International Journal of Multidisciplinary Research and Development
Online ISSN: 2349-4182 Print ISSN: 2349-5979
www.allsubjectjournal.com
Volume 2; Issue 11; November 2015; Page No. 428-433

A binary logistic regression analysis on the demand for bottled water in the city of Colombo

[1] DM Bandula Bandara, [2] DPS Chandrakumara

[1] Director Applied Research and Skills Activation Consultancy Limited 272, 2nd Floor, Negombo Road, Kurunegala

[2] Senior Lecturer in Economics University of Sri Jayewardenepura Sri Lanka

Abstract
The bottled water was introduced into the Sri Lankan market in the late 1980s. It began to expand a decade later in 1990s. Since then, with the interference of the government, this market has been expanding continuously. However, no systematic research has been carried out so far for analyzing the demand and supply behavior of the bottled water market. The aim of this study was to identify the determinants of migrants' demand for bottled water in the City of Colombo in Sri Lanka. The literature review revealed some important variables that determined the demand for bottled water. The methodology consisted descriptive statistics and an estimation of the demand function using Binary Logistic Analysis. The analysis was based on primary data which was collected from three popular tourist places in the city of Colombo. Finally, the study unveiled the key determinants of the migrants' bottle water demand. The age, education level, and the monthly income of the family of the migrants were found to be the three main determinants of the demand. With the increase of income and education of people, the demand for bottled water can be expected to rise in the future. Since the low income people have no concern on the safety and hygienity of water, the government should take action to improve the quality of water provided as a public utility.

Keywords: Bottled water, Water demand, quality of water, Binary Logistic Regression, Sri Lanka, Migrants' demand

1. Introduction

1.1. Background

Economics is a subject that studies how people choose to use scarce resources to meet competing ends. One can say that water is not a scarce factor as the world is made up mostly of water. There are 317 million square miles of ocean water in the world and it is about two-thirds of the globe (Jordan, 1998). However, that water cannot easily be used for human consumption and it should be undergone for some kind of cleansing depending on the need. Besides, even the available stock of drinkable water is not equally distributed among countries, places and individuals. At the same time the demand for drinking water increases with the growth in population, global economy and the urbanization. Hence, people in many places face water shortages. Therefore, the concepts of choice, scarcity, demand, effective demand, competing uses, factors determining the demand, growth, etc. are necessarily relevant in an analysis of water issues (Manemann, 2006: Aguirre, 2006: Jordan, 1998). The demand for drinking water market is also not free from that.

At present, drinking water is available in many forms. With the use of technology people produce better quality water for human consumption. For example, water from wells, tap water, boiled water, bottled water, etc. Furthermore, there are some other qualities that people can fulfill their need of drinking water. For example, soft/cool drinks, king coconuts or young coconuts etc. However, all the people in a country cannot demand the same quality water. The demand for different qualities of water by different consumers can be determined by many factors such as the price of the commodity, level of income, prices of substitutes, taste, etc. Therefore, the cases to water should not be equal among the people in any country.

People have accustomed to some kind of water sources with more certainty when they are at home or in their usual places. However, when they move away from their usual place, their water source also can be changed. For example, the people who are consuming water from their own well will change the water source may change their water source from own well to bottled water when they travel to a distant place situated in an urban area. However, since this change may involve some kind of transaction either in financial or other forms, the water source may not be equal among the people.

Bottled water becomes a marketable good due to a number of reasons. Among them, non-availability of quality water is free of charge, health and safety concerns, convenience, etc can be important. Furthermore, the demand for bottle water can be affected by education and improvement of knowledge of consumers, change in life-style, urbanization, Increase in incomes and pollutions of water due to unplanned urbanization. In the case of Sri Lanka, more than 70 percent of people live in rural areas. They are mostly accustomed to consume the water taken from wells of their own or neighboring houses or to a certain extent tap water. In urban areas also people mostly use either tap water or water from wells. In the case of household water consumption, majority of people in Sri Lanka do not face a big problem of quality water. If they have a doubt about the quality, they boil the water for drinking purpose. However, almost all the people in Sri Lanka face a problem of having water for drinking purpose when they go out of home or travel from place to place. This means migrants in Sri Lanka have an especial case of water scarcity to behave according to the principles of consumer behavior.

Bottled water was introduced into the Sri Lankan market during late 1980s. However, it began to popularize since late 1990s. With the expansion of the bottle water industry, government of

Sri Lanka also started interfering in the market. Having identified the growing market, Industrial Development Board (IDB) of Sri Lanka conducted some workshops to educate investors properly for bottled water related matters and to encourage the entrepreneurs. Sri Lanka Standard Institute introduced specifications for bottled water with SLS mark. Ministry of Health made arrangements to take the bottled water industry under the regulatory system of the Ministry in 2005. It was made mandatory that every manufacturer has to register their factories under the Ministry of Health. Hence, the present market for bottled water is the result of series of actions of the entrepreneurs, government and the consumers. On the part of the migrants, everyone will not demand water from the same source of water. Their demand can be dependent on various factors. Therefore, this study focuses on the demand for bottled water by the local migrants in the city of Colombo in Sri Lanka. Furthermore, the study will give a special reference to bottled water since it is a recently introduced product to the Sri Lankan market.

2. Literature Review

The literature on the demand for bottled water is not rich and especially there is a lack of investigations in developing countries. Most of the available studies within the economics discipline have attempted to analyze the demand and supply sides of the bottled water market. In addition, there are studies that show the failures of the bottled water market as a healthy product to the consumers since some producers have not have a concern about the quality of water that they are supplying against what the consumers are expecting from the bottled water. However, this study focuses only on the studies which have analyzed the demand for bottled water regardless of the quality of water or quality differences between different brands.

Fortue (2013) examined how the awareness of people on health effects of consuming unhygienic water affects the demand for improved water in Cameroon. The bottled water in the current study is also considered as a kind of improved water even if it may not be realistic. Fortue considered drinking water and water used for other domestic needs for his study. The results suggest that awareness of households on the health effects positively affects the choice of an improved water source. Furthermore, reflecting the effect of economic status, he found that the households owning a TV had higher tendency to use improved water. Therefore, it is rational to choose the 'income level' or proxy variable as a variable that determines the demand for bottled water in the current study too.

Bibi *et al* (2014) estimated the demand for bottled water within the university campus Peshawar in Pakistan. The study found own-price of bottled water, household income, price of substitutes, awareness of people, taste and preferences as the crucial determinants of bottled water. They revealed that the price elasticity of water was less than one (-0.21) while the income elastic was positive and greater than zero and less than one suggesting that the bottled water was a normal good. Furthermore, they suggest that the bottled water users as health-related risk averse and recommends for actions that makes more access to bottled drinking water assuming that the bottled water was good in hygienity.

Linden (2013) also examined how bottled water consumption based on an online survey in among students of a Dutch public university. This study also gives an idea about the determinants of consumer demand for bottled water consumption. Findings revealed that beliefs on health, taste, water quality, lifestyle, the environment and perceived alternatives had correlations with the bottled water consumption.

Ferrier (2001) provided an overview of the bottled water market and mentioned that the bottled water market was the most dynamic market among all the food and beverage industry. She identified three types of bottled water as natural mineral water, spring water and purified water though there are alternative definitions of categories. According to this author, consumers think that bottled water is safer and good in quality and those who care about the health and well-being have a propensity to buy bottled water to feel well.

Foote (2011) reveals important findings about the reasons for bottled water consumption through his research conducted in the USA. This study examined individual perspectives on bottled and tap water in order to understand how preferences for bottled water emerge within immediate, everyday contexts. The author found that a larger proportion of residents of the lower-income neighborhood were more likely to drink bottled water more frequently, suggesting that the demand for bottled water is relatively inelastic. Meanwhile, residents of the higher-income neighborhood appear to have more trust in their tap water. This contradicts assumed positive links between income and bottled water consumption, and suggests problems related to the age and quality of tap water infrastructure in each of the neighborhoods. An especially interesting finding was in terms of race, where non-white races presented a much higher preference for bottled water over tap water. Foote (2011) further reveals that Health, safety and taste were all properties considered regularly amongst bottled water consumers, but secondary to the convenience that bottled water provides.

Iran is one of the countries where the water scarcity is high. Nezhad *et al* (2013) estimated the domestic water demand function in Ahvaz, Iran. The study revealed that the demand for domestic water function had been price and income inelastic. Therefore, in such a market where the income and price elasticity is very low, a huge demand changes cannot be arisen unless there is a huge change in other factors of the demand function.

Theoretically, in the demand theory, prices of alternative goods or the existence of substitutes are also taken as one of the determinants for the demand for a good. There are empirical attempts that tested this hypothesis in the case of water market also. Lanz & Provins (2014), while estimating the demand for tap water quality by surveying more than 4500 households in England and Wales, reveals that bottled water is one of the substitutes for the aesthetic quality of tap water and the other substitutes included in the study were water filter devices, adding squash or cordial before taking water for drinking purpose.

Yao (2011) studied the factors influencing bottled water drinking behavior with special respect to the people's beliefs on bottled water and tap water. The study considered impersonal information, interpersonal information, educational background and physical location of residents as independent variables while the dependent variable was the behavior of respondents on drinking bottled water. The analysis revealed that interpersonal information and education were the crucial factors of with the bottled water consumption whereas the impersonal source of information which included newspapers, TV, etc. and physical education had a weak influence. This study highlights the significance the source of interpersonal

information and the education of water users in determining their behavior.

Ahmad *et al* (2010) examining the factors determining the public demand for safe drinking water with respect to the Peshawar district in Pakistan. Even if the study did not consider the bottled water, the variables included in the analysis and the conclusion attained is fairly constructive to decide the direction of the current research. The dependant variable of the study was household willingness for continuous and portable water supplies while the independent variables were household characteristics such as the highest education level of the household, income or wealth level and the variables represented for demographic and media exposure of the respondents. The study revealed that the awareness did the major role as the key determinant for the demand for safe drinking water.

The review of literature proves that the investigations into the bottled water market do not have a long history. In the Sri Lankan context, people do not generally consume bottled water at their home and sources of drinking water they domestically use are entirely different. The demand for bottled water arises mainly from the migrants from place to place or away from their homes. Investigations of local migrants' demand for bottles water are still scarcer especially in developing countries. However, the determinants that influence the migrants' demand for drinking water can be hypothesized to be originated from the key psychological factors of hardness, aesthetic quality and safety as identified in some studies of the reviewed literature. This is the place of the current research in the historical path of investigations of the demand for bottled water.

1.2. The Research Problem

Household level consumers can choose to drill their own wells, or purchase water from the local public sector water sources. Hence, the demand for bottled water for household consumption does not have a very wide private market. However, the demand for water is high especially from migrants and travelers when they travel in urban areas. Due to water pollution and population-pressure caused by urbanization, water cannot be consumed in its unrefined or raw form. Thus, water, after refining, becomes scarcer commodity with a substantial value added. In the private market, bottled water is available in different qualities in different brands. At the same time, water can be obtained from the public utility without any payment. Cool or soft drinks are other alternatives for drinking water sources. As such, it seems that in order to obtain a better quality, a consumer demands bottled water when people move away from their home as travelers will reveal the factors that affect the demand for bottled water. Therefore, the problem considered in the study is the question that by which factors is the local migrants' demand for bottled water is determined.

1.3. Significance of the Study

The problem that how the demand of local tourists for bottled water, and the economic factors determining it, is important to be solved due to three main reasons:

First: there is no any systematic study has been done in the field of demand for bottled water in Sri Lanka even if there is a market gradually developing for this special product based-on natural water resource. Hence, the solving of this problem by this study is useful for all who are engaged in the bottled water market.

Second: understanding about the demand for water quality or the willingness to pay for water of local tourist will be useful for government policy makers to take decisions with regard to the efficient utilization of the water supply system as a public utility.

Third: in addition to the government, conclusions of the study are useful for the bottle water suppliers to take marketing decisions.

Finally: the study will be important for the academics involved in analyzing cause-effect relationships in the bottled water market.

1.4. The Aim

Drinking water is a valuable economic good for tourists. But, water is not a homogeneous product especially in the modern market. Bottled water can be obtained in various qualities and brands from the private goods market. At the same time drinking water is freely provided for travelers as a government service for public. Furthermore, they have substitutes for drinking water. However, in one hand, all are not having equal accesses for drinking water, especially for bottled water. On the other hand, even though they have equal accesses, their demand for water can vary between individuals due to many reasons. Therefore, the aim of this study is to identify the factors affecting the demand for bottled water.

1.6. Limitations

The study was affected with some constraints. In identifying the factors of demand for bottled water is a thing which should be examined with the effect of the time factor. However, being a study based on primary data based on cross-sectional data, it was not possible to examine the time effect.

Identification of factors effecting to demand for bottled water can be better achieved from a triangulation process of a quantitative and qualitative data. However, due to the time constraint, it was not possible to execute a qualitative kind of study. The study was confined to a quantitative study.

The success of field surveys is thoroughly determined on the success of collecting data. Being a study based on primary data, it had to collect data from a sample of population. However, some of the houses which were included in the sample were either not answered or well answered.

2. Methodology

2.1. Analytical method

The demand theory and its theoretical variables cannot be empirically applied in analyzing bottled water demand empirically existent in Sri Lanka. It constrained by limitations associated with data collection, construction of variables, other calculations and costs and time to be spent for the study. However, the methodology was focused to make an approximate bridge between the theory and the empirical strategy.

The study mainly used the Binary Logistic Analysis for estimating the demand function. However, before estimating the model an in depth examination on the behavior of variables were made using descriptive statistics such as 'statistical

tables', 'bar charts', 'pie charts', 'scatter plots', 'graphs', 'correlation tests', 'measures of central tendencies', measures of dispersion, correlation tests, etc. This analysis descriptively identified the existent patterns and the relationship between variables though that section of analysis is not presented in the paper.

Model estimation identifies both significant and insignificant determinants of demand for bottled drinking water. The following are the variables which were taken into consideration at the initial stage of the analysis.

The demand for bottled water (the dependent variable of the function): This means whether the migrants purchased the bottled water or not. This is also a categorical variable that indicates binary response, 'Yes=1' and 'No = 0'.

Rural or Urban (categorical variable): This variable indicates whether the respondents are mainly from rural sector or urban sector.

Distance travelled (continuous variable): Having known the original place that the respondents travelled, the distance from the original place to the place where the interview was taken place in Colombo was calculated using a distance schedule.

Age of respondent (categorical variable): Age has been divided into two levels such as 1. Below 30, 2. 31-40, 3. 41-50 and Over 50 years of age.

Gender (categorical variable): Gender was taken as 1. Male and 0. Female.

Education level (categorical variable): This has been divided into three levels such as 1. O/L or below, 2. A/L and 3. Above A/Level.

Income (Categorical Variable): Monthly family income of the respondents was considered.

Place of interview (categorical variable): Three popular tourist places in the city of Colombo were selected for interviewing the respondents. The places were; (1) Kelaniya Temple premises, (2) Viharamahadevi Park (3) Galle Face Court

1. Kelaniya Temple: Kelaniya temple is a famous place of the Buddhists in Sri Lanka. People come to this place for religious purpose from different areas of the country.
2. Viharamahadevi Park: This is also a popular place as a National park in Colombo. The local tourists from different places come and spend their leisure at this place.
3. Galle Face Court: Galle Face Court was selected for the study as it was a popular place of people to spend leisure with children. In addition, it is a popular place of lovers and the people who visit Colombo from distant areas.

Binary logistic regression technique was employed for the model estimation since it is a kind of regression where the dependent variable is a dummy: coded 0 (did not purchased bottled water) or 1(did purchased bottled water).

The "logit" model was estimated to get the following: $\ln[p/(1-p)] = \alpha + \beta X + e$

- p is the probability that the event Y occurs, p(Y=1)
- p/(1-p) is the "odds ratio"
- ln[p/(1-p)] is the log odds ratio, or "logit"

More

The logistic distribution constrains the estimated probabilities to lie between 0 and 1.

The estimated probability is:

$p = 1/[1 + \exp(-\alpha - \beta X)]$

if you let $\alpha + \beta X = 0$, then $p = .50$

as $\alpha + \beta X$ gets really big, p approaches 1

as $\alpha + \beta X$ gets really small, p approaches 0

2.2. Data collection method

Both primary and secondary data were used in the study. Primary data were collected through a sample survey conducted in three selected areas of the city of Colombo. In addition, data was obtained from institutional sources and the studies done by individual level researchers. For the primary data collection, a well-developed semi-structured questionnaire was administered. Nine invigilators, three for each tourist place, were employed for the collection of data. The survey was conducted on Saturday since free travelers can be mostly expected to come to these places only on holydays.

Sampling Method: First, Colombo was selected for the study as it was the most appropriate city for representing the widest range of categories of people who traveled from different areas of the country. Second, from the Colombo city three main places representing different characteristics were selected for the purpose of selecting sampling units. The places, as mentioned earlier also, were (1) Kelaniya Temple premises, (2). Viharamahadevi Park, and (3). Galle Face. Finally, informants were randomly selected from each place. The random selections of informants were made based on the following method:

Gall Face Court: Starting from 10.AM on 19th Saturday, January, 2013, three trained invigilators were placed at the left sea-side corner of Gall Face garden. Each investigator approximately selected the first traveler or group of travelers passing that corner at the starting time, 10 AM. Since then, the first traveler or group of travelers, who were passing that corner soon after completing every questionnaire, was selected as the subsequent respondent. However, if the due respondent was not conducive to answer the questionnaire, the next person or the leader of the group of travelers were selected. As such, the sampling method employed in this study was very similar to the systematic random sampling method (Davis and Cosenza, 1985). The minimum target of the number of questionnaires from this area was assigned as 40 for the whole day. However, the investigators had successfully completed 53 questionnaires.

Viharamahadevi Park: Similar to the procedure used at Gall Face Court, three investigators collected data through the questionnaire starting from 10.00 AM at the same day. The respondents were randomly selected based on systematic sampling method. The minimum target of questionnaires from this area was assigned as 40 for the whole day. However, the investigators had successfully completed 56 questionnaires.

Kelaniya Temple: Similar to that of Gall Face and Viharamahadevi Park, three investigators collected data through the questionnaire instrument starting from 10.00 AM at the same day. They also randomly selected the respondents based on systematic sampling method. The minimum target of questionnaires from this area was 40 for the whole day. However, the investigators had successfully completed 55questionnaires.

3. Results and Discussion

3.1. Results

Results of the model estimation process of the study can be presented step by step in the following way:

Step - 1: Understanding the descriptive statistics

At the outset, it was tested to know whether there was a relationship between the dependent variable and all other considered explanatory variables. The dependent variable, 'WPWB', was tested with the following eleven explanatory variables for identifying whether there is a correlationship. It was the Spearman correlation test that was used for this purpose since there are categorical variables. The test found that only the variables, 'Distance travelled', 'Rural Urban status', 'Age of respondent', 'Education level of respondent' and 'Monthly family income of the respondent' had significant correlations with the dependent variable:

Step - 2: Model estimation

Finally, the above five variables were brought forward to estimate the model. Table - 1 displays the estimated model. Only four variables are significant at 10% level in determining the demand of migrants for bottled water. Table – 1 shows the results.

Table 1: Variables in the Equation

Variable	B	Wald	df	Sig.	Exp (b)
Age					
Below 20		.856	1	.355	2.188
21-30	1.731	3.808	1	.051	5.645
31-40	-.846	.678	1	.410	.429
Above 40	-20.314	.000	1	.999	.000
Education					
Ordinary Level and Below		.860	2	.288	
Advanced Level	1.356	2.778	1	.096	3.881
Above Advanced Level	4.999	20.411	1	.000	148.272
Monthly family income					
30,000 and below		.001	1	.977	1.036
30,001-50,000	2.665	4.695	1	.030	14.362
Above 50,000	3.171	5.084	1	.024	23.826
Constant	-3.615	7.080	1	.008	.027

Source: Author

It shows that 'Age', 'Education Level' and 'Monthly Family Income' have been the significant determinants of bottled water demand of local tourists who are visiting places in the city of Colombo. Specifically, it shows that the visitors at the age of 21 – 30 (age level (2), who are young shows a special positive relationship with the demand for bottled water. Furthermore, with the increase of the age beyond that level shows a negative relationship, which means that the more is the age, the less likely they will purchase bottled water.

It also shows that education level (2) and (3), which represents people who are educated up to 'Advanced Level' and 'Above Advanced Level' are more likely to purchase bottled water while the people educated only up to Ordinary Level are not significant in purchasing water bottles at their local tourism. This means that the demand for bottled water has a positive relationship with the level of education of local tourists.

Most of variables which were thought to be important were rejected by the study. Among these variables, gender, the prices of substitutes, rural-urban, distance travelled and the place visited by the respondent were either removed due to multi-co linearity problem or rejected due to non-existence of a significant correlation or effect on the dependent variable.

4. Summary and Conclusions

4.1. Summary

The study intended to identify the main determinants of migrants' demand for bottled water based on migrants' demand behavior in Colombo. The literature review pointed out some important variables that determined the demand for bottled water from a number of previous studies. The methodology was consisted of theoretical framework and the empirical strategy which included analytical methods and data collection methods. The study mainly based on primary data which was collected from three popular tourist places, Kelaniya Temple, Viharamahadevi Park and Gall Face Court in the city of Colombo. The sample size of 164 migrants was randomly selected from each tourist area. Both analysis of descriptive statistics and model estimation were used as the analytical methods of the study.

Results of the descriptive analysis were important only for the identification of some main features of the demand behavior of migrants. Dependent variable of the model to be developed was dichotomous and therefore binary logistic regression analysis was used. Out of the all explanatory variables selected for the analysis, only three variables, age, level of education and monthly income, turned out to be significant.

4.2. Conclusions

Results of the study help draw the following conclusions with regard to the migrants' demand for bottled water in the city of Colombo:

- The age group ranging from 21 to 30 is the significant age range that makes a positive influence on the demand for bottled water. This means that they are the most responsible and opinion leader group in purchasing bottled water for his/her own safety or the safety of those who are travelling with them.
- More educated people have a positive influence on the demand for bottled water. This shows the significance of education for the hygienity.
- Monthly family income of migrants also makes a positive influence on the demand for bottled water. This means that in order to protect the low income people from the low quality water, the government should take alternative actions such as improving the quality of tap water which is provided as a public good.
- The popular bottle size of bottled water buyers is 500 ml.
- The variables such as gender, prices of substitutes, rural-urban, distance travelled and the place visited by the respondent do not have significant associations with the demand for bottled water.

5. Reference

1. Ahmad I, Haq MU, Sattar A. Factors Determining Public Demand for Safe Drinking Water (A Case Study of District Peshawar). *PIDE Working Papers 2010: 58.* Pakistan Institute of Development, Islamabad, 2010. Retrievable from http://www.pide.org.pk/pdf/working%20paper /workingpaper-58.pdf.

2. Aguirre MS. The value of water and theories of Economic growth. Water Crisis: In P.P. Rogers, M.R. Llamas & L. Martinez-Cortina (Eds.), Myth or Reality. 2006, 93-104.
3. Bibi T, Khan H, Khan MA. Estimation of Demand for Bottled Water in Peshawar-Pakistan. Euro-Asian Journal of Economics and Finance. 2014; 2(3):216-223.
4. Ferrier C. Understanding a Social Phenomenon. Discussion Paper, 2001. Retrievable from http: //www.assets.panda.org/downloads/bottled_water.pdf.
5. Foote ML. Examining Reasons for Bottled Water Consumption: A Case Study in Pensacola, Florida (Master's thesis, University of South Florida, Florida, USA), 2011. Retrievable from http://www.usf,edu/cgi/viewcontent.cgi?article+4301&context+etd.
6. Fotue LAT. Awareness and the Demand for Improved Drinking Water Source in Cameroon. International journal of Economic Practices and Theories. 2013; 3(1):50-59.
7. Manemann WM. Economic Conception of Water. Water Crisis: In P.P. Rogers, M.R. Llamas & L. Martinez-Cortina (Eds.), Myth or Reality. 2006, 61-92.
8. Jordan JL. An Introduction to water: Economic Concepts, water supply and water use in USA, 1998. Faculty series 98-12. Retrievable from http://www.ageconsearch.umn.edu/bitstream /16659/1/fs9813.pdf
9. Lanz B, Provins A. Estimating the Demand for Tap Water Quality: Avertive Expenditures on Substitutes for Hardness and Aesthetic Quality. Research Paper 23. Graduate Institute/Centre for International Environmental Studies, Geneva, 2014.
10. Linden S. van der Exploring Beliefs about Bottled Water and Intentions to Reduce Consumption: The Dual-Effect of Social Norm Activation and Persuasive Information. *Environment and Behavior*, 2013; 47(5):526-550. DOI: 10.1177/0013916513515239.
11. Nezhad MZ, Bavarsad B, Zangeneh L. Estimation of domestic water demand function in Ahvaz, Iran. Herald Journal Economic and Finance. 2012; 1(1):15-20.
12. Nketiah-Amponsah E, Aidam PW, Senadza B. Conference on International Research on Food Security, Natural Resource Management and Rural Development. University of Hamburg, 2009.
13. Yao Z. Factors influencing bottled water drinking behavior: A survey on factors that shape people's beliefs on bottled water and tap water. DEA 1501. Retrievable, 2011. From http://www. courses.cit.cornell.edu/dea150/files/2011%20files/Project%203.pdf