of the status-quo in choice experiments (see Lanz and Provins 2012; Viscusi and Huber 2012). Some scholars argue against the inclusion of a
status-quo while others support it. Meyerhoff and Liebe (2009) suggest that protest attitude, attitude towards the good, and perceived choice task complexities could make respondents opt out and choose the status-quo. The status-quo is experienced by respondents, whereas the utility associated with experimentally designed hypothetical alternatives is only imagined by the respondent, increasing chances of status-quo biases (Scarpa, Willis and Acutt, 2007). This study joins the debate by presenting households with two distinct experiments, one with their most applicable status-quo and the other with a less applicable status-quo. The rationale is to examine the role of the status-quo by testing if households’ water services preferences would change if they respond to choice-sets with different status-quo. Table 6 shows Block 2 results where households responded to choice-sets with their less applicable status-quo.

Table 6: CLM estimation results for Block 2

<table>
<thead>
<tr>
<th></th>
<th>Suburbs</th>
<th>Townships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>-0.00018</td>
<td>-0.00165***</td>
</tr>
<tr>
<td></td>
<td>(0.00015)</td>
<td>(0.00018)</td>
</tr>
<tr>
<td>Pipe</td>
<td>-0.27280***</td>
<td>-0.00652</td>
</tr>
<tr>
<td></td>
<td>(0.03352)</td>
<td>(0.02362)</td>
</tr>
<tr>
<td>Reliability</td>
<td>0.25226***</td>
<td>0.27675***</td>
</tr>
<tr>
<td></td>
<td>(0.08031)</td>
<td>(0.07061)</td>
</tr>
<tr>
<td>Pressure</td>
<td>0.39286***</td>
<td>0.02883</td>
</tr>
<tr>
<td></td>
<td>(0.07618)</td>
<td>(0.08021)</td>
</tr>
<tr>
<td>Quality</td>
<td>-1.10325***</td>
<td>-0.44705***</td>
</tr>
<tr>
<td></td>
<td>(0.06701)</td>
<td>(0.03875)</td>
</tr>
</tbody>
</table>

| LL       | -2334.818            | -2697.234            |
| N        | 6024                 | 5998                 |
| $p^2$    | 0.21                 | 0.09                 |

Except for PRESSURE which now has a positive coefficient, Block 2 results for suburban households are consistent with those reported in Block 1. The sign and significance of COST, PIPE, RELIABILITY and QUALITY are similar to those reported in Block 1. As noted in Block 1 results, the monthly cost of water services is also not important to suburban households even when the experiment had a status-quo less applicable to the stratum. Additionally, suburban
households do not prefer any changes in the way they access piped water services, neither do they prefer changes in the quality of the water they receive from the municipality. However, they prefer changes in water supply reliability and pressure. The sign of the coefficient of water pressure is the only inconsistent result for suburbs across the two blocks. Since there is consistency in most of the attributes in terms of sign and significance, the results from the suburban stratum suggest that the status-quo does not really bias choices in high income households.

However, for township households some few inconsistencies are noted between results in the two blocks. Results on COST, RELIABILITY and QUALITY are similar in terms of sign and significance across the two blocks. Households do not prefer any changes in the monthly cost and quality of water services but do prefer changes in the reliability of water supply. However, unlike in the first block, second block results show that PIPE and PRESSURE are not important to township households. This discrepancy could be because unlike in the first block where the status-quo presented a water service package that was free of charge, in the second block the status-quo included a monthly cost. The inclusion a monthly cost in the status-quo could have possibly made households to be more careful in their choices since there is a cost involved in every option. This may suggest that in Block 1 township households could easily opt out by choosing the status-quo. Such kind of behaviour confirms assertions by Scarpa et al. (2007) that given an applicable status-quo, households choose the status-quo that they experience as opposed to choosing the utility associated with experimentally designed hypothetical alternatives.

The results presented in Tables 5 and 6 show households’ overall preferences for each attribute. In an attempt to understand how the levels in each attribute influenced choices, we estimate households’ preferences for each level in every attribute. An analysis of levels shows which components of the attribute are preferred or not preferred by households. This is good for policy makers so that they would know the specific aspects of attributes to include and exclude in a water service package. The CLM was used to estimate households’ preferences for water service levels and results are presented in Table 7.
Table 7: CLM estimation results for levels

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Level</th>
<th>Suburbs</th>
<th>Townships</th>
<th>Suburbs</th>
<th>Townships</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Block 1</td>
<td></td>
<td>Block 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suburbs</td>
<td>Townships</td>
<td>Suburbs</td>
<td>Townships</td>
</tr>
<tr>
<td>Access to piped water</td>
<td>Inside dwelling</td>
<td>-17.07713</td>
<td>0.13313</td>
<td>2.91851***</td>
<td>3.93073***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5082.553)</td>
<td>(0.41707)</td>
<td>(0.35117)</td>
<td>(0.33830)</td>
</tr>
<tr>
<td></td>
<td>In yard</td>
<td>-17.10568</td>
<td>0.91844***</td>
<td>-3.77053***</td>
<td>3.18621***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5082.553)</td>
<td>(0.39450)</td>
<td>(0.38783)</td>
<td>(0.37792)</td>
</tr>
<tr>
<td></td>
<td>Community tap</td>
<td>-20.37896</td>
<td>-0.51122</td>
<td>-4.50124***</td>
<td>-6.09442***</td>
</tr>
<tr>
<td>&lt;200m</td>
<td></td>
<td>(5082.553)</td>
<td>(0.53275)</td>
<td>(0.43356)</td>
<td>(0.49111)</td>
</tr>
<tr>
<td></td>
<td>Community tap</td>
<td>-18.00228</td>
<td>-2.07548***</td>
<td>-3.67143***</td>
<td>-4.74143***</td>
</tr>
<tr>
<td>&gt;200m</td>
<td></td>
<td>(5082.553)</td>
<td>(0.58682)</td>
<td>(0.49346)</td>
<td>(0.42265)</td>
</tr>
<tr>
<td></td>
<td>No piped water</td>
<td>-20.57067</td>
<td>-0.51007</td>
<td>-5.20863***</td>
<td>-4.52893***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5082.553)</td>
<td>(0.33817)</td>
<td>(0.47485)</td>
<td>(0.45185)</td>
</tr>
<tr>
<td>Reliability</td>
<td>Reliable supply</td>
<td>11.80909</td>
<td>-0.71330</td>
<td>0.56147***</td>
<td>0.04519</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5082.553)</td>
<td>(0.64058)</td>
<td>(0.15973)</td>
<td>(0.14954)</td>
</tr>
<tr>
<td></td>
<td>Unreliable supply</td>
<td>13.4897</td>
<td>-1.68369***</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5082.553)</td>
<td>(0.64509)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure</td>
<td>High pressure</td>
<td>2.35507***</td>
<td>-0.16451</td>
<td>-0.62001***</td>
<td>1.29944***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.19784)</td>
<td>(0.20697)</td>
<td>(0.20044)</td>
<td>(0.13950)</td>
</tr>
<tr>
<td></td>
<td>Low pressure</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Safe to drink</td>
<td>2.54535***</td>
<td>1.05422***</td>
<td>2.81366***</td>
<td>3.06893***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.10962)</td>
<td>(0.43105)</td>
<td>(0.34507)</td>
<td>(0.33861)</td>
</tr>
<tr>
<td></td>
<td>Water quality</td>
<td>Has colour</td>
<td>-1.22527</td>
<td>1.82602***</td>
<td>2.25650***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.16688)</td>
<td>(0.37882)</td>
<td>(0.33778)</td>
<td>(0.34068)</td>
</tr>
<tr>
<td></td>
<td>Has taste</td>
<td>0.67446</td>
<td>0.27750</td>
<td>0.99850***</td>
<td>2.46205***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.03198)</td>
<td>(0.49829)</td>
<td>(0.38076)</td>
<td>(0.35638)</td>
</tr>
<tr>
<td></td>
<td>Has smell</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

| **LL**                     | -1864.533      | -2472.506   | -2309.048   | -2634.293   |
| **N**                      | 5976           | 5974        | 6024        | 5998        |
| **p2**                     | 0.36           | 0.17        | 0.22        | 0.11        |

Block 1 results presented in Table 7 show high water pressure and water that is safe to drink as the only important levels to suburban households. The positive signs on the coefficients of these two levels suggest that suburban households prefer the levels. On the other hand, township
households prefer accessing piped water services at least in the yard and do not prefer accessing water from a community tap located more than 200 meters away from their place of residents. Additionally, township households prefer water that is safe to drink and do not prefer unreliable water supply. The preferences revealed in Table 7 are both consistent with prior expectations that households would prefer reliable and high pressure water that is safe to drink. The implication of this is that the municipality should focus resources on providing high pressure water that is safe to drink in suburbs whereas in townships water that is reliable and safe to drink should be provided at least in the yard.

In Block 2, all levels are statistically significant except for water supply reliability in the township stratum. Suburban households in Block 2 prefer access to piped water inside the dwelling and do not prefer the other levels for piped water. On the other hand, township households prefer accessing piped water either inside the dwelling or in the yard and do not prefer any of the other levels for piped water. These results make sense and are consistent with findings from other studies (see Kanyoka et al., 2008; Snowball et al., 2008; Anand, 2001). However, in Block 2, high water pressure has conflicting signs to those reported in the first block. Regarding quality, three levels are both significant and positive in Block 2 for households in both strata, contradicting results in Block 1 where only the “safe to drink” level was positive and significant. These inconsistencies show that the status-quo plays a role when households make choices. It is evident that if respondents are given two experiments with different status-quo, their choices may differ.

The study also estimates the willingness to pay (WTP) which is a welfare measure showing the average estimates of what households are prepared to pay for or against each attribute. Positive figures show the average amount that households are willing to pay for the particular attribute, whereas negative figures show how much households are willing to accept as compensation for the attribute. Mathematically, WTP is calculated by dividing the coefficient of each attribute by the coefficient of the cost attribute. Table 8 shows the WTP for both strata in the two blocks as adopted in this study.
Table 8: WTP estimation

<table>
<thead>
<tr>
<th></th>
<th>Block 1</th>
<th>Block 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Suburbs</td>
<td>Townships</td>
</tr>
<tr>
<td>Pipe</td>
<td>1278.63</td>
<td>-87.14</td>
</tr>
<tr>
<td>Reliability</td>
<td>-10913.05</td>
<td>641.23</td>
</tr>
<tr>
<td>Pressure</td>
<td>6996.63</td>
<td>243.49</td>
</tr>
<tr>
<td>Quality</td>
<td>8741.17</td>
<td>-708.31</td>
</tr>
</tbody>
</table>

As expected, WTP figures for suburban households are higher than those for township households in both Blocks 1 and 2 which is consistent with the two samples’ income levels. In Block 1, suburban households are willing to pay more for water quality and pressure which is consistent with Block 1 suburban results presented in Table 7 where only high water pressure and water that is safe to drink were the most important levels. Except for water pressure which is consistently positive for both blocks, suburban WTP figures in Block 2 have different signs to those reported for the same stratum in Block 1. The discrepancies in the WTP figures for suburban households across the blocks show that preferences change when households are presented with different status-quos in choice experiments.

However, WTP figures are consistent in terms of sign for township households. There is a revelation in both blocks that township are willing to pay more for the reliability of water supply and pressure. This result agrees with findings in Table 7 where township households indicated a negative significant preference for unreliable water supply. It is also consistently revealed in the WTP estimates that households are not willing to pay for access to piped water and quality. Based on the WTP estimates, it can be suggested that the municipality should invest more on water quality, pressure and access to piped water in the suburbs. In the townships, emphasis should be on reliability and pressure.
7. CONCLUSION

This study used the choice experiment method to address two fundamental objectives, these are, establishing households’ preferences for water service packages in the eThekwini metropolitan municipality and the role of the status-quo in choice experiments. Data was collected from a sample of 1002 households stratified into suburban and township households. Two experiments with distinct status-quo alternatives were presented to each stratum. Block 1 experiments had the most applicable status-quo to each stratum while Block 2 experiments had less applicable status-quo alternatives. By presenting households with two sets of experiments differentiated by the status-quo, the study tested if the inclusion of a status-quo alternative would bias the results. The study also estimated the WTP figures for each stratum in the two blocks and results are compared.

In Block 1 (our baseline block), we find that while the monthly cost of water services is not important to suburban households, township households do not prefer increases in monthly water costs. We also find that households in both strata do not prefer any changes in the way they access piped water services. Results also reveal that households in both strata prefer changes in the reliability of water supply. Furthermore, some distinctive findings were revealed on household preferences for water pressure. It was found that suburban households do not prefer any changes in the pressure of the water they receive whereas township households prefer changes in water pressure. Finally, results reveal that both suburban and township households in the two strata do not prefer any changes in the current water quality.

An analysis of the driving levels was separately conducted and results showed high water pressure and water that is safe to drink as the only important levels to suburban households. In township, households prefer accessing piped water services at least in the yard and do not prefer accessing water from a community tap located more than 200 meters away from their place of residence. Additionally, township households prefer water that is safe to drink and do not prefer unreliable water supply. The households’ WTP for water service attributes was also estimated and results showed that WTP figures for suburban households are higher than those for township households. Findings showed that suburban households are willing to pay more for water quality and pressure while township households are willing to pay for reliability of supply and pressure.
These findings entail several policy implications. First, the revelation that households in both strata do not prefer any changes in the way they access piped water services can be beneficial to the municipality in terms of cost reduction. Households in townships can be happy with accessing water at least in the yard which is less costly than providing water inside the dwelling. Second, even though results reveal that township households do not prefer increases in monthly water costs, WTP estimates show that they are willing to pay for reliability and pressure suggesting that the municipality can raise revenue from providing reliable and high pressure water. Since a lot of township households in the municipality receive free basic water services, the municipality is loosing on possible revenue that could be gained if reliable and high pressure water is supplied. Finally, the revelation that both suburban and township households do not prefer any changes in the current water quality suggests that the municipality is doing a good job in satisfying demand and should maintain the good standard of providing good quality water to its residents.

Lastly, we tested whether the inclusion of an applicable status-quo in choice experiments biases results. We found that the results from the suburban stratum suggested that the status-quo did not really bias choices in high income households. Only the sign of the coefficient of water pressure was the only inconsistent result for suburbs across the two blocks. However, some few inconsistencies were noted between results in the two township blocks suggesting that the status-quo played a role when township households made choices. There is a possibility that township households easily opt out by choosing the status-quo in Block 1. This confirms assertions by Scarpa et al. (2007) that households normally choose the status-quo that they experience as opposed to choosing the utility associated with experimentally designed hypothetical alternatives. Therefore, this study concludes that for low income households, the status-quo played a role in determining choices. The same did not apply in high income households.
8. REFERENCES


