ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
COLLEGE OF DEVELOPMENT STUDIES

ASSESSING ENVIRONMENTAL KNOWLEDGE, ATTITUDE AND BEHAVIOR (KAB) OF THE RESIDENTS OF ADDIS ABABA, ETHIOPIA

By
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INSTITUTE OF DEVELOPMENT STUDIES (IDS)

Title

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DEVELOPMENT STUDIES

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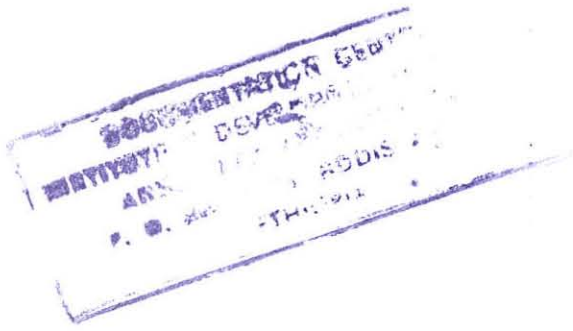
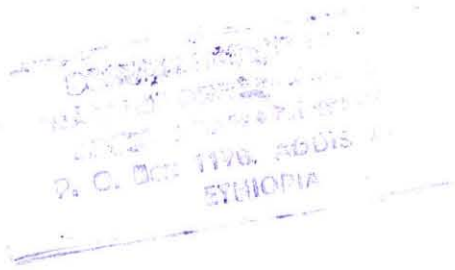


Acronyms

1. UNESCO - United Nations Education Scientific and cultural Organization
2. UNEP -United Nation Environmental Programme
3. ESSS - Ethiopian Soil Science Society
4. NGO - Non-Governmental Organization
5. UN -United Nations
6. WHO -World Health Organization
7. EEJA - Ethiopian Environment Journalists Association



Abstract

Environmental problems such as air and water pollution, urban garbage and climate changes in urban areas are the result of human environmental knowledge, attitude and behavior. Only changes in human knowledge, attitude and behavior can reduce these environmental problems. Thus, studying environmental knowledge, attitude and behavior of residents towards environment is a precondition to change this situation. So, the main objective of this study was to assess the environmental Knowledge, attitude and behavior of residents of Addis Ababa City Government.

To examine the level of environmental knowledge, attitude and behavior of Addis Ababa residents 204 individuals were chosen through a stratified cluster random sampling technique. Respondents were interviewed a

bout their environmental knowledge, attitude and behavior, and their major source of information. Environmental knowledge, attitude and behavior were measured through 26, 10, and 16 items. Individual's response to each of these items has been given an equal weight of one and their total scores computed by aggregating values of each of the items. Pearson's correlation coefficient was used to assess possible relationship among environmental knowledge, attitude and behaviors of respondents. Data processing and analysis was done using the CSPro and SPSS statistical packages respectively.

The results of the study showed that although the majority of the residents of Addis Ababa (95.5%) are aware of existing environmental problems of the city, the level of their knowledge is observed to be still very low (58.9% of them scored below the mean value). When looked across the different socio-demographic characteristics Male, literate, single, and protestant Christian respondents are observed to be better in environmental knowledge (69%, 78.3%, 67.1%, 68.8% respectively scored above the mean value) than their colleagues in other categories.

Likewise, above half of the respondents (52.9%) have also scored below the mean attitude value. Consistent finding is observed only among male respondents. While only 43.5% of female respondents scored above the mean attitude value, the majority of male respondents (59%) are found to score more than the mean attitude score. Significant differences are also observed among the different categories of age. The highest positive attitude was observed in the age category of above 60 years. More than two-third of the respondents in this category are observed to score above the mean attitude score.

Oromo ethnic group and protestants are also observed to have better pro environmental attitude (64.5% and 66.7% of Oromo and Protestant respectively scored above the mean attitude value) than Amhara, Tigrie, and Guragie Ethnic groups, and Orthodox Christians and Muslims.

Looking into environmental behavior, most respondents are observed to behave negatively towards the environment (53% have scored below the mean value in environmental behavior).Tigrie ethnicity have better environmental behaviour than others. Male respondents and protestants are consistently found in a better position. More than half (50.5%) and about two-third (66.7%) of male and protestant respondents respectively are observed to score morethan the mean in environmental behavior.

As regards the correlation between environmental knowledge, attitude and behavior a relatively weak correlation (Pearson's correlation of 0.16) is observed between environmental attitude and behavior. The highest correlation is recorded among environmental knowledge and attitude (a Pearson's correlation of 0.45) followed by correlation between knowledge and behavior, i.e., a Pearson's correlation of 0.32.

CHAPTER ONE

1. Introduction

1.1 Back ground of the study

The environment is continuously suffering from environmental degradation. Toxic gases enter the atmosphere. Toxic wastes threaten problems such as air, water and soil pollution, the solid waste problem, among others, together with the social, political, and technological changes going on in the country have brought about greater challenges to the academe, government, industries and other stakeholders.

Environmental problems can happen due to natural phenomena or unwise human activities. The environmental problems that the world is suffering from are mainly due to human activities. Humans have created and brought strange substances to the environment which have changed the environment to the extent that is difficult to reverse (Demel 2003). In fact, some of naturally caused problems such as flood strike, storm hits, may directly or indirectly be consequences of human activities.

It is when people push the issue of the environment aside and give the priority to the timely economic demands that they stop to be friendly with the environment. As a result economic advantages become more important than environmental considerations (Axen, 1999). The demand could be for

subsistence as in the case of the majority poor in developing countries or for luxury in developed ones. This ascertains the belief of most environmentalists who take poverty and development as the most enemies of environment (Gedion, 2003). The poor in developing countries exploit the readily available resources using the unwise traditional way. This brings about the depletion of resources to a stage where reversal to the original state would be beyond the ability of these poor.

It is in this way that the environment specially (the flora and fauna) in the developing nations have been degraded even more seriously than those in developed ones.

All what have been discussed so far are only the immediate cause of poverty. The real cause for all the problem is lack of environmental literacy-literacy that goes beyond awareness to affect people's attitude and commitment (UNESCO-UNEP, 1988). So long as people, regardless of their economic status, are well aware of the long effect of harmful environmental skills and develop the values that help them become pro-active, there would be no way their economic demand drives them to leave environmental concerns aside. Thus, the root causes for all the aforementioned environmental problem is lack of education in which lays the sustainable solution for the problem.

Environmental problems and the accelerating changes in living conditions have therefore become a fundamental part of the world in general and metropolises in particular. Earlier, environmental problems have been considered as technical

and economic problems; while in the recent decades the social dimensions of environmental problems such as public attention and people's attitudes towards environment have became one of the areas of environmental sociology and environmental psychology (Kalantari and et. al., 2009).

Environmental attitudes and ecological behavior and their environmental consequences have been investigated in developing and developed countries during the last few decades. The "International Attitudes Towards Environment and Development" study by Dunlap (1994) finding for instance has revealed that environmental deterioration is seen as very serious by citizens of all types of nations. While the foci of their concerns vary somewhat residents of both rich and poor countries see environmental conditions as serious problems. No longer is concern about environmental quality limited to those who live in the wealthy, industrialized northern hemisphere—if it ever was.

A study by McGranahan, 1991 entitled "Environmental Problems and the Urban Household in Third World countries" has shown that the core environmental problems faced by the urban poor are (1) water and sanitation, (2) air pollution, (3) food contamination, (4) solid waste disposal, (5) pests and pesticides.

In another survey, on "citizens of Sao Paulo's perceptions of environmental problems and their solutions" (Jacobi, Kjellen, & Castro, 1998), 63% of the participants said that air pollution is a problem in their neighborhood; 39% complained about contaminated streams and rivers nearby; 39% cited noise pollution; 37% said they suffer from problems with water supply and quality;

and 29% complained about solid waste in the neighborhood. For most problems the great majority of the participants thought that the solution should be governmental (more than 87% for water, sewage, and air pollution problems). Regarding solid waste, 71% thought the solution is governmental, 17% thought the solution is on the community level, and 12% thought it is at the individual level. The governmental solutions preferred were either direct, such as investment in infrastructure, and enforcement, or indirect such as education and information.

Studies estimate that 30% of households of Addis Ababa lack private or communal sanitation facilities and some of the available toilets are sub-standard. Very few public toilets are available to those who do not have domestic toilet facilities. The public toilets are not evenly distributed in the City and most of them are not accessible by the population who need them. Thus all available vacant spaces within the city (green areas, and riverbanks) are common defecation sites (a).

Appropriate solid waste disposal sites are scarce and the ones available deliver inadequate services. Addis Ababa is estimated to generate 765 tons of solid waste each day. Of this volume, 65% is collected and transported to the disposal site at Repi. The remaining 35% is left unattended in the various corridors of the city. Solid wastes are not segregated at the points of generation before their transportation to the disposal site [a].

According to a study by Meson (1996), solid waste is rankest top of environmental Problems in Addis Ababa, scoring 26.47, and immediately followed by sewerage (20.59), then population congestion (14.71) [b].

Air quality deterioration is an emerging trend in Addis Ababa due to the old age of vehicles; poor fuel quality; poor maintenance of vehicles; inadequate transport infrastructure; and a lack of proper transport planning and management. Studies have shown that there are more than 250,000 vehicles found in Ethiopia out of which, more than 62% are driven in Addis. Clean fuels and new vehicles are needed to improve Addis Ababa's air quality [c].

How many residents of Addis Ababa, not including the ones who are driving around with windows rolled up, suffer from breathing difficulties, headaches, coughs and eye irritations? An increasing number of diesel powered buses, trucks and 4 wheel drives are pumping tons of toxic fumes in the Addis Ababa air and nobody seems to be paying any attention. Those who use diesel powered vehicles save a lot in operating cost but at whose expense and for how long? There is no question that to date diesel buses and goods vehicles are the top polluters, not to mention government, NGO and UN diesel powered fleets which roam Addis Ababa's streets spewing thick black smoke (Capital Ethiopia News, 2004).

A study by Jene Akumu, Program Manager of United Nations Environmental Program (UNEP) in Kenya, has also indicated that the contribution of vehicle fumes to poor air quality is superior (EEJA, 2009)

Studies has also indicated that in addition to the contribution of vehicle fumes to poor air quality, emissions from industries and mining; the open burning of waste; and blown dust are the other major sources of air pollution in Addis Ababa. The resultant fuel wastage; exacerbation of disease, particularly respiratory diseases; and poor air quality comprises a negative economic burden for the country [c].

Noise is unwanted sound, and the problem with noise is not only that it is unwanted but also that it negatively affects human health and well-being. Culprits named as sources of most noise worldwide are transportation systems (including motor vehicle noise), office equipment, factory machinery and construction work [h].

According to a study conducted by Tibebu, there are two major categories of impacts of noise pollution; they are human health and environmental impact. In case of human health impact the World Health Organization (WHO) says that chronic exposure to noise, including daytime traffic, is strongly associated with disease and premature death. It can affect both health and behavior in nature. It can contribute to cardiovascular effects, and exposure to moderately high levels during a single eight hour period causes a statistical rise in blood pressure of five to ten points and an increase in stress and vasoconstriction leading to the increased blood pressure noted above, as well as to increased incidence of coronary artery disease. An impact of noise on the environment can be

explained by reduction of usable animal life habitat due to noise increase, which in the case of endangered species may be part of the path to extinction [h].

Based on a "Preliminary assessment of noise in some residential, industrial and commercial areas in Addis Ababa" by Aberra, the problem of noise pollution is not as pronounced in developing countries such as Ethiopia compared to that of the developed ones. However, the problem is still there to the extent of having adverse consequences, especially in terms of human health. The case of Addis Ababa is worth much attention for it has long been home to the many socio-economic activities in many sectors such as the construction sector, the industrial sector, the transport sector, commercial and domestic sectors etc, which are believed to be responsible for the noise pollution problem in the city.

These issues are increasingly taking more attention of policy into account in Ethiopia in the recent decades. Particularly, increasing population density in Addis Ababa is putting pressure on the city's environment. The intention of this paper is therefore to investigating environmental knowledge, attitude and behavior of Addis Ababa residents. There is hardly any empirical study of public environmental knowledge, attitude and behavior in Ethiopia. This study will therefore be the first attempt in this respect.

1.2 Statement of the Problem

Addis Ababa attracted migrant population from other parts of the country. In addition to this, rate of rural-urban migration drained rural labor force from agricultural production created problems of unemployment congestion and

strains on existing inadequate social services in Addis Ababa like solid and liquid waste management, etc.

The current stock of Addis Ababa housing is both insufficient and of very poor quality and also some of the households in Addis Ababa have no sanitation facilities. The serious deficiencies in sanitation services and the inadequacy of sewerage infrastructure and random defecation have created dangerous health and environmental problems. Rivers and streams in the vicinity of Addis Ababa have become open sewers and is one of the main sources of infections resulting in diarrhea and other diseases.

This indicates that great attention has to be given to the environmental problems of Addis Ababa. How and where future intervention programs are going to be implemented should also be based on reliable statistical information, for otherwise effective behavioral change in the society may not be achieved. To meet the above aims, the following research questions were formulated.

1. What is the level of environmental knowledge, attitude and behavior of residents?
2. Is there any difference of knowledge, attitude and behavior in terms of socio-demographic factors?
3. What is the inter linkage between knowledge, attitude and behavior?

1.3 Objective

1.3.1 General objective

The general objective of the study is to assess the knowledge, attitude and behavior of Addis Ababa City inhabitants towards environment.

1.3.2 Specific Objectives

The specific objectives of the study are to:

1. Estimate the levels of environmental knowledge, attitude and behaviors of Addis Ababa city residents.
2. Compare environmental knowledge, attitude and behavior across different socio-demographic categories.
3. Assess existing relationships between environmental knowledge, attitude and behaviors.

1.4 Significance of the Study

Development is an output of savior efforts including different researches in different disciplines across time horizon and levels. Although to know about the environmental knowledge, attitudes and behaviors of Addis Ababa community is not sufficient to bring about successful intervention, its contribution to the effectiveness of future activities is tremendous.

Therefore, having accomplished the study, it will create an awareness about the environmental knowledge, attitude and behavior of Addis Ababa general population to concerned bodies especially those environmental authorities, policy planners, NGOs program and project interventions to get a feedback

about the phenomenon. Additionally, this research will provoke researchers for further researches and investigations.

1.5 Scope and delimitation of the study

The study is delimited to Addis Ababa residents of three sub city out of ten sub cities these are Bole, Yeka and Addis ketema. Out of this sub city only two kebele is selected from each sub city. It accommodates different types of peoples which has different religion, culture, ethnicity, and in general have different backgrounds. Information would be gathered from head of house holds it includes female and male headed house hold.

1.6 Limitation of the study

It would have been much stronger if the study also takes into account the whole family of the household as the subject of the study. Besides, the study does not involve other family of the household except the head of the household due to time and financial constraints. So it affects to conclude and generalize the results.

1.7 Materials and Methods

1.7.1 Materials

The study employed an entirely structured questionnaire. The questionnaire was organized as follows:

- Totally, fifty-seven different questions were used to carry out the study.
- Twenty-six questions were used to measure respondents' environmental knowledge. The questions were developed after considering several issues (see appendix_1). Each question has been given an equal weight of one

point. Individuals who have correctly responded to a particular question have received a value of one point. Each score of a respondent were therefore summed up and evaluated out of 26.

- Attitude level, on the other hand, was calculated based on ten separate questions. All attitude questions are "Yes/No" or "Agree/disagree" type (see appendix_1). Like in knowledge, each question of attitude has also received an equal value of one point. Each question's score were thus summed up and evaluated out of 10.
- Behavior was measured through sixteen key questions. Most behavioral questions were presented in the form of "Frequently/ sometimes/ never". An equal value was given for respondents who have replayed either "Frequently" or "Sometimes". Finally, each questions score were thus summed up and evaluated out of16.
- The rest five questions focus on access and sources of information.

1.7.2 Methodology

1.7.2.1 Description of the Study Area

Addis Ababa is the main centre for economic, social and political affairs of Ethiopia and lies between 2000 and 3000 meters above sea level, enjoying mild, Afro alpine and warm temperature climates [a]. Its topography is constituted by hills, valleys, rivers and streams. The air temperature is fairly constant throughout the year, with variations between 20 to 25 °C during the day, and between 7 and 11 °C at night. Average rainfall is 1200 mm per year, with the major rains occurring between July and September (Enda-Ethiopia, 1999).

Addis Ababa has 10 distinct sub-cities. The current population of the city is estimated at around 3,000,000 with a population density of about 4,990/km^2. The standard of living amongst the city population is poor and below acceptable standards. Provision of basic facilities such as housing, potable water, sanitation, energy and health care services is in evolution and still at infancy. Environmental degradation is threatening at an alarming scale and remains a threat to the socio-economic development of the city [a].

1.7.2.2 Study Design

In fulfilling the aforementioned study objectives a quantitative data collection technique was employed. The quantitative method was administered on a sample of households through a structured questionnaire.

1.7.2.3 Sample Design

A stratified four-stage cluster sample design was employed in order to identify the required sample households. Sample sub-cities, kebeles and health extension units (that have been considered as clusters) were chosen in the first, second and third stages of sampling respectively. Households of each sample health extension unit was stratified by sex and proportional number of male and female headed households drawn in the fourth stage of sampling. The overall feature of the sample strategy employed is depicted in the figure given below.

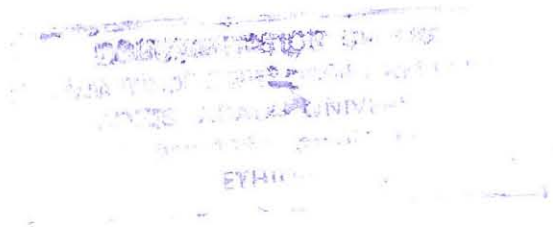


Figure.1 Sampling Strategy

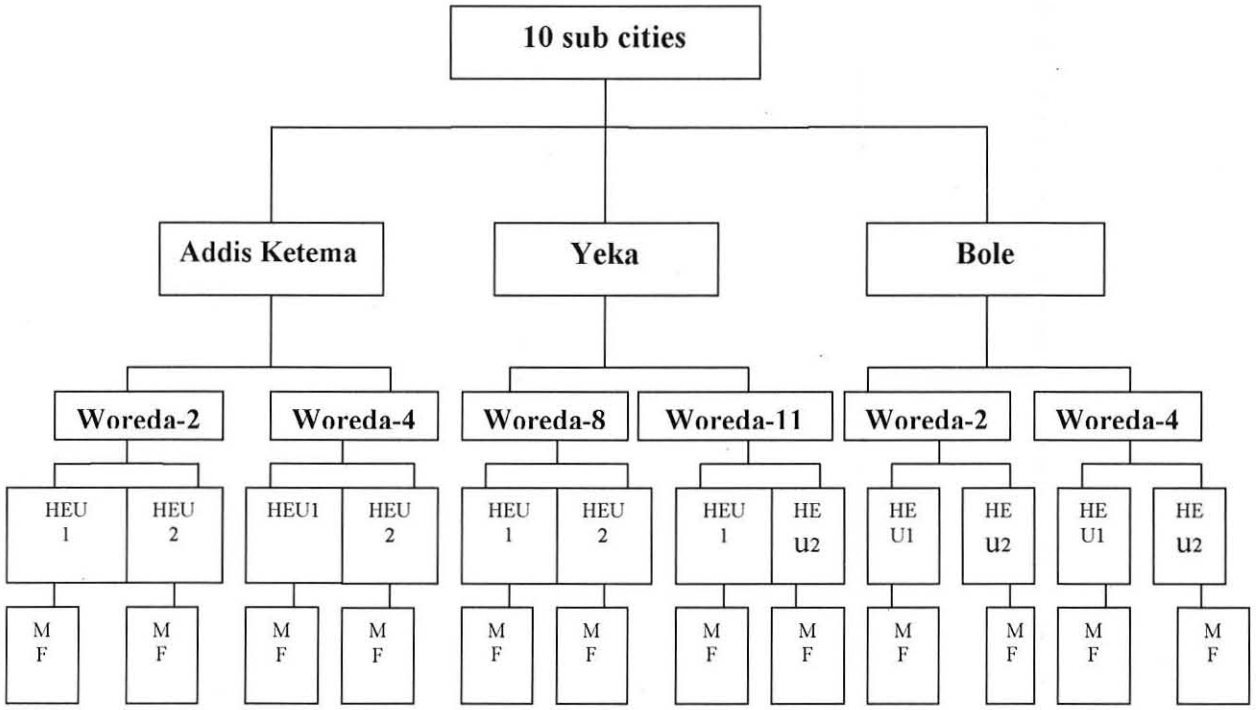
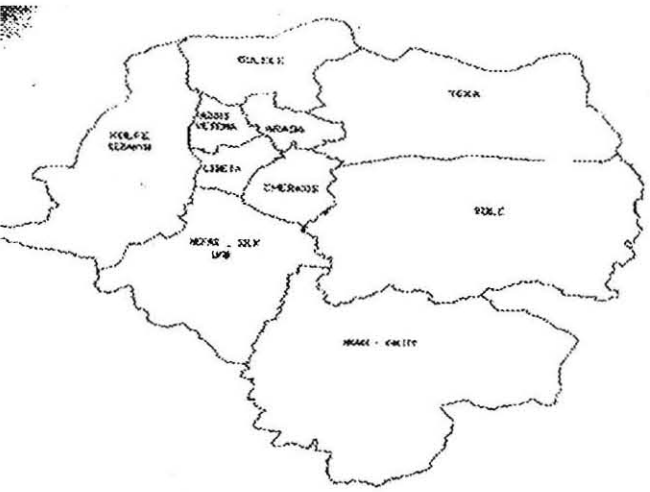


Figure 2 City Map of Addis Ababa



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1.7.2.4 Sample Size and Sample Allocation

Sample size is the pivotal feature that governs the overall design of the sample. Computation of necessary sample sizes will vary according to the measurement objective we desired. The procedure to be followed in computing the required sample size when our key measurement objective is estimating changes that occur between surveys and when our objective is to measure (estimate) a proportion within a given precision are also different.

This study is a cross sectional study mainly focusing in obtaining the current estimates. Thus, following sample size computation procedures used for estimating not of changes between levels but of only level would suffice our purpose. The following formula is used to determine the necessary sample size.

$$n = deff \frac{(Z_{\alpha/2})^2 * p(1-p)}{\varepsilon^2}$$

Where,

n = *required samp lesize*
$Z\%_2$ = *the* $\alpha / 2$ *s* tan *dard normal distribution score, usually* 95% *value* (1.96) *is consdered as appropriai*
p = *estimated value for the population proportion*
ε = *m* arg *ine of error usually taken as* 5 – 10%
$deff$ = *anticipated design effect, the default value is* 2.

In determining sample size, with no prior information about the variability of the population proportion, which is going to be measured, the variance of the population proportion is often guessed by taking the population proportion to

be equal to 0.5. Therefore, setting the population proportion (p) equal to 0.5 and assuming a design effect of 2 to make an adjustment for the clustering effect, a minimum sample of 192 households was found to be sufficient to attain a 95% confidence with an absolute error of 10%. Considering possible non-responses and some minor adjustments for operational convenience a sample of **204** households was determined to be sufficient.

In cluster sampling increasing the number of clusters to be sampled instead of number of individuals to be selected per cluster is essential for providing precise information. Increasing the number of clusters, on the other hand, may incur extra costs. Hence, considering both constraints, **three** sub-cities (Addis ketema, Yeka and Bole) were sampled and covered in the study. **Two** woredas per sample sub-city and **two** health extension units per sample Kebele were chosen. Thus, a total of **twelve** health extension units were selected and surveyed from the six sample kebeles. On the other hand, 17 male and female headed households were chosen from each sample health extension unit. Totally, **204** households were surveyed from all the three sample sub cities.

Since the numbers of male headed and female headed households vary significantly, household selection was accomplished proportionately. Thus, health extension units having more female headed households than male headed households had given the chance of receiving more female headed sample households than male headed. Consequently, 115 male headed and 89 female headed households were sampled and surveyed.

Table 1 Distribution of Sampling Units by Sub City

Sub-City	Woreda # %	Cluster (HEU) # %	Household		
			Male Headed # (%)	Female Headed # (%)	Total # (%)
Addis Ketema	2 (33.3%)	4 (33.3)	38 (55.9)	30 (44.1)	68 (100)
Yeka	2 (33.3%)	4 (33.3)	45 (66.2)	23 (33.8)	68 (100)
Bole	2 (33.3%)	4 (33.3)	32 (47.0)	36 (53.0)	68 (100)
Total	6 (100)	12 (100)	115 (56.4)	89 (43.6)	204 (100)

1.7.2.5 Selection scheme

Sample sub-cities, woredas and health extension units were chosen using a simple random sampling technique. Households however were identified through systematic sample selection scheme.

1.7.2.6 Sampling Frame

The lists of sub cities and woredas within each sub city were used to choose sample sub cities and kebeles. The lists were obtained from Addis Ababa City Government Office. On the other hand, Health Extension Units were chosen from the list of Health Extension Units within kebeles. The list was obtained from respective sample kebeles.

Finally, households were selected from the lists of male headed and female headed households found in the sample Health Extension Unit. The lists were obtained from Health Extension Worker.

1.7.2.7 Field organization

Data from sample households were collected by 12 Health extension Workers. Data collectors were recruited in such a way that he/ she should have at least Nursing diploma and also have at least one year experience in collecting data of the same type. He/she should be honest and capable of doing such a careful task. On average, six questionnaires were filled-in per data collector per day. Thus, 4 days were required to complete the whole data collection activity. To closely follow-up the data collection activity and made timely on-site corrections of errors field supervision was conducted by the researcher herself. Training guide regarding the techniques of collecting data from samples as well as mechanisms of selecting households was prepared and a half day technical training regarding the concepts, definitions and methods of collecting data were provided for data collectors.

1.7.2.8 Data Management and Processing

After the field activity was completed all the data was edited. Data that was obtained from the structured questionnaire was in addition carefully coded. Properly edited and coded data was finally entered to computers using data entry software packages like CSPro by a qualified data entry clerk. After cleaning the data analysis was done using the most frequently used statistical software package of analyses - SPSS.

CHAPTER TWO

Review of Literature

2. Conceptual frame work

2.1 Environmentalism

Environmentalism has a cumulative meaning that includes environmental action, environmental movements, environmental politics, and environmental attitudes. Harper (1996) indicates that environmentalism is both ideology and action; "as ideology, it is a broad set of beliefs about the desirability and possibility of changing the human relationship with the environment" (1996:293). According to this definition environmentalism includes environmental beliefs and attitudes. Environmentalism is a total perception or worldview within a society on environmental relations.

Historically, environmentalism as a social movement and political ideology varies from the anthropocentric pole to the eco-centric pole. Resource conservation, human welfare ecology, preservation, animal liberation, and eco-centrism are major environmentalist streams (Eckersley, 1992:34). The resource conservation movement basically advocates conservation of natural resources for better usage. Human welfare ecology targets a clean, safe, and more pleasing natural environment for human being. The preservation movement advocates reservation of wilderness for human enjoyment. Accordingly, this movement, like the resource conservation movement and the human welfare ecology movement, is human centric as well. These three environmental streams are anthropocentric streams.

According to these streams, environment has instrumental value for us. These environmental streams are confirmed by the dominant social paradigm of industrial society. However, according to modern environmentalism, nature should have been valued for its own sake (Eckersley, 1992:42; Naes, 1995).

2.2 Environmental problems in Ethiopia

In Ethiopia, environmental problems are increasing at an alarming rate. The degree becomes severe in the northern, central and eastern parts of the country. This is because the degrees of land degradation, deforestation, over cultivation and over grazing are extremely intensified due to intensive agriculture and early settlement (Ermias, 2003; Desalegn 2003; Aklilu, 2001; Gebeyehu, Yosef and Gronrall, 1992; Beletu and Yosef, 1990).

The driving force for environmentalism are the intensification of the above problems.(Desalegn, 2003) .Land degradation due to soil erosion and soil fertility decline is becoming a pressing problem (Ermias, 2003; Aklilu, 2001) .

According to the Ethiopian Soil Science Society (ESSS, 1998), the country looses a total of 1.5 billion tons of soil on a yearly basis. It further makes clear that it is only 20 percent of the highlands which does not face soil erosion hazards.

Similarly, soil fertility decline is also another major problem in the agricultural areas. Based on the assessment of soil nutrient depletion, Ethiopia experiences the highest rate of nutrient depletion (Stoorvogel et al, 1993). This brutal reality has, in turn, brought about the loss of 40,000 tons of grain production annually (Azene, 2001).

What adds fuel to the fire is deforestation. In Ethiopia deforestation is too high. Forests are cleared for fuel wood, agriculture, livestock grazing, house construction, etc (Konemund, 2002). Forest cover has presently decreased from 16% in the 1950s to 2.5% of the total land area. Forest depletion rate is assumed to be 160,000 to 200,000 hectares annually (Ibid).

There are various factors which contribute to the acceleration of deforestation. A typical cause is energy supply. In Ethiopia, almost 96% of the energy supply comes from biomass which is a traditional energy supply. Due to population growth and luck of other options, the demand for biomass has created unbalanced ecosystem, putting pressure on biomass resources and arable land in an already deteriorating environment.

Equally important, urban environmental problems such as solid waste, liquid effluents and air pollutions turn to be series hurdles to environmental well being (Alebel and Dawit 2006 ; Teferi,1996). Goods and services are returned after use into the environment as waste and emissions which instigate various forms of environmental problems: resource depletion, poor quality of air , deterioration of water and soil quality, noises, etc (Ibid).Besides, environmental problem have their own effect on the socio-economic progress. They also dispossess people's quality of life, and dwellers experience health problems (Huizen and Nijkamp, 1995).

Wastes can be either solid or liquid. Unlike developed countries where industry waste is a headache, in Ethiopia, particularly in Addis Ababa, house holds (76%)

contribute the lion's share of solid waste, followed by commercial establishments and industries. They jointly contribute 14% of the total waste. Four percent of solid waste in the city comes from streets. Thus, Solid waste is the major obstacle for Addis in particular and other towns and cities in general (Alebel and Dawit, 2006).

With regard to waste water, they can emanate from industries or municipalities. Compared to municipal waste waters industrial waste water are highly offensive for they contain chemical pollutants and toxic substances in large amounts. To examine the seriousness of industries waste water pollution, it is essential to inspect how industries in Addis Ababa region discharge their liquid effluents. Sadly enough, they discharge their effluents directly to Akaki River which ends in Aba Samuel water body. Studies uncover that 26 industries discharge their effluents directly to the above rivers as a result of which the rivers have become sources of infections for both humans and animals (Teferi, 1996).

All in all, both rural and urban environmental problems, with brutal realism, are escalating. The present environmental crisis notifies that there is no harmony between nature and human being. Consequently, nature has already started punishing us in the form of drought, diseases and flood. At this juncture, it seems high time to re-dress our relationship with nature.

2.3 . The Concept of Environment, Environmental knowledge, attitude and behavior

2.3.1 Environment

Our environment is our surrounding. This includes living and non-living things around us. The non-living components of environment are land, water and air. The living components are germs, plants, animals and people. [d].

All plants and animals adjust to the environment in which they are born and live. A charge in any component of the environment may cause discomfort and affect normal life. Any unfavorable change or degeneration in the environment is known as 'Environmental Pollution'. We need to protect our environment to live happily. [d].

For better environment, all its components should be protected from pollution and the surroundings should be clean. We need to take good care of our land, water resources, forests and atmosphere. It is also necessary to ensure a balance between these resources and living creatures, to meet our needs. [d].

2.3.2 Environmental knowledge

Environmental knowledge is defined as embedded explanatory, instrumental and evaluative knowledge, offering the 'why' and 'how' for the actors. Individuals and communities need 'living' environmental knowledge as their particular resource in order to develop their environmental practices and identities [e].

Knowledge may appear as a boring and empty word; it reminds us of education and official knowledge systems, piled up in libraries and databases. Externally

documented knowledge may seem to differ from 'living' knowledge, active in one's work, identity, motivation and future plans. However, 'official' and 'external' knowledge can develop links with 'living' and 'internal' knowledge, to be acted out in personal life and professional work [e].

Moore (1979) and Walmsley and lewis (1993), puts forward three postulates of environmental knowledge construction. First, "environmental knowledge constructed in that individuals invent structures in order to enable them copes with reality". In this view, separation of the known form the process of knowing is hardly possible. Second, environmental knowledge is formed through the interaction of internal need and external demand. Third, environmental knowledge can be constructed in a holistic manner. In other words, there is mutual understanding between human being and nature. The above postulates display different frames of orientation towards nature: some are anthropocentric others are interactive.

With regards to types of environmental knowledge, there are four: dominion (anthropocentric), stewardship, partnership and participation. They range from anthropocentric to ecocentrism (Kockelkoren et al, 1993). Anthropocentrism views nature as subject to man. On the other hand, ecocentrism views man as subject to nature. In between the extremes, there are two moderate environmental out looks: in stewardship and partnership.

1. Dominion: - Human being is the center and the ruler of the earth. He has free disposal over all forms of planetary life. The role of nature is to safeguard human survival by providing raw materials. The relationship is

master-slave type that man never ceases to extend his power. The "Either you or me" philosophy is self-suicidal which has a diverse effect up on the environment in general and human's life in particular (Kockelkoren et al, 1993; List, 1993).

2. Stewardship:-It grounds on anthropocentric view, putting limit to man's demand from nature. Man is accountable to the future generation. It dictates conservative approach. As List (1993;8) points out, "It emphasized the fight against pollution and resource depletion because of concerns about the health and affluence of people in the industrial countries ".Otherwise, there is a clear demarcation between nature and man in such a way that nature is designed for the well being of human being (Ibid).
3. Partnership:-Interaction between nature and human being is the essence of partnership philosophy. It tries to safeguard the diversity of life, disallowing man not to interfere with the self generating capacity of nature. It gives due regard to the intrinsic value of nature. partnership, according to List (1993:20):

> *"Enhances the potentialities of survival, the chances of new modes of life, and the richness of forms. And the so called struggle for life, and survival of the fittest should be interpreted in the sense of ability to co-exist and cooperate in complex relationships, rather than ability to kill, exploit, and suppress. 'live and let live' is a more powerful ecological principle than 'either you or me."*

4. Ecocentrism:-It is a radical philosophy which encourages anti-technical attitude; expressed by the slogan"back to nature" It requires deep ansystematic alterations of philosophies. Their basic principle states that "humans have no right to reduce the richness and diversity except to satisfy vital need". In principle it has grain of truth, but practically mutual predation is the pragmatist mode of biological life. Hence, traditional lifestyle which grounds on communalism and small scale craft production appears far from reality (Kockelkoren et al, 1993; List, 1993).

In relation to environmental knowledge studies, environmentalism requires high level of environmental knowledge (Inglehart, 1995a; 1995b; Arcury, 1986; 1987). In other words, high level of environmental knowledge is related to high level of education. Buttel and Flinn (1978) also point out that well educated people give due regard to the environment than their lower educated counterparts. Therefore, environmental knowledge plays a paramount role in promoting environmentalism.

Several studies have confirmed the ideas mentioned above. For instance, Aklilu (2006), in his study on "knowledge about and attitude towards certain environmental issues", indicated that most primary and secondary school students, in general, have poor, very general, and uncritical knowledge, and attitudes that cannot be rated as promising. Ibrahim and Babayemi (2010) using Nigerian undergraduate students have also confirmed that the lion share of the students (68.7%) scored below the mean value. Arcury (1990) using telephone survey data from 680 Kentucky residents, asserted that his respondents "did

not score well on the measures of environmental knowledge". Mansaray *et al.* (1998) in their survey among some Nigerian secondary school teachers also asserted that their respondents "generally demonstrated a low level of environmental knowledge".

The relationship between gender and environmental concern also has been more carefully theorized than other structural variations in environmental concern (Caiazza and et. al., 2003). Women are generally more concerned than men and the literature explores several possible mediating factors. One is gender differences in the experience and effects of parenthood. For men, parenthood leads to less environmental concern while, for women to greater concern (Stern, and et.al., 1998).

However, empirical efforts have found associations between "gender and environmentalism to weak and consistent" (Blocker and et al., 1997). Age, marital status and literacy level could also be causes for existing variations in environmental knowledge among individuals.

The relationship between religion and environmentalism has been the subject of a great deal of controversy, given the interest generated by Lynn White's (1967) argument that Christian beliefs accrue anti-nature predispositions. Eckberg and Blocker (1996), using data from the 1993 General Social Survey, lend some evidence to support this argument, though "the negative effect of Christian "theology" seems to be largely an effect of fundamentalism or sectarianism". Ethnicity is also a factor that is highly related with individuals calture and

tradition. It may therefore be one of the factors affecting environmental knowledge of an individual.

2.3.3 Environmental Attitude

Environmental attitudes are conceptualized in terms of attitude theory as being composed of beliefs and affect toward an object. The environment as an object is difficult to define and this has implications for the study of general environmental attitudes. Attitudes are based on values, have horizontal and vertical structure and tend from general to specific. The overall affect statement is the summary of this structure [f].

Conceptualization of Environmental Attitudes: Environmental attitudes are related to environmental problems. Environmental values, the relationship between the environment and society, and perceptions of natural source consumption directly affect overall environmental balance (Dunlap and Van Liere, 1978). Environmental attitudes are perceptions or values about given environmental issues. Environmental issues include the relationship between environment and society, effects of economic growth and technology on the environment, environmental degradation, air and water pollution, green house effect, global warming and numerous other environmental problems.

According to Fishbein and Ajzen (1975), attitude is learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object. Attitude creates action or behavior that is generally consistent. Environmental attitude is defined as a learned belief which develops from an individual's knowledge and values about the environment and governs action to

support or sustain the environment. In most theories of attitudes, two components are noted, an emotional dimension involving feelings and a cognitive aspect which refers to dispassionate facts and beliefs.

A study conducted in twenty-four nations from different economic levels and geographic regions on international attitude towards environment and development had shown that respondents generally tend to see their nation's environment, and especially that of the world as a whole, as in poor shape, as majorities in nine countries rate their nation's environment negatively while majorities in twenty-one countries rate the world environment negatively (Dunlap, 1994).

Consistent with prior studies, respondents were more likely to rate their nation's environment negatively than they are their local community's environment (with Turkey and Finland the only exceptions). They are also generally more likely to see the world's environment as worse than their nation's, with six exceptions. In the three East European nations plus Nigeria, India, and the increasingly industrialized Republic of Korea, a higher proportion of respondents give their nation's environment a poor rating than give the word's environment such a rating. In the remainder of the countries (with the exception of Turkey and Finland, as noted above), there is a clear pattern in which the more distant the environment being rated, the more negatively it is viewed (Dunlap, 1994).

A preliminary investigation into the environmental awareness of the Omani public and their willingness to protect the environment had indicated that the

Omani people had generally high positive attitudes toward the environment. Of the respondents, 90.5% believed that people who pollute the environment should be punished. Although the majority of the respondents (68.1%) were optimistic in believing that it is possible to create future generations that treat the environment with respect, 27.0% of the respondents indicated that it can be done but with some difficulty (Abdul-Wahab, 2008).

The great majority of respondents (82.6%) believed that air pollution in Muscat and surrounds is an important issue with dangerous consequences. Respondents indicated that the effects of air pollution are observable on buildings and facilities (32.9%), on cars (32.1%), and on air conditioners (19.9%). The results of the survey showed that the majority of respondents (92.7%) agreed that smoking cigarettes and Sheesha (water pipe) inside the house pollutes the house environment. The great majority of respondents (91.4%) believed that there has been an increase in smoking in Muscat and 93.2% of the respondents indicated that such smoke constitutes air pollution. Most of the respondents (60.1%) found that the state of the environment in the area where they live has improved over the past ten years, while 24.5% thought that it did not change. The rest of the respondents said that the state of the environment has deteriorated (15.4%) (Abdul-Wahab, 2008).

A survey of Finnish 9th grade comprehensive school students showed that students from grades 2-5 had more positive attitudes towards the environment. However when it comes to action, they certainly had no idea what to do. Students were eager to put some effort to protect their environment but they

needed guidance. Both students and their parents stated they were willing to make sacrifices in order to live in a quality environment. On the other hand students from grades 6 - 8 seemed to have a more neutral attitude towards the environment. Some of them stated that individual efforts would not make a difference, and government and local authorities were the major ones responsible for the protection of the environment (Uitto and et al, 2003).

Disaggregated results of attitude by different socio-demographic characteristics have also indicated the following. Age, education, gender, occupation, place of residence and income is the most explanatory variables related to environmental attitudes (Mohai and et al., 1987, Vogel, 1994, Cottrell and et al., 2002, EORG, 2002).

Scholars such as Tarrant and Cordel, 1997, Stern *et al.*, 1998, and Arcury, 2000 also discussed gender effects of environmental attitudes. Their findings have been contradictory to each other. Arcury (2000) found that female respondents were less environmentally concerned than male respondents and Tarrant and Cordel (1997) and Stern *et al. (1998)* reported that female had higher levels of environmentalism than male. Overall findings have indicated no clear gender difference on environmental attitudes. Because different researchers used different samples each research arrived to different result. Some studies also suggest a weak positive relationship with some measures of religious participation (Tommy and et al. 2002).

Socialization theories support the expectation of gendered differences in dispositions towards environmentalism. These theories concord that females are predisposed toward the caregiver role, making women to be more compassionate, nurturing and protective than men (Beutel and et al., 1995). This mentality extends to protective knowledge and attitudes toward the natural world.

Nevertheless, other empirical investigations show inconsistent results on this hypothesis. For instance, one of the earlier studies done by McEvoy (1972, quoted in Van Liere and Dunlap 1980) showed that men are more concerned about environment than women due to their higher level of education and involvement with the communities and political issues. However, other studies shows that women are more concerned about environment than men because men are much more concerned about economic growth and economic stability (Passino and Lounsbury, 1976 quoted in Van Liere and Dunlap 1980) and consider environment as constraint to the economic growth. The review of further analysis by Mohai suggests (quoted in Stern, Dietz, and Kalof, 1993) that women tend to be more concerned about local environmental issues than men, but this difference is smaller when it comes to the issues at national or global level. It also notes that women are less likely to take political actions to protect the environment.

Many studies reveal the relationship between the concern and age. It says that in general, younger generation tends to be more concerned about environmental quality than older generation. The earliest of this study, as it was stated in the

Mohai and Twight (1987), was realized by Malkis and Grasmick (1977, quoted in Mohai and Twight, 1987) which discovered the dominant relationship between age and environmental concern from a survey of Minneapolis.

Also, Akinbote (2000) opined that education should make young people aware of environmental problems. Ibrahim and et.al (2010), in their study on knowledge and attitude of a group of Nigerian undergraduates towards environmentalism, have also confirmed that "There is a positive, significant and strong relationship between knowledge of and attitudes towards environmentalism."

The mean attitude score of Nigerian undergraduates as stated in Ibrahim & Babayemi's (2010) study was also observed to be low, 47.7, with 54.2% of respondents scoring below the mean. Fifty four point two percent of respondents can be said to possess unhealthy or risky attitude towards environmentalism. Likewise, a previous study by, Mansaray et al. (1998) found "negative environmental attitudes" among some Nigerian secondary school teachers, after surveying their environmental knowledge and attitudes.

A study by Atlabachew (2007) on "Learners and Acadamic staffs' Environmental knowledge, Attitude, Information and Behavior, the Case of Adama University has indicated that the environmental attitude of bôth Adama University students and instructors are neutral indicating that they fail to demonstrate favorable attitudes towards the environment. Similarly Asmare (2007) in his study on "Contribution of Environmental Education in Raising Students'

Knowledge, Attitude and Practice in Selected First Cycle Secondary School" has also shown that only 18.6% of the students surveyed had positive attitude towards the environment.

2.3.4 Environmental Behavior

Behavior can be defined as the way in which an individual behaves or acts. It is the way an individual conducts herself/himself. Behavior should be viewed in reference to a phenomenon, an object or person. It can be seen in reference to society norms, or the way in which one treats others or handles objects. Behavior, therefore, is the way an individual acts towards people, society or objects. It can be either bad or good. It can be normal or abnormal according to society norms. Society will always try to correct bad behavior and try to bring abnormal behavior back to normal. The following are the root causes of behavior differences [g].

1. Individual differences
2. Differences in family patterns
3. Impairment/disabilities
4. Environmental factors
5. Psychological factors

Environmentally significant behavior can reasonably be defined by its impact: the extent to which it changes the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere itself (see Stern, 1997). Some behavior, such as clearing forest or disposing of household waste, directly or proximally causes environmental

change (Stern, Young, & Druckman, 1992). Other behavior is environmentally significant indirectly, by shaping the context in which choices are made that directly cause environmental change (e.g., Rosa & Dietz, 1998; Vayda, 1988). For example, behaviors that affect international development policies, commodity prices on world markets, and national environmental and tax policies can have greater environmental impact indirectly than behaviors that directly change the environment.

Through human history, environmental impact has largely been a by-product of human desires for physical comfort, mobility, relief from labor, enjoyment, power, status, personal security, maintenance of tradition and family, and so forth, and of the organizations and technologies humanity has created to meet these desires. Only relatively recently has environmental protection become an important consideration in human decision making. This development has given environmentally significant behavior a second meaning. It can now be defined from the actor's standpoint as behavior that is undertaken with the intention to change (normally, to benefit) the environment. This intent-oriented definition is not the same as the impact-oriented one in two important ways: It highlights environmental intent as an independent cause of behavior, and it highlights the possibility that environmental intent may fail to result in environmental impact. For example, many people in the United States believe that avoiding the use of spray cans protects the ozone layer, even though ozone-destroying substances have been banned from spray cans for two decades. The possible discrepancy between environmental intent and environmental impact raises important

research questions about the nature and determinants of people's beliefs about the environmental significance of behaviors.

Both definitions of environmentally significant behavior are important for research but for different purposes. It is necessary to adopt an impact-oriented definition to identify and target behaviors that can make a large difference to the environment (Stern & Gardner, 1981). This focus is critical for making research useful. It is necessary to adopt an intent-oriented definition that focuses on people's beliefs, motives, and so forth in order to understand and change the target behaviors.

2.3.5 Nexus between Environmental Knowledge, Attitudes and Behavior

There have been numerous projects that address the relationships environmental knowledge, attitudes and behaviors, have with one another (Armstrong & Impara, 1991; Campbell, Waliczek, Bradley, Zajicek, & Townsend, 1997; Lyons & Breakwell, 1994; Oskamp et al., 1991; Ramsey & Rickson, 1976).

Although the effect of knowledge is not conclusive, there have also been several studies suggesting that knowledge plays an important role in enhancing the environmental attitude and behavior relationship by providing individuals with the ability to better formulate alternative views and present arguments to support their believes and behaviors (EORG, 2002).

For instance, Ajzen (1998) posited that behavior is a function of behavioral intentions, which must have been endeared by attitudes and subjective norms. Knowledge is not an explicit element of this model. However, Ajzen and Fishbein (1980) stated that "attitudes are functions of beliefs". Beliefs refer to

knowledge in this context. A great deal of information is a prerequisite for any attitude Stutzman and et al. (1982). Similarly, Katz (1960) expressed the functional approach to attitude which upholds a positive relationship between knowledge and attitude. According to Katz, "the reasons for holding or for changing attitudes are found in the functions they perform for the individual, specifically the functions of knowledge." Every phenomenon is attributed a number of information whether true or false. Storing all these information in a single cognitive system will probably result to information overload (Hewstone and et al., 1988).

However, some research shows that, there is not a direct correlation between environmental knowledge and environmentally responsible behavior. Kuhlemeier et al. (1999) states that the relation between environmental knowledge and environmental attitudes and behavior are weak, and environmentally responsible behavior is more strongly connected with willingness to make sacrifices than the attitude.

Kibret (2000) found that knowledge and attitude had a weak correlation, while attitudes and behavior components demonstrate a moderate correlation; and knowledge and behavior revealed no relationship.

2.3.5.1 Environmental knowledge and Attitude

A great deal of information is a prerequisite for any attitude (Stutzman, T.M. and S.B. Green, 1982.).

A study which was reviewed and reported by Kaiser and et. al. (1999) has indicated that factual knowledge about the environment is a precondition for one's environmental attitude.

Ibrahim and et al. (2010), in their study on "Knowledge and Attitude of a Group of Nigerian Undergraduates towards Environmentalism" have found a significant positive but weak Pearson correlation of 0.282. Kuhlemeier *et al.* (1999) studied environmental literacy among Dutch students and also found a positive but weak correlation between knowledge and attitude; Kibert (2000) upon analyzing the correlations between environmental attitude, knowledge and behavior among undergraduates of the University of Florida, recorded a Pearson's *r* of .220 between environmental knowledge and attitude.

2.3.5.2 Environmental knowledge and Behavior

Several sudies were conducted to identify the relationship between environmental knowledge and behaviour. The findings reveal the existance of positive relationships, having differences in streangth across studies. Ostman and Parker (1987) for example reported that there is a positive association among environmental knowledge concerns and behavior.

In another study which was reviewed and reported by Kaiser et al (1999) it was stated that " Given that factual knowledge about the environment is a precondition of one's environmental attitude, this knowledge should not be related with ecological behavior strongly because its influence is attentuated both by environmental attitude and ecological behavior intention. Hence, it is not surprising that several studies found either no relationship between factual

environmental knowledge and ecological behavior (Maloney and Ward 1973; Maloney et al 1975; Amelang et al, 1977; Schahn and Holzer, 1990a, 1990b) or at least a moderate relationship (Arbuthnot, 1977; Dispoto; 1977; Symthe and brook; 1980, Stutman and Green, 1982; Hines et al, 1986/87; Oskamp et al, 1991). When this relationship appears to be stronger, it is knowledge about ecalological behavior rather than factual knowledge ... that is related to ecological behavior (Levensole, 1974; Sia et al, 1985/86, Smith Sebasto and Fortner, 1994).

2.3.5.3 Environmental Attitude and Behavior

One of the first and most frequently cited studies on the link between attitudes and behavior was La Piere's investigation into racial prejudice conducted in the early 1930s (La Piere 1934). La Piere traveled across the United States with a young Chinese couple to determine whether the couple would be refused service on the basis of race. Of the 251 hotels, restaurants and other establishments visited only one refused service. La Piere sent a letter to each of the establishments some six months later asking whether they would serve "members of the Chinese race." Of the 128 establishments that replied to the letter, over 90 per cent claimed that they would not accept members of the Chinese race as their guests. La Piere concluded that, although attitudes could be measured quantitatively, they were ineffective predictors of behavior.

Researchers largely ignored La Piere's warning until the 1960s, when concerns about the usefulness of attitudes became more prominent. This culminated in an influential article by Wicker in 1969. Wicker reviewed 47 empirical studies of

attitudes and behavior and found that attitude-behavior correlations were rarely above 0.30, and often nearer to zero, a finding later supported by McGuire (1985). Wicker concluded that "It is considerably more likely that attitudes will be unrelated or only slightly related to overt behaviors than that attitude will be closely related to actions".

More recently, Kraus (1995) published a comprehensive meta-analysis and review of this attitude-behavior link. He questioned the results of Wicker (1969) and McGuire (1985) upon finding that the average correlation of the 88 studies he examined was 0.38 and that 52% of these were above 0.30 (Kraus 1995). Kraus interpreted this as a high level of attitude-behavior correlation, but as we indicated earlier, we still regard this rather weak relationship.

In the area of environmental attitudes and behavior, Hines et al. (1987, cited in Peattie 1995, p. 162) reviewed 51 studies and found only a moderate correlation. While there appears to be a growing awareness of the environmental consequences of personal consumption (Berger 1993) studies in this area have generally failed to show any clear relationship between environmental concern and environmentally oriented consumer behavior (Gillroy, Crosby and Taylor 1986; Martin and Simintiras 1995). These results are consistent with the findings of La Piere (1934), Wicker (1969), and Kraus (1995),

 suggesting that the strength of the relationship between environmental attitudes and behavior is similar to that found for other attitudes and behaviors.

Some researchers have also questioned the direction of the attitude-behavior link. East suggests that "the precedence in the attitude-behavior relationship varies with the subject matter" (1993, p. 66). Foxall suggests four possible causal relationships between attitudes and behavior: (i) attitudes cause behaviors; (ii) behaviors cause attitudes, (iii) attitudes and behaviors are reciprocally causative, or (iv) attitudes and behaviors are unrelated (1983, p. 45). Foxall proposes that behavior may be "the result, not of intrapersonal events [attitudes], but of the consequences of previous behavior in similar situations. The reward or reinforcement of that behavior shapes and sustains present and future behavior of the same or similar kind" (1983, p. 3). Consequently, there is often a strong link between past and present behavior, but this link may be maintained by environmental (non-green) influences rather than attitudes; that is, by the rein-forcers normally encountered by an individual in their daily life (Foxall 1997).

This difficulty of establishing that attitudes cause behavior prompted many attitude researchers to offer possible explanations for the poor research results. After all, as East states, "finding no evidence is not the same as there being no evidence" (East, 1993, p. 65). Kraus (1995) divides the explanations for poor results into moderator variable explanations and methodological explanations. In examining moderator variable explanations, Kraus (1995) found that the attitude behavior relationship was moderated by attitudinal variables (stability, certainty, affective cognitive consistency, direct experience, and accessibility), the topic of the research, the personality trait of self-monitoring, and certain

situational variables such as self-awareness and time pressure. We have not examined these moderator variable explanations in this research.

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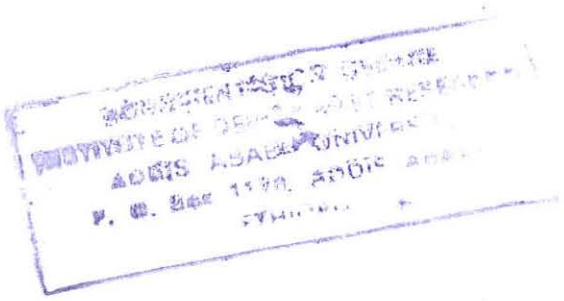
Page 46 The most important methodological explanation comes from Azjen and Fishbein, who argued that the correlation between attitudes and behaviors would be higher if the measurements corresponded in their 'target' and 'action' elements (Azjen and Fishbein, 1977).



CHAPTER THREE

Results and Discussion

Results of the analysis and their discussion are presented in this chapter. Analysis of the data is done using the Statistical Package for Social Sciences (SPSS) software, version 19. As their presence or absence could change the way the analysis should be accomplished, assessment of missing values and non-responses is the first step undertaken during analysis. The total number of cases (households interviewed) is found to be 204, of which 89 are females and 115 males. No non-response is found and the total missing values observed are less than 3%, which is very low. As a result weighting the data is found to be not advisable and the analysis is done on the un-weighted total cases. Tables consisting of important summaries are given and discussed in the sections given below.

3.1 Surveyed population

The study covered a total of 204 households, 12 clusters (Health extension Units), six Woredas, and three sub cities of Addis Ababa. An equal number of sixty-eight households are drawn and surveyed from each sample sub city. About 44% and 56% of the households interviewed are female and male headed households respectively.

3.2 Socio-Demographic Characteristics

3.2.1 Age

Respondents' age varies between 22 and 80 years. The mean age is found to be around 46. As can be seen in Table 2 below, more of the respondents are observed almost 80% of them below 60 year old.

Table 2 Frequency and Percentage of Respondents by Age Category

Age Category	Frequency	Percent
22-59 (Adult)	162	79.41
60&Above (Old)	42	20.59
Total	204	100

3.2.2 Education

As depicted in the Table given below, about two-third (66%) of the individuals interviewed are secondary school completed or above. Specifically, 29.2% are diploma / degree holders, 26.3% secondary school completed, 6.1% have master's degree, and 4.0% 10+1/10+2 completed. While primary school and informal education completed respondents constitute 15.7% and 9.1% respectively, illiterates comprise only 9.6%.

Table 3 Educational Status of Respondents

Education	**Frequency**	**Percent**
Illiterate	19	9.6
Informal Education	18	9.1
Primary School	31	15.7
Secondary School	52	26.3
10+1/10+2	8	4.0
Diploma	29	14.6
First Degree	29	14.6
Masters	12	6.1
Total	**198**	**100.0**

3.2.3 Marital Status

More than three-fourth (78.8%) of the respondents are married individuals. 11.6%, 7.6%, and 2%, on the other hand, are single, widowed and divorced individuals respectively.

3.2.4 Ethnicity and Religion

Table 4 Ethnicity of Respondents

Ethnicity	Frequency	Percent
Oromo	37	18.1
Amhara	97	47.5
Guragie	46	22.5
Hadiya	1	.5
Tigrie	19	9.3
Wolayita	1	.5
Kembata	1	.5
Siltie	1	.5
Wolene	1	.5
Total	**204**	**100.0**

The majority of the respondents (97.4%) are observed to come from Amhara, Oromo, Guragie, and Tigrie ethnic groups. Other ethnic groups contributed only 2.6%. They are Hadiya, Wolayita, Kembata, Silitie, and Wolene.

Table 5 Religion of Respondents

Religion	Frequency	Percent
Orthodox	163	80.3
Muslim	24	11.8
Protestant	16	7.9
Total	**203**	**100.0**

As regards religion, all the respondents hold any of the three religions: Orthodox Christian, Protestant Christian or Muslim. The majority of the respondents are observed to be Orthodox Christians (80.3%), followed by Muslims (11.8). Protestant Christians comprise only 7.9%.

3.2.5 Occupation

Table 6 Occupation of Respondents

Occupation	Frequency	Percent
House wife	48	24.6
Private employee	58	29.8
Handicraft	8	4.1
Pension	14	7.2
Government employee	33	16.9
Unemployed	8	4.2
Trade	9	4.6
Others	17	8.7
Total	**195**	**100.0**

More than one-third of the respondents (29.8%) are found to be engaged in private employment, followed by government/private employees (16.9%). Nearly one-fourth of the respondents (24.6%) are house wives, 7.2% pension, 4.6% trade, 4.2% unemployed, and 4.1% handicraft.

3.2.6 Access to Facilities

Respondents have also been asked whether or not they have access to television/radio, and toilets. The following is thus the responses obtained.

Table 7 Access to Television/radio

Type of Problem	Frequency	Percent
Having access only to television	21	10.3
Having access only to radio	34	16.7
Having access to both	141	69.1
Having no access to both	8	3.9
Total	**204**	**100**

Table 7 above indicated that more than three fourth of the respondents (69.1%) have access to both television and radio. It is only about 4% of them who have replied not having access to both facilities. In relation to this; radio, television and magazines are mentioned as the most important sources of information on Environment. They are mentioned by 76.5%, 64.7%, and 23.5% of the respondents respectively.

Concerning access to toilets, more than three fourth of the households (69.3%) responded using pit latrine, followed by water carriage latrine (22.8%). About 5% and 2.5% of the respondents replied using open defection methods (plane areas, rivers, etc...), and Bowel, festal, etc. respectively. The results are more or less similar to the findings of the 2004 Welfare Monitoring Survey of the Central Statistical Agency. The survey finding states that most households (about 75%) have pit latrines discharging to open drains; about 17% have flush toilets and septic tanks, these likewise often discharging to open drains; a significant minority (about 6%) resorts to open defecation. Public toilets are not common, but pit latrines are often shared between several households.

3.3 Environmental Knowledge

As mentioned in the first chapter, respondents' knowledge is assessed through 26 key items. Selection of these key items bases different nation-wide studies. Accordingly, the key findings obtained from analyzing the knowledge questions are given as follows.

Table 8 The most important causes of air pollution in Addis Ababa, by sex

Responses	Sex				Total	
	Male		Female			
	Frequency	%	Frequency	%	Frequency	%
House hold waste	54	47	31	34.8	85	41.7
Cars	47	40.9	37	41.6	84	41.2
Cigarette	6	5.2	8	9	14	6.9
Industrial waste	28	24.3	18	20.2	46	22.5
Others	10	8.7	6	6.7	16	7.8
Total	**115**	**100.0**	**89**	**100.0**	**204**	**100.0**

Frequencies and percentages can't be added as they are multiple responses

Table 8 depicted that most of the males (54%) responds that the most cause of air pollution in Addis Ababa is house hold wastes and followed by cars (47%) while the females are responds that the reverse of males responses thus, (41.6%) of females responds that cars is the most causes of air pollution and followed by house hold (34.8%).Next to this two major responses industrial waste is in third level by both male and female (24.3%and.20.2% respectively).

Table 9 The most important causes of air pollution in Addis Ababa, by age category

Responses	22-59Year		60 year and above		Total	
	Frequency	%	Frequency	%	Frequency	%
House hold waste	63	38.9	22	52.4	85	41.7
Cars	71	43.8	13	31	84	41.2
Cigarette	12	7.4	2	4.8	14	6.9
Industrial waste	36	22.2	10	23.8	46	22.5
Others	13	8.0	3	7.1	16	7.8
Total	**162**	**100.0**	**42**	**100.0**	**204**	**100.0**

Frequencies and percentages can't be added as they are multiple responses

Table 9 depicted that the age group 22-59 year (43.8%) responds that the most causes of air pollution in Addis Ababa is cars and followed by house hold wastes (38.9%) while the age group 60 and above year (52.4%) are responds like male and female the reverse of the age group 22-59 year that is the most causes of air pollution is house hold wastes and followed by cars (31%) and industrial wastes are in both of them at third level (22.2% and 23.8%respectively) this also almost the same as to male& female table.

Table 10 The most important causes of air pollution in Addis Ababa,

Response	House wife		Private employee		Hand craft		pension		Government employee		Unemployed		Trade		Others		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
House hold waste	21	43..8	25	43.1	3	37.5	6	42.9	8	24.2	4	50	2	22.2	9	52.9	78	40
Cars	16	33.3	25	43.1	2	25	3	21.4	22	66.7	4	50	4	44.4	8	47.1	84	43.1
Cigarette	4	8.3	5	8.6	0	0	1	7.1	2	6.1	1	122.5	1	11.1	0	0	14	7.2
Industrial waste	8	16.7	11	19	3	37.5	7	50	10	30.3	1	12.5	2	22.2	4	23.5	46	23.6
Others	3	6.2	4	6.9	0	0	2	14.3	1	3	0	0	2	22.2	2	11.8	14	7.2
Total	**48**	**100**	**58**	**100**	**8**	**100**	**14**	**100**	**33**	**100**	**8**	**100**	**17**	**100**	**9**	**100**	**195**	**100**

Frequencies and percentages can't be added as they are multiple responses

Significantly (66 .7%) of government employee responds that the most causes of air pollution is cars and(30.3%)of them responds industrial waste .In the case of private employee an

Un employee (43.1%&50%) respectively responds that both house hold waste and cars are the most causes of air pollution in Addis Ababa. On the other hand (50%) of Pension and (44.4%) of trader also responds that industrial wastes are the most and house wife, hand craft and others (43.8%,37.5%and 52.9%) respectively responds house hold waste is the most causes of air pollution.

Table 11responses to the most important causes of air pollution, by education

Responses	Illiterate		Informal		Primary		Secondary		10+1/10+2		Diploma		Degree		Master		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
House hold waste	9	47.4	9	50	11	35.5	21	40.4	2	25	14	48.3	12	41.4	4	33.3	82	41.4
Cars	8	42.1	6	33.3	15	48.4	24	46.2	4	50	11	37.9	10	34.5	3	25	81	40.9
Cigarette	1	5.3	1	5.6	2	6.5	3	5.8	0	0	1	3.4	5	17.2	1	8.3	14	7.1
Industrial waste	2	10.5	2	11.1	10	32.3	10	19.2	5	62.5	8	27.6	5	17.2	4	33.3	46	23.2
Others	1	5.3	1	5.6	2	6.5	6	11.5	0	0	1	3.4	3	10.3	2	16.7	16	8.1
Total	**19**	**100**	**18**	**100**	**31**	**100**	**52**	**100**	**8**	**100**	**29**	**100**	**29**	**100**	**12**	**100**	**198**	**100**

Frequencies and percentages can't be added as they are multiple responses

Significantly 10+1/10+2 (62.5%) responds that the most causes of air pollution in Addis Ababa is industrial wastes and illiterates, Informal educated, diploma, degree and masters (47.4%, 50%,48.3%,41.4%&33.3%)respectively responds that house hold wastes are the main cause on the other hand primary, secondary (48.4% &46.2%) responds that cars is the main causes of air pollution.

Table 12 The most important causes of air pollution in Addis Ababa, by access to TV/Radio

Responses	Have access of TV/Radio		Have no access of TV/Radio		Total	
	Frequency	%	Frequency	%	Frequency	%
House hold waste	82	41.8	3	37.5	85	41.7
Cars	81	41.3	3	37.5	84	41.2
Cigarette	12	6.1	2	25	14	6.9
Industrial waste	44	22.4	2	25	46	22.5
Others	15	7.7	1	12.5	16	7.8
Total	**196**	**100.0**	**8**	**100.0**	**204**	**100.0**

Frequencies and percentages can't be added as they are multiple responses

As the table shown the respondents who have an access to TV/Radio(41.8%) responds that the most causes of air pollution in Addis Ababa is house hold wastes and followed by cars(41.3%) and then industrial wastes are in third level(22.4%).The respondent who have no access to TV/Radio(37.5%) responds that the most causes of air pollution is both house hold wastes and cars and followed by cigarette and industrial wastes with equal percent of respondent that is (25%).

Table 13 The most important causes of air pollution in Addis Ababa, by marital status

Responses	Single		Married		Divorced		Widowed		Total	
	F	%	F	%	F	%	F	%	F	%
House hold waste	10	43.5	68	43.6	0	0	6	40	84	42.4
Cars	9	39.1	64	41	2	50	5	33.3	80	40.4
Cigarette	1	4.3	13	8.3	0	0	0	0	14	7.1
Industrial waste	7	30.4	35	22.4	1	25	3	20	46	23.2
Others	1	4.3	12	7.7	1	25	1	6.7	15	7.6
Total	**23**	**100.0**	**156**	**100.0**	**4**	**100.0**	**15**	**100.0**	**196**	**100.0**

Frequencies and percentages can't be added as they are multiple responses

Significantly (50 %) of the divorced responds that the main cause of air pollution is cars but other types of marital status single, Married and widowed (43.5%,43.6%and40%) respectively responds house hold waste is the most cause is and next to this(39.1 %,41% and 33.3%) respectively responds cars is the most

causes and industrial wastes are the third level of the response of all types of marital status.

Table 14 The most important causes of air pollution in Addis Ababa, by religion

Responses	Orthodox		Muslim		Protestant		Total	
	F	%	F	%	F	%	F	%
House hold waste	73	44.8	5	20.8	6	37.5	84	41.4
Cars	66	40.5	13	54.2	5	31.2	84	41.4
Cigarette	10	6.1	3	12.5	1	6.2	14	6.9
Industrial waste	40	24.5	2	8.3	4	25	46	22.7
Others	11	6.7	3	12.5	2	12.5	16	7.9
Total	**163**	**100.0**	**24**	**100.0**	**16**	**100.0**	**203**	**100.0**

Frequencies and percentages can't be added as they are multiple responses

Most of Muslims respondents (54.2%) respond that causes of air pollution is cars and next to this (20.8%) responds household wastes. Orthodox and protestant (44.8 %&37.5%)respectively responds that the most causes of air pollution is house hold wastes followed by cars (40.5%and 31.2%) and industrial waste is the third level of response (24.5% and 25% respectively) but in case of Muslim it is different that 12.5% responds that cigarette is most cause of air pollution in Addis Ababa.

Table 15 The most important causes of air pollution in Addis Ababa, by ethnicity

Responses	Oromo		Amhara		Guragie		Tigrie		Others		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
House hold waste	17	45.9	44	45.4	18	39.1	5	23.6	1	20	85	41.7
Cars	15	40.5	36	37.1	20	43.5	10	52.6	3	60	84	41.2
Cigarette	2	5.4	6	6.2	4	8.7	1	5.3	1	20	14	6.9
Industrial waste	6	16.2	30	30.9	5	10.9	4	21.1	1	20	46	22.5
Others	3	8.1	6	6.2	5	10.9	2	10.5	0	0	16	7.8
Total	**37**	**100**	**97**	**100.**	**46**	**100**	**19**	**100**	**5**	**100**	**204**	**100**

Frequencies and percentages can't be added as they are multiple responses

Oromo and Amhara ethnicity (45.9% and 45.4% respectively) responds the causes of air pollution is house hold wastes and followed by cars (40.5% and37.1% respectively). On the other hand Guragie and Tigrie (43.5% and 52.6%

respectively) responds that the most causes of air pollution is cars and followed by house hold wastes(39.1% & 23.6% respectively) from all ethnicity pollution due to industrial waste is the third level.

The health consequences of exposure to dirty air are considerable and are likely to be greater in developing countries although it is not an easy task to qualify the death toll of outdoor pollution. But the health effects of bad air are known to range from coughing and bronchitis to heart disease and lung cancer. Vulnerable groups include infants, the elderly, and those suffering from chronic respiratory diseases including asthma, bronchitis or emphysema.

In developing countries urban pollution may have a tremendous impact on health aggravated by both lack of nutrition and general health status. Children living in neighborhoods with the worst air could suffer permanent alterations to cells in the nose and throat linings, which could lead to cancer later in life.

In relation to this, respondents were asked about the causes of air pollution in Addis Ababa. The majority of them believe that wastes from households and cars are the major causes of Air pollution in Addis Ababa (41.7% and 41.2% respectively). Cigarettes are the least mentioned cause by respondents (6.9%).

Table 16 Sources of Solid Waste Mentioned, by sex

Responses	Male		Female		Total	
	F	%	F	%	F	%
Residential activities	94	81.7	68	76.4	162	79.4
Agricultural activities	5	4.3	3	3.4	8	3.9
Industrial activities	21	18.3	19	21.3	40	19.6
Commercial activities	3	2.6	2	2.2	5	2.5
Total	**115**	**100.0**	**89**	**100.0**	**204**	**100.0**

Frequencies and percentages can't be added as they are multiple responses

Table 16 depicted that the majority of both male and female respondent (81.7% and 76.4% respectively) stated that most of the solid wastes in Addis Ababa are produced by residential activities. Higher percentage of female respondents than males (21.3% females as compared to 18.3%) has also replied that industrial activities are the second most sources of solid waste.

Table 17Sources of Solid Waste Mentioned, by Marital Status

Responses	Single		Married		Divorced		Widowed		Total	
	F	%	F	%	F	%	F	%	F	%
Residential activities	19	82.6	119	76.3	4	100	14	93.3	156	78.8
Agricultural activities	0	0.0	8	5.1	0	0	0	0.0	8	4.0
Industrial activities	4	17.4	35	22.4	0	0	1	6.7	40	20.2
Commercial activities	0	0.0	4	2.6	0	0	1	6.7	5	2.5
Total	**23**	**100**	**156**	**100**	**4**	**100**	**15**	**100**	**198**	**100**

Frequencies and percentages can't be added as they are multiple responses

Like in Table 16 this table also indicated that respondents, irrespective of their marital status, mentioned that residential activities are the main source of solid waste in Addis Ababa (stated by 76.3% - 100%), followed by industrial activities.

Table 18 Sources of Solid Waste Mentioned, by Religion

Responses	Orthodox		Muslim		Protestant		Total	
	F	%	F	%	F	%	F	%
Residential activities	128	78.5	22	91.7	11	68.8	161	79.3
Agricultural activities	8	4.9	0	0	0	0	8	3.9
Industrial activities	32	19.6	3	12.5	5	31.3	40	19.7
Commercial activities	5	3.1	0	0	0	0	5	2.5
Total	**163**	**100**	**24**	**100**	**16**	**100**	**203**	**100**

Frequencies and percentages can't be added as they are multiple responses

Although residential activities has been stated as the major source of solid waste by respondents of all religions, a significant percentage of Protestants

(31.3%) has mentioned that industrial activities are also the second most important source.

Table 19 Sources of Solid Waste Mentioned, by Age category

Responses	22 - 59 years		60 and above years		Total	
	F	%	F	%	F	%
Residential activities	127	78.4	35	83.3	162	79.4
Agricultural activities	7	4.3	1	2.4	8	3.9
Industrial activities	32	19.8	8	19	40	19.6
Commercial activities	3	1.9	2	4.8	5	2.5
Total	**162**	**100.0**	**42**	**100.0**	**204**	**100.0**

Frequencies and percentages can't be added as they are multiple responses

Respondents from both age categories have invariably notified that residential and industrial activities are the first and second most important sources of solid wastes respectively. Further comparison among the two broad age categories however has also indicated that higher proportion of respondents (83.3% versus 78.4%) from the upper age category (>= 60 years) than the lower category (22 -59 years) believed residential activities as the main source of Addis Ababa solid waste.

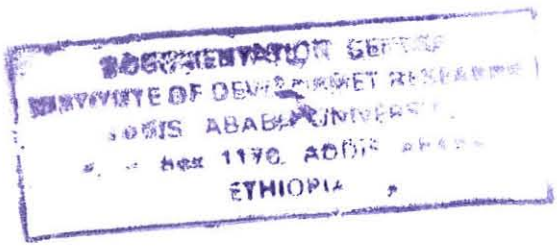


Table 20 Sources of Solid Waste Mentioned, by Occupation

Response	House wife		Private employee		Hand craft		Pension		Governmen t employee		Unemploye d		Trade		Others		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Residential activities	38	79.2	45	77.6	3	37.5	13	92.9	27	81.8	5	62.5	7	77.8	15	88.2	153	78.5
Agricultura l activities	2	4.2	2	3.4	0	0	0	0	3	9.1	1	12.5	0	0	0	0	8	4.1
Industrial activities	9	18.8	15	25.9	5	62.5	2	14.3	6	18.2	1	12.5	1	11.1	1	5.9	40	20.5
Commercia l activities	0	0	0	0	0	0	1	7.1	1	3	0	0	1	11.1	2	11.8	5	2.6
Total	**48**	**100**	**58**	**100**	**8**	**100**	**14**	**100**	**33**	**100**	**8**	**100**	**17**	**100**	**8**	**100**	**195**	**100**

Frequencies and percentages can't be added as they are multiple responses

The above table shows results disaggregated by type of occupation. Even if the overall result showed that the majority of respondents from most occupation categories (78.5%) still mentioned that residential activities are the main source of solid waste, most handicrafts (62.5%) and a significant portion of private employees holds the view that most of the solid waste in Addis Ababa is the results of industrial activities.

Table 21 Sources of Solid Waste Mentioned, by Educational Status

Response	Illiterate		Informal		Primary		Secondary		10+1/10+2		Diploma		Degree		Master		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Residential activities	16	84.2	15	83.3	25	80.6	39	75	6	75	24	82.8	23	79.3	8	66.4	156	78.8
Agricultural activities	0	0	0	0	0	0	2	3.8	0	0	1	3.4	3	10.3	2	16.7	8	4
Industrial activities	3	15.8	3	16.7	8	25.8	12	23.1	3	37.5	5	17.2	3	10.3	3	25	40	20.2
Commercial activities	1	5.3	0	0	1	3.2	2	3.8	0	0	0	0	1	3.4	0	0	5	2.5
Total	**19**	**100**	**18**	**100**	**31**	**100**	**52**	**100**	**8**	**100**	**29**	**100**	**8**	**100**	**12**	**100**	**198**	**100**

Frequencies and percentages can't be added as they are multiple responses

Here also more than three-fourth of the respondents (78.8%) stated that residential activities are the major sources of solid waste followed by industrial activities (20.2%). It is surprising that agricultural activities (as the source of

solid waste) was stated by only individuals who are relatively at the higher level of education - secondary school completed (3.8%), and diploma (3.4%), degree (10.3%) and masters holders (16.7%).

Table 22 Sources of Solid Waste Mentioned, by Access to TV/Radio

Response	Have access to TV/Radio		Have no access to TV/Radio		Total	
	F	%	F	%	F	%
Residential activities	158	80.6	4	50	162	79.4
Agricultural activities	7	3.6	1	12.5	8	3.9
Industrial activities	37	18.9	3	37.5	40	19.6
Commercial activities	4	2	1	12.5	5	2.5
Total	**196**	**100.0**	**8**	**100.0**	**204**	**100.0**

Frequencies and percentages can't be added as they are multiple responses

Significant difference in response is observed among those who have access to TV/radio and those who don't have. While 80% of individuals with access to either TV or radio replied that residential activities are the main source of solid waste, it is only half (50%) of those who don't have access that have responded in like manner. More than one-third of the respondents that have no access to TV/radio have mentioned that industrial activities are one of the main sources.

Table 23 Sources of Solid Waste Mentioned, by Ethnicity

Response	Oromo		Amhara		Guragie		Tigrie		Others		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Residential activities	31	83.8	71	73.2	41	89.1	16	84.2	3	60	162	79.4
Agricultural activities	0	0	6	6.2	1	2.2	1	5.3	0	0	8	3.9
Industrial activities	0	18.9	24	24.7	6	13	2	10.5	1	20	40	19.6
Commercial activities	0	0	5	5.2	0	0	0	0	0	0	5	2.5
Total	**37**	**100**	**97**	**100**	**46**	**100**	**19**	**100**	**5**	**100**	**204**	**100**

Frequencies and percentages can't be added as they are multiple responses

All ethnic groups have uniformly responded that residential activities are the main source of solid waste in Addis Ababa (83.8% of Oromo, 73.2% of Amhara,

89.1% of Guragie, and 84.2% of Tigrie have replied so), followed by industrial activities. Unlike other ethnic groups almost a quarter of Amhara ethnic group (24.7%) have replied that industrial activities are the second most important cause for Addis Ababa solid waste.

As shown in above tables, this study has also resulted more than three fourth of the respondents (79.4%) mentioned that "Household activities" are the main source of solid waste in Addis Ababa, followed by "Industrial activities" (19.6). "Commercial activities", on the other hand, is the least mentioned cause (2.5%) by respondents.

Table 24 Causes of Increasing Noise Pollution, by sex

Responses	Male		Female		Total	
	F	%	F	%	F	%
Industrial development	15	13	16	18	31	15.2
Growth in vehicle number	46	40	25	28.1	71	34.8
Air craft	4	3.5	5	5.6	9	4.4
Video and music shops	60	52.2	45	50.6	105	51.5
Total	115	100.0	89	100.0	204	100.0

Frequencies and percentages can't be added as they are multiple responses

More than half of male and female respondents (52.2% male and 50.6% female) have invariably replied that video and music shops are the main cause of increasing noise pollution in Addis Ababa. Forty percent of male and 28.1% of female respondents have also responded that growth in vehicle number is the second most important cause of increasing noise pollution.

Table 25 Causes of Increasing Noise Pollution, By Marital Status

Responses	Single		Married		Divorced		Widowed		Total	
	F	%	F	%	F	%	F	%	F	%
Industrial development	7	30.4	24	15.4	0	0	0	0	31	15.7
Growth in vehicle number	5	21.7	54	34.6	0	0	6	40	65	32.8
Air craft	1	4.3	7	4.5	1	25	0	0	9	4.5
Video and music shops	10	43.5	83	53.2	3	75	9	60	105	53
Total	**23**	**100**	**156**	**100**	**4**	**100**	**15**	**100**	**198**	**100**

Frequencies and percentages can't be added as they are multiple responses

Like the findings in the above table here also video and music shops are the main cause of noise pollution in Addis Ababa mentioned by respondents of all marital status. While married and widowed individuals mentioned that growth in vehicle number is the second most important cause (34.6% and 40% respectively), respondents who are single and divorced stated industrial development and air craft as the second major cause respectively.

Table 26 Causes of Increasing Noise Pollution, By Religion

Responses	Orthodox		Muslim		Protestant		Total	
	F	%	F	%	F	%	F	%
Industrial development	26	16	1	4.2	4	25	31	15.3
Growth in vehicle number	55	33.7	11	45.8	5	31.3	71	35
Air craft	7	4.3	1	4.2	1	6.3	9	4.4
Video and music shops	85	52.1	11	45.8	8	50	104	51.2
Total	**163**	**100**	**24**	**100**	**16**	**100**	**203**	**100**

Frequencies and percentages can't be added as they are multiple responses

About half of Orthodox and Protestant Christians believed that video and music shops are the major cause of increasing noise pollution. Muslims, however, stated that both "video and music shops" and "growth in vehicle number" have equally contributed for the increasing noise pollution (45.8%).

Table 27 Causes of Increasing Noise Pollution, By Age Category

Responses	22 - 59 years old		60 and above years		Total	
	F	%	F	%	F	%
Industrial development	27	16.7	4	9.5	31	15.2
Growth in vehicle number	62	38.3	9	21.4	71	34.8
Air craft	8	4.9	1	2.4	9	4.4
Video and music shops	77	47.5	28	66.7	105	51.5
Total	**162**	**100.0**	**42**	**100.0**	**204**	**100.0**

Frequencies and percentages can't be added as they are multiple responses

About three-fourth (66.7%) of "60 and above years" respondents replied that "Video and music shops" are the main cause of noise pollution in Addis Ababa. On the other hand it is only less than half (47.5%) of "22 - 59 years old" respondents that have provided similar responses. More than one-third (38.3%) of 22- 60 years respondents as opposed to only 21.4% of "60 and above years respondents" have replied that "growth in vehicle number is also another cause of noise pollution in Addis Ababa.

Table 28 Causes of Increasing Noise Pollution, By Occupation

Responses			Private employee		Hand craft		pension		Government employee		Unemployed		Trade		Others		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Industrial development	8	16.7	10	17.2	1	12.5	0	0	5	15.2	2	25	0	0	3	17.6	29	14.9
Growth in vehicle number	11	22.9	24	41.4	0	0	4	28.6	12	36.4	3	37.5	5	55.6	9	52.9	68	34.9
Air craft	1	2.1	4	6.9	1	12.5	0	0	2	6.1	0	0	0	0	0	0	8	4.1
Video and music shops	30	62.5	23	39.7	6	75	10	71.4	16	48.5	3	37.5	4	44.4	10	58.8	102	52.3
Total	**48**	**100**	**58**	**100**	**8**	**100**	**14**	**100**	**33**	**100**	**8**	**100**	**17**	**100**	**8**	**100**	**195**	**100**

Frequencies and percentages can't be added as they are multiple responses

While house wives, pensions, government employees, and those engaged in handicraft believed that "Video and music shops" are the main causes of noise pollution (62.5%, 71.4%, , 48.5%, and 75% respectively) private employees and individuals engaged in trade, on the other hand, responded that "growth ion vehicle number is the major cause for the existing noise pollution of the town.

Table 29 Causes of Increasing Noise Pollution, By Educational status

Response	Illiterate		Informal		Primary		Secondary		10+1/10 +2		Diploma		Degree		Master		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Industrial development	2	10.5	2	11.1	5	16.1	11	21.2	1	12.5	5	17.2	5	17.2	0	0	31	15.7
Growth in vehicle number	7	36.8	3	16.7	12	38.7	16	30.8	3	37.5	10	34.5	11	37.9	6	50	68	34.3
Air craft	1	5.3	1	5.6	1	3.2	1	1.9	1	12.5	1	3.4	2	6..9	1	8.3	9	4.5
Video and music shops	10	52.6	13	72.2	15	48.4	23	44.2	4	50	18	62.1	14	48.3	5	41.7	102	51.5
Total	**19**	**100**	**18**	**100**	**31**	**100**	**52**	**100**	**8**	**100**	**29**	**100**	**8**	**100**	**12**	**100**	**198**	**100**

Frequencies and percentages can't be added as they are multiple responses

Respondents in all educational level except those who hold masters degree have invariably responded that "Video and music shops" are the main cause of noise pollution in Addis Ababa. Half of the respondents who have masters degree, on the other hand, replied "growth in vehicle number" as the major cause of noise pollution.

Table 30 Causes of Increasing Noise Pollution, By Access to TV/Radio

	Have access to TV/Radio		Have no access to TV/Radio		Total	
Response	F	%	F	%	F	%
Industrial development	30	15.3	2	25	31	15.2
Growth in vehicle number	69	35.2	2	25	71	34.8
Air craft	8	4.1	1	12.5	9	4.4
Video and music shops	102	52	3	37.5	105	51.5
Total	**196**	**100.0**	**8**	**100.0**	**204**	**100.0**

Frequencies and percentages can't be added as they are multiple responses

Respondents, irrespective of their access to TV/radio have similarly (37.5% and 52% of those who have and do not have access respectively) responded that "video and music shops" are the primary cause of noise pollution.

Table 31 Causes of Increasing Noise Pollution, By ethnicity

Response	Oromo		Amhara		Guragie		Tigrie		Others		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Industrial development	5	13.5	21	21.6	2	4.3	2	10.5	1	20	31	15.2
Growth in vehicle number	12	32.4	29	29.9	17	37	10	52.6	3	60	71	34.8
Air craft	1	2.7	5	5.2	2	4.3	1	5.3	0	0	9	4.4
Video and music shops	22	59.5	48	49.5	25	54.3	8	42.1	2	40	105	51.5
Total	**37**	**100**	**97**	**100**	**46**	**100**	**19**	**100**	**5**	**100**	**204**	**100**

Frequencies and percentages can't be added as they are multiple responses

While Oromo, Amhara and Guragie ethnic groups believe that "video and music shops" are the main cause of Addis Ababa noise pollution (59.5%, 49.5%, and 54.3% respectively), the majority of Tigrie responded that it is "growth in vehicle number" instead of "videos and music shops" that should be primarily attributed to the existing noise pollution in Addis Ababa.

In relation to this respondents were asked about the causes of noise level increase in Addis Ababa. Accordingly, more than half the respondents (51.5%) believe that "Video and music shops" are the main causes for the increase in level of noise in Addis Ababa. While "Growth in vehicle numbers" is the second major cause mentioned by respondents (34.8%), "Air craft", on the other hand, is stated to be the least cause (4%) of noise.

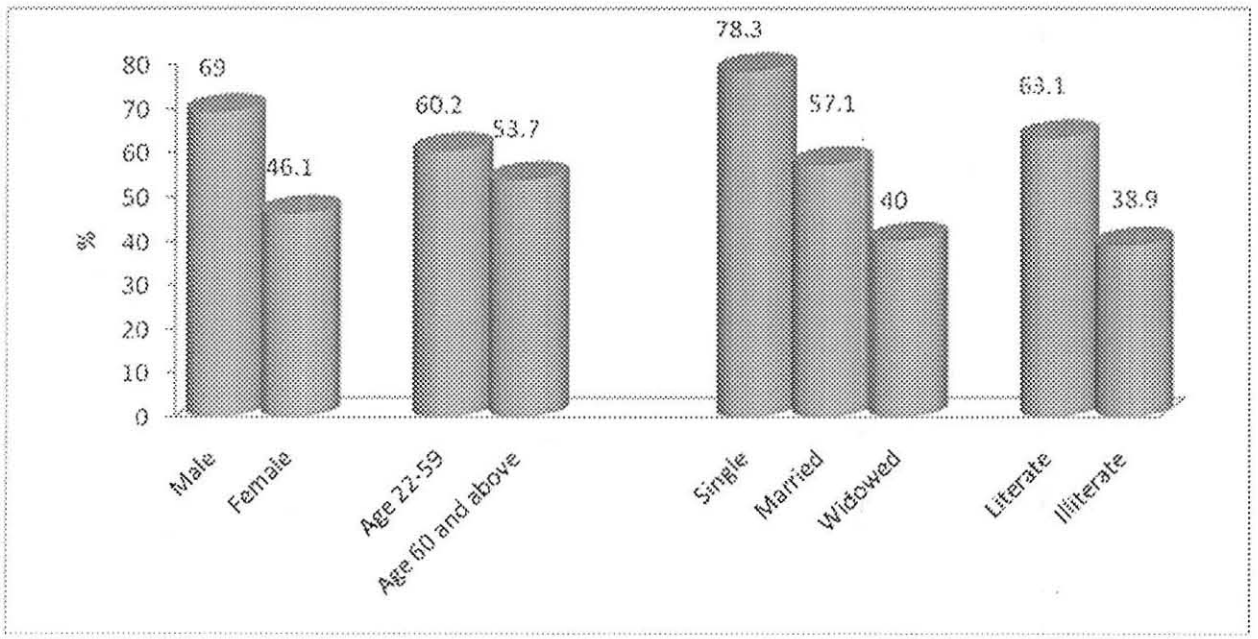
3.3.1 Level of Environmental knowledge

In order to measure the level of respondents' knowledge, individuals response to each of the 26 selected questions are given a value "1" or "0" depending on correct or incorrectness of the responses. As there is no theoretical background that supports giving more weight to one question than the other equal weights

are given to each of the 26 question. Each individual value has therefore been summed up and evaluated out of 26.

Accordingly, the minimum, maximum, and mean knowledge scores of respondents are observed to be 9, 24, and 18.5 respectively. The standard deviation of individual scores is 3.4. Moreover, nearly three-fifth of the respondents (58.9%) has also scored below the mean value. This percentage of respondents can be arbitrarily referred to as possessing unhealthy knowledge of environmentalism.

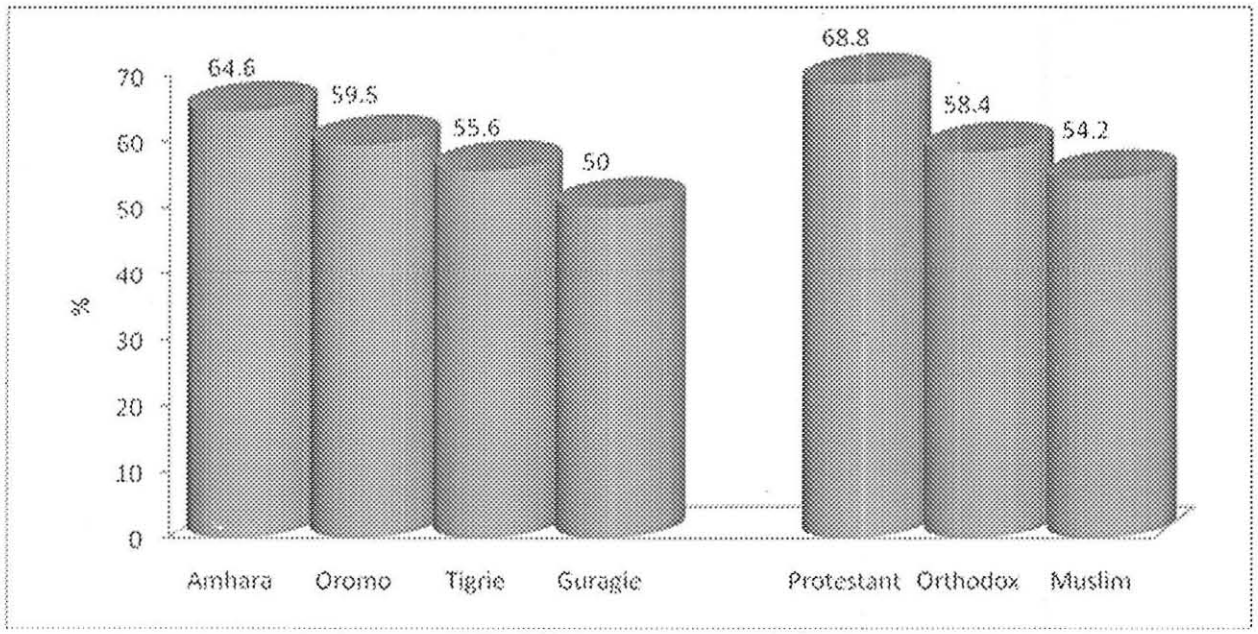
Figure 3 Percentage of respondent who score above the mean in environmental knowledge by socio-demographic characteristics.



Thus, respondents knowledge has also been analyised based on their gender, age, marital status and literacy level. The above figure depicts the percentage of

respondents in rent categories diffewho scored above the mean in environmental knowledge. Thus, males, respondents under the age category of 22-59 years, single individividuals, andliterates are observed to be more knowledgable than their counterparts in other categories. Large differences are observed among literates and illiterates (63.1% & 38.9%), male and female (69% & 46.1%), and single and married individuals (78.3% & 57.1%).

Figure 4 Percentage of respondent who score above the mean in environmental knowledge by Ethnicity and religion.



As can be seen in the the figure given above, relatively higher percentages of above mean environmental knowledg scores are observed among the Amhara ethnic group and protestants (64.6% and 68.8% respectively) and low percentages within Guragies and Muslims (50% and 54.2% respectivelly).

3.4 Environmental Attitude

Respondents' attitude is assessed through 10 different items. Like knowledge, selection of the 10 attitude questions also bases the different nationwide studies mentioned in section 3.3 Similar to knowledge, attitude findings are also presented in two distinct sections - key environmental attitude findings of some selected questions and respondents' level of attitude. The following are key findings from some of the attitude questions forwarded to the respondents.

Table 32 Belief that rivers are convenient places for disposing waste, By Sex

Responses	Male		Female		Total	
	F	%	F	%	F	%
Agree	20	17.4	20	22.7	40	19.7
Disagree	95	82.6	68	77.3	163	80.3
Total	**115**	**100.0**	**88**	**100.0**	**203**	**100.0**

Although more than three-forth of both male and female respondents disagree in having the wrong attitude that "rivers are convenient places for disposing waste", significantly more males (82.6%) responded than females (77.3%).

Table 33 Belief that rivers are convenient places for disposing waste, By Religion

Responses	Orthodox		Muslim		Protestant		Total	
	F	%	F	%	F	%	F	%
Agree	28	17.3	9	37.5	3	18.8	40	19.8
Disagree	134	82.7	15	62.5	13	81.3	162	80.2
Total	**162**	**100.0**	**24**	**100.0**	**16**	**100.0**	**203**	**100.0**

The majority of Orthodox and Protestant Christians (82.7% and 81.3% respectively) do have the right attitude with respect to disposing waste in rivers. More than one-third Muslims however still hold the wrong attitude that "rivers are convenient places for disposing waste".

Table 34 Belief that rivers are convenient places for disposing waste, By Broad Age Category

Responses	22 - 59 years		60 and above years		Total	
	F	%	F	%	F	%
Agree	35	21.7	5	11.9	40	19.7
Disagree	126	78.3	37	88.1	163	80.3
Total	**161**	**100.0**	**42**	**100.0**	**203**	**100.0**

Significantly more respondents in the age category of "60 and above years" than 22 - 59 years" have hold the correct attitude that rivers are not convenient places for disposing waste (88.1%, 78.3% respectively).

Table 35 Belief that rivers are convenient places for disposing waste, by Occupation

Responses	House wife		Private employee		Hand craft		pension		Government employee		Unemployed		Trade		Others		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Agree	10	21.3	13	22.4	0	0	1	7.1	8	24.2	1	12.5	2	22.2	2	11.8	37	19.1
Disagree	37	78.7	45	77.6	8	100	13	92.9	25	75.8	7	87.5	7	77.8	15	88.2	157	80.9
Total	**47**	**100**	**58**	**100**	**8**	**100**	**14**	**100**	**33**	**100**	**8**	**100**	**9**	**100.0**	**17**	**100**	**195**	**100**

Although the majority of respondents, irrespective of their occupation, hold correct attitude towards disposing waste in rivers, more than one-fifth of house wives, private employees, government employees, and traders still hold the wrong attitude that "rivers are convenient places for disposing waste" (21.3%, 22.4%, 24.2%, and 22.2% respectively).

Table 36 Belief that rivers are convenient places for disposing waste, by education

Response	Illiterate		Informal		Primary		Secondary		10+1/10+2		Diploma		Degree		Master		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Agree	1	5.3	3	17.6	5	16.1	7	13.5	1	12.5	11	37.9	8	27.6	2	16.7	38	19.3
Disagree	8	94.7	14	82.4	26	83.9	45	86.5	7	87.5	18	62.1	21	72.4	10	83.3	159	80.7
Total	**9**	**100**	**17**	**100**	**31**	**100**	**52**	**100**	**8**	**100**	**29**	**100**	**29**	**100**	**12**	**100**	**197**	**100**

Even though the above table indicated that the majority of respondents of all educational level hold correct attitude towards disposing waste into rivers, it is surprising that more than one-third and one-fourth of diploma and degree holders respectively still have the wrong attitude of disposing waste into rivers.

Table 37 Belief that rivers are convenient places for disposing waste, by Access to TV/radio

Table 37 Belief that rivers are convenient places for disposing waste, by education

	Have access to TV/Radio		Have no access to TV/Radio		Total	
Response	F	%	F	%	F	%
Agree	39	20	1	12.5	40	19.7
Disagree	156	80	7	87.5	163	80.3
Total	**195**	**100.0**	**8**	**100.0**	**203**	**100.0**

No significant variation in attitude towards disposing waste into rivers is observed among respondents who have and have not access to TV/radio. The majority of them more than 80% hold the correct attitude.

Table 38 Belief that rivers are convenient places for disposing waste, by Ethnicity

Respons	Oromo		Amhara		Guragie		Tigrie		Others		Total	
e	F	%	F	%	F	%	F	%	F	%	F	%
Agree	10	27	17	17.7	6	13	7	36.8	0	0	40	19.7
Disagree	27	73	79	82.3	40	87	12	63.2	5	100	163	80.3
Total	**37**	**100**	**96**	**100**	**46**	**100**	**19**	**100**	**5**	**100**	**203**	**100**

Even though the majority of respondents from all ethnic categories hold correct attitude toward disposing waste into rivers, more than one-third of Tigrie (36.8) and one-fourth of Oromo (27%) ethnic groups still hold the wrong attitude that "rivers are convenient places for disposing waste".

Table 39 Belief that rivers are convenient places for disposing waste, by marital status

Responses	Single		Married		Divorced		Widowed		Total	
	F	%	F	%	F	%	F	%	F	%
Agree	3	13.0	36	23.2	0	0	0	0	39	19.8
Disagree	20	87.0	119	76.0	4	100.0	15	100	158	80.2
Total	**23**	**100.0**	**155**	**100.0**	**4**	**100.0**	**15**	**100.0**	**197**	**100.0**

Although all the respondents irrespective of their marital status hold correct attitude towards disposing waste into rivers, significantly large number of married respondents (23.2%) still have wrong attitude.

Table 40 Willingness to decrease the use of cars to improve pollution and crowding, by sex

Responses	Male		Female		Total	
	F	%	F	%	F	%
Agree	53	46.9	37	45.1	90	46.2
Disagree	60	53.1	45	54.9	105	53.8
Total	**113**	**100.0**	**82**	**100.0**	**195**	**100.0**

Less than half of both male and female respondents are observed to be willing full to decrease the use of cars. About 53% and 55% of males and females disagree to decrease the use of cars.

Table 41 Willingness to decrease the use of cars to improve pollution and crowding, by marital status

Responses	Single		Married		Divorced		Widowed		Total	
	F	%	F	%	F	%	F	%	F	%
Agree	9	40.9	71	47.3	1	33.3	8	57.1	89	47.1
Disagree	13	59.1	79	52.7	2	66.7	6	42.9	100	52.9
Total	**22**	**100.0**	**150**	**100.0**	**3**	**100.0**	**14**	**100.0**	**189**	**100.0**

It is astonishing that the majority of the respondents (52.9%) do not agree to reduce the number of cars. Particularly, about two-third divorced, 59.1% single, 52.7% married and 42.9% widowed respondents never agree in reducing the number of cars for the sake of improving pollution and crowding.

Table 42 Willingness to decrease the use of cars to improve pollution and crowding, by religion.

Responses	Orthodox		Muslim		Protestant		Total	
	F	%	F	%	F	%	F	%
Agree	72	46.5	12	52.2	6	37.5	90	46.4
Disagree	83	53.5	11	47.8	10	62.5	104	53.6
Total	**155**	**100.0**	**23**	**100.0**	**16**	**100.0**	**194**	**100.0**

Only slightly above half Muslims mention their willingness to decrease the use of cars. The more than half of Orthodox Christians (53.5%) and about 63% of Protestant Christians totally disagree to reduce use of cars for the sake of improving pollution and crowding.

Table 43 Willingness to decrease the use of cars to improve pollution and crowding, by age category

Responses	22- 59 years old		60 and above years old		Total	
	F	%	F	%	F	%
Agree	67	42.9	23	59	90	46.2
Disagree	89	57.1	16	41	105	53.8
Total	**155**	**100.0**	**39**	**100.0**	**195**	**100.0**

Older age respondents are observed to have positive attitude towards decreasing the use of cars than their younger counterparts. 59% and 42.9% of "60 and above years" and "22 - 59 years" respondents respectively have agreed to decrease their use of cars.

Table 44 Willingness to decrease the use of cars to improve pollution and crowding, by occupation

Responses	House wife		Private employee		Hand craft		pension		Governmen t employee		Unemployed		Trade		Others		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Agree	19	42.2	28	49.1	4	50	8	66.7	11	34.4	2	25	5	55.6	6	35.3	83	44.6
Disagree	24	55.8	29	50.9	4	50	4	33.3	21	65.6	6	75	4	44.4	11	64.7	103	55.4
Total	**43**	**98**	**57**	**100**	**8**	**100**	**12**	**100**	**32**	**100**	**8**	**100**	**9**	**100**	**17**	**100**	**186**	**100**

The above table depicted that three-fourth of unemployed individuals, about two-third of government employees, half or more than half of private employees, house wives, and handicrafts are not willing to decrease their use of cars. Only the majority of individuals who are living through pension (66.7%) and traders (55.6%) agree to reduce the use of cars.

Table 45 Willingness to decrease the use of cars to improve pollution and crowding, by education

Response	Illiterate		Informal		Primary		Secondary		10+1/10+2		Diploma		Degree		Master		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Agree	11	61.1	8	53.3	14	45.2	20	39.2	2	33.3	11	39.3	14	50	7	58.3	87	46
Disagree	7	38.9	7	46.7	17	54.8	31	60.8	4	66.7	17	60.7	14	50	5	41.7	102	54
Total	**18**	**100**	**15**	**100**	**31**	**100**	**51**	**100**	**6**	**100**	**28**	**100**	**28**	**100**	**12**	**100**	**189**	**100**

The above table indicates that in general willingness to reduce the use of cars decrease as the level of education increase (while 61.1% of illiterate agree to reduce the use of cars, almost similar percentage of diploma holders (60.7%) disagree on the idea).

Table 46 Willingness to decrease the use of cars to improve pollution and crowding, by access to TV/Radio

Response	Have access to TV/Radio		Have no access to TV/Radio		Total	
	F	%	F	%	F	%
Agree	87	46.5	3	37.5	90	46.2
Disagree	100	53.5	5	62.5	105	53.8
Total	**187**	**100.0**	8	100.0	**195**	**100**

It may be expected that those who are well informed will be likely to change their attitude towards the environment. The above finding however shows contrary results. About 63% and 54% of respondents who have and do not have access to TV/radio respectively disagree to reduce use of cars.

Table 47 Willingness to decrease the use of cars to improve pollution and crowding, by Ethnicity.

Response	Oromo		Amhara		Guragie		Tigrie		Others		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Agree	17	48.6	41	45.1	24	52.2	7	38.9	1	20	90	46.2
Disagree	18	51.4	50	54.9	22	47.8	11	61.1	4	80	105	53.8
Total	**35**	**100**	**91**	**100**	**46**	**100**	**18**	**100**	**5**	**100**	**195**	**100**

The majority of Oromo, Amhara, and Tigrie ethnic groups disagree to reduce the use of cars (51.4%, 54.9%, and 61.1% respectively). Only slightly above half of Guragie ethnic groups are observed to be willing to reduce the use of cars.

Table 48 The conservation of natural resources is totally the responsibility of government, by sex.

Responses	Male		Female		Total	
	F	%	F	%	F	%
Agree	21	18.3	21	23.9	42	20.7
Disagree	94	81.7	67	76.1	161	79.3
Total	**115**	**100**	**88**	**100**	**203**	**100**

More than one-fifth of female respondents (23.9%) still hold the wrong attitude that conservation of natural resources is totally the responsibility of government. Relatively more male respondents (81.7%) hold the right attitude than females

Table 49 The conservation of natural resources is totally the responsibility of government, by religion.

Responses	Orthodox		Muslim		Protestant		Total	
	F	%	F	%	F	%	F	%
Agree	25	15.4	13	54.2	4	25	42	20.8
Disagree	137	84.6	11	45.8	12	75	160	79.2
Total	162	100.0	24	100.0	16	100.0	202	100.0

While Orthodox and Protestant Christians hold correct attitude towards conservation of natural resources (84.6% and 75% respectively), more than half of Muslim respondents hold the wrong attitude that conservation of natural resources is totally the responsibility of government

Table 50 The conservation of natural resources is totally the responsibility of government, by age category

Responses	Less than 60 years old		60 and above 60 years old		Total	
	F	%	F	%	F	%
Agree	35	21.7	7	16.7	42	20.7
Disagree	126	78.3	35	83.3	161	79.3
Total	**161**	**100**	**42**	**100**	**203**	**100**

Even though the majority of respondents from both age categories hold correct attitude towards conservation of natural resources, relatively higher percentage of older age group respondents than younger ones replied correctly.

Table 51 The conservation of natural resources is totally the responsibility of government by access to TV/Radio.

	Have access to TV/Radio		Have no access to TV/Radio		Total	
Response	F	%	F	%	F	%
Agree	40	20.5	2	25	42	20.7
Disagree	155	79.5	6	75	161	79.3
Total	195	100.0	8	100.0	203	100.0

While about 80% of the respondents with no access to TV/radio hold correct attitude towards conservation of natural resources, one-fourth of the respondents who have access to TV/radio hold the incorrect view that conservation of natural resources is totally the responsibility of government.

3.4.1 Level of Environmental Attitude

To measure the level of respondents' attitude, a technique similar to what has been employed to knowledge is also used here. Respondents' responses to each of the 10 selected questions are given a value "1" or "0" depending on correct or incorrectness of the responses. An equal weight of one point is given to each

question. Each individual value has therefore been summed up and evaluated out of 10.

Consequently, the minimum, maximum and mean values of attitude score are 2, 10, and 7.4 with a standard deviation of 1.6. Only slightly above half of the respondents (52.9%) are observed to score an attitude above the mean value.

Thus, this study will in addition see if there is any variation in environmental attitude between literates and illiterates, and the different marital statuses.

Figure 5 Percentage of respondent who score above the mean in environmental Attitude by socio-demographic characteristics.

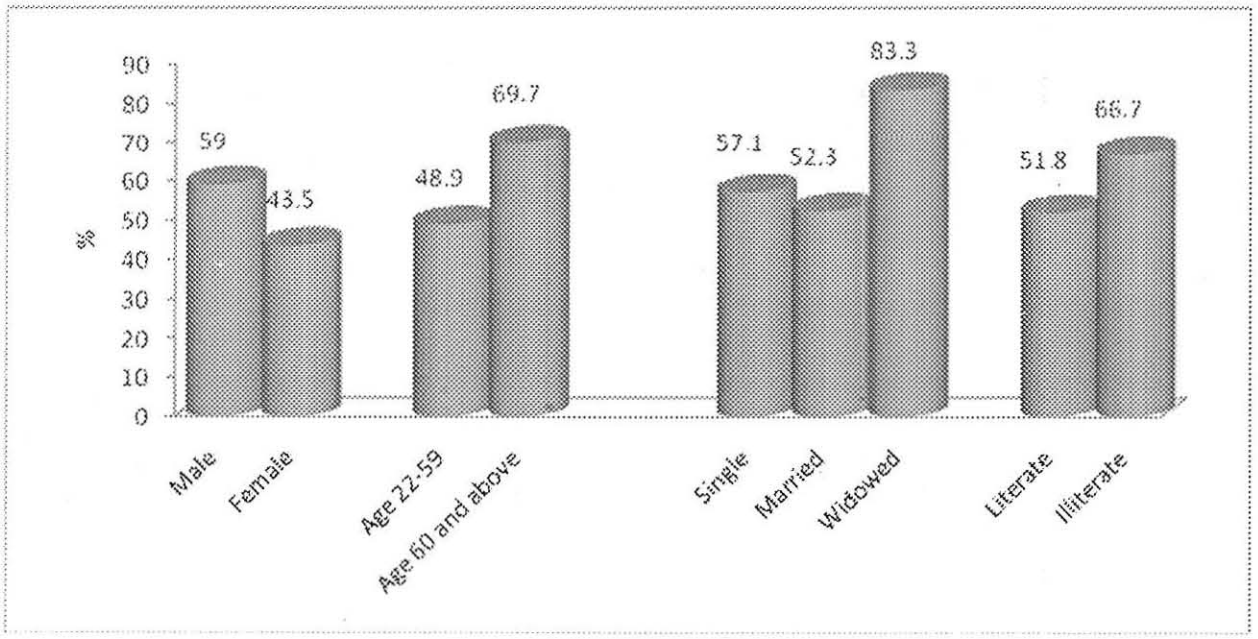
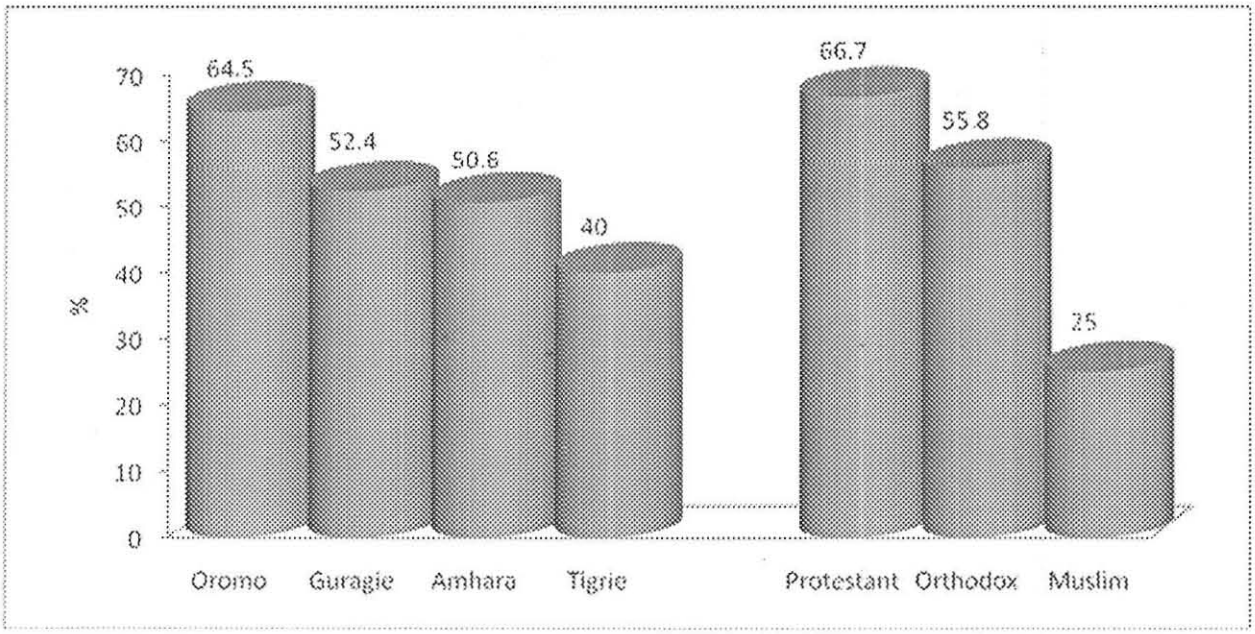


Figure 5 depicted that attitude variation among the two sexes is just like to what was observed in environmental knowledge. The percentage of male respondents who scored above mean attitude value (59%) is shown to be higher

than females (43.5%). Unlike knowledge, attitude is observed to increase along with increase in the age of respondents (69.7%). It is also surprising that illiterate individuals are found to have a much more positive attitude towards the environment than those who are literate (66.7% and 51.8% respectivelly). Widowed and single individuals are also observed to have better positive attitude towards their environmen than those who are married (83.3%, 57.1%, and 52.3% respectively).

Figure 6 Percentage of respondent who score above the mean in environmental Attitude by Ethnicity and religion.



When we look attitude variations across the different ethnic group and religion sects, Oromos are observed to have relatively greater positive attitude towards the environment than Guraghie, Amhara, and Tigrie (above mean scores of 64.5%, 52.4%, 50.6%, and 40% respectively). It is worth to note that while two-

third of protestants score above the mean attitude value (66.7%), it is only one-fourth of muslims that have an attitude score that is above the mean.

3.5 Environmental Behavior

Respondents' behavior is assessed through 16 different items. Like knowledge and attitude, selection of the 16 behavioral questions also bases different nation-wide studies stated under section 3.3 like knowledge and attitude, behavioral findings are also presented in two distinct sections: key environmental behavior findings of some selected questions and respondents' level of attitude. Following is key findings of some of the behavior questions.

Table 52 Frequency of throwing when nobody is watching, by sex

Responses	Male		Female		Total	
	F	%	F	%	F	%
Always	5	4.3	8	9.1	13	6.4
Some times	38	33	27	30.7	65	32
Never	72	62.6	53	60.2	125	61.6
Total	**115**	**100.0**	**88**	**100.0**	**203**	**100.0**

About 40% of both male and female respondents (38.4% and 39.8% respectively) still have a habit of throwing rubbish when nobody is watching them.

Table 53 Frequency of throwing when nobody is watching, by marital status

Responses	Single		Married		Divorced		Widowed		Total	
	F	%	F	%	F	%	F	%	F	%
Always	0	0	12	7.7	0	0	0	0	12	6.1
Some times	8	34.8	47	30.3	1	25	4	26.7	60	30.5
Never	15	65.2	96	61.9	3	75	11	73.3	125	63.5
Total	**23**	**100.0**	**155**	**100.0**	**4**	**100.0**	**15**	**100.0**	**197**	**100.0**

Divorced and widowed respondents are observed to behave better with respect to throwing rubbish (75% and 73.3% respectively never through rubbish) than single and married individuals (65.2% and 61.9% never through rubbish).

Table 54 Frequency of throwing when nobody is watching, by religion

Responses	Orthodox		Muslim		Protestant		Total	
	F	%	F	%	F	%	F	%
Always	9	5.6	3	12.5	1	6.3	13	6.4
Some times	51	31.5	10	41.7	4	25	65	32.2
Never	102	63	11	45.8	11	68.8	124	61.4
Total	**162**	**100.0**	**24**	**100.0**	**16**	**100.0**	**202**	**100.0**

The majority of Muslims (54.2%) are observed to behave negatively towards the environment. They said that they have habits of throwing rubbish while nobody is watching them. Though relatively small, significantly high percentage of Orthodox and Protestant Christians are also behaving similarly (37% and 31.2% respectively).

Table 55 Frequency of throwing when nobody is watching, by educational status.

	Illiterate		Informal		Primary		Secondary		10+1/10+2		Diploma		Degree		Master		Total	
Response	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Always	2	10.5	1	5.9	2	6.5	2	3.8	1	12.5	2	6.9	2	6.9	0	0	12	6.1
Some times	3	15.8	7	41.2	8	25.8	17	32.7	1	12.5	10	34.5	11	37.9	5	41.7	62	31.5
Never	14	73.7	9	52.9	21	67.7	33	63.5	6	75	17	58.6	16	55.2	7	58.3	123	62.4
Total	**19**	**100**	**17**	**100**	**31**	**100**	**52**	**100**	**8**	**100**	**29**	**100**	**29**	**100**	**12**	**100**	**197**	**100**

A general trend of misbehaving is also observed towards increasing level of education. For instance, while only 26.3% of illiterates responded that they are throwing rubbish sometimes or always, about 45% and 42% of first degree and masters degree holders respectively responded the same answer.

Table 56 Frequency of throwing when nobody is watching, by access to TV/ Radio

	Have access to TV/Radio		Have no access to TV/Radio		Total	
Response	F	%	F	%	F	%
Always	11	5.6	2	25	13	6.4
Some times	60	30.8	5	62.5	65	32
Never	124	63.6	1	12.5	125	61.6
Total	**195**	**100**	**8**	**100**	**203**	**100**

Significantly high difference is observed among those who have and do not have access to TV/radio. While only 36.4% of respondents who have access replied that they throw rubbish either always or sometimes, the majority of respondents from no access category (87.5%) provided similar responses.

Table 57 Participation in any Environmental activities, by sex

Responses	Male		Female		Total	
	F	%	F	%	F	%
Always	29	25.4	25	28.4	54	26.7
No	57	50	46	52.3	103	51
Some times	28	24.6	17	19.3	45	22.3
Total	**114**	**100.0**	**88**	**100.0**	**202**	**100.0**

Males and females have responded more or less similarly towards their involvement in protecting their environment. About half of male and female respondents (50% and 47.7%) of male and female never participated in activities like planting trees, terracing etc...

Table 58 Participation in any Environmental activities, by marital status

Responses	Single		Married		Divorced		Widowed		Total	
	F	%	F	%	F	%	F	%	F	%
Always	8	34.8	43	27.9	0	0	3	20	54	27.6
No	12	52.2	74	48.1	1	25	10	66.7	97	49.5
Some times	3	13	37	24	3	75	2	13.3	45	23
Total	**23**	**100**	**154**	**100**	**4**	**100**	**15**	**100**	**196**	**100.1**

Significant differences in participation are also observed among the different marital statuses. Married and divorced individuals are observed to behave positively towards the environment. 51.9% and 75% respectively have either "sometimes" or "always "participation. Only 33.3% and 47.8% of widowed and single respondents replied in like manner.

Table 59 Participation in any Environmental activities, by age category

Responses	22 - 59 years		60 and above years		Total	
	F	%	F	%	F	%
Always	41	25.6	13	31	54	26.7
No	85	53.1	18	42.9	103	51
Some times	34	21.3	11	26.2	45	22.3
Total	**160**	**100.0**	**42**	**100.0**	**202**	**100.0**

Age has also been observed to be influential in determining individual's behavior. While more than half of respondents (57.2%) from "60 and above years" category have positive attitude towards protecting negatively, it is only 46.9% of respondents from younger age category replied to have participation in any environmental activities.

Table 60 Participation in any Environmental activities, by ethnicity

Response	Oromo		Amhara		Guragie		Tigrie		Others		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Always	8	22.2	32	33.3	6	13	7	36.8	1	20	54	26.7
No	19	52.8	42	43.8	30	65.2	8	42.1	4	80	103	51
Some times	9	25	22	22.9	10	21.7	4	21.1	0	0	45	22.3
Total	**36**	**100**	**96**	**100**	**46**	**99.9**	**19**	**100**	**5**	**100**	**202**	**100**

Respondents from Tigrie and Amhara ethnic categories are observed to be actively participating in environmental activities (57.9% and 56.2% respectively). Respondents who came from Oromo and Guragie ethnic categories however are behaving the other way (47.2% and 34.8% respectively).

Table 61 Participation in any Environmental activities, by occupation

Responses	House wife		Private employee		Hand craft		pension		Government employee		Unemployed		Trade		Others		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Always	15	31.9	19	32.8	2	25	3	21.4	8	25	2	25	1	11.1	4	23	54	28
No	27	57	24	41.4	5	62.5	5	35.7	15	46.9	4	50	7	77.8	8	47.1	95	49.2
Some times	5	10.6	15	25.9	1	12.5	6	42.9	9	28.1	2	25	1	11.1	5	29.4	44	22.8
Total	**47**	**99.5**	**58**	**100.1**	**8**	**100**	**14**	**100**	**32**	**100**	**8**	**100**	**9**	**100**	**17**	**99.5**	**193**	**100**

Occupation has also been observed to affect individual's participation in environmental activities. Those who are in pension, private employees, government employees and unemployed individuals are found to be relatively actively participating in their environmental activities (64.3%, 58.6%, and 53.1% 50% respectively). Traders, those engaged in handicrafts and housewives on the other hand are behaving negatively. Only 22.2%, 37.5% and 43% respectively mentioned to have experience in participating in environmental activities.

Table 62 Plastic bag usage during shopping, by sex

Responses	Male		Female		Total	
	F	%	F	%	F	%
Always	64	56.1	55	62.5	119	58.9
Some times	47	41.2	32	36.4	79	39.1
never	3	2.6	1	1.1	4	2
Total	**114**	**99.9**	**88**	**100**	**202**	**100**

Relatively higher percentage of females than male s is observed to have habits of using plastic bags (97.3% and 98.9% respectively).

Table 63 Plastic bag usage during shopping, by marital status

Responses	Single		Married		Divorced		Widowed		Total	
	F	%	F	%	F	%	F	%	F	%
Always	13	59.1	91	58.7	3	75	8	53.3	115	58.7
Some times	9	40.9	60	38.7	1	25	7	46.7	77	39.3
never	0	0	4	2.6	0	0	0	0	4	2
Total	**22**	**100**	**155**	**100**	**4**	**100**	**15**	**100**	**196**	**100**

Significant variations in using plastic bags are also observed among the different marital statuses. While 100% of Single, divorced and widowed individuals responded to use plastic bags either always or sometimes, about 2.6% of married respondents replied as having no experiences of using plastic bags.

Table 64 Plastic bag usage during shopping, by religion

Responses	Orthodox		Muslim		Protestant		Total	
	F	%	F	%	F	%	F	%
Always	93	57.4	15	65.2	10	62.5	118	58.7
Some times	68	42	6	26.1	5	31.3	79	39.3
Never	1	6	2	8.7	1	6.3	4	2
Total	**162**	**105.4**	**23**	**100**	**16**	**100.1**	**201**	**100**

More or less similar findings in plastic usage are observed among the different religions. Only 6%, 6.3% and 8.7% of Orthodox Christians, Protestants and Muslims respectively replied "never used" plastic bags for shopping purpose.

Table 65 Plastic bag usage during shopping, by age category

Responses	22 - 59 years		60 and above years		Total	
	F	%	F	%	F	%
Always	98	60.9	21	51.2	119	58.9
Some times	60	37.3	19	46.3	79	39.1
never	3	1.9	1	2.4	4	2
Total	**161**	**100.1**	**41**	**99.9**	**202**	**100**

Age has not also been seen as a significant factor in plastic bag usage. More or less similar percentages of respondents from "22-59" and "60 and above" age category replied to have "Never" experience in using plastic bags (1.9% and 2,4% respectively).

Table 66 Plastic bag usage during shopping, by occupation

Responses	House wife		Private employee		Hand craft		pension		Government employee		Unemployed		Trade		Others		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Always	29	61.7	28	49.1	3	37.5	8	57.1	20	60.6	6	75	5	55.6	14	82.4	113	58.5
Some times	17	36.2	28	49.1	5	62.5	6	42.9	13	39.4	2	25	2	22.2	3	17.6	76	39.4
never	1	2.1	1	1.8	0	0	0	0	0	0	0	0	2	22.2	0	0	4	2.1
Total	**47**	**100**	**57**	**100**	**8**	**100**	**14**	**100**	**33**	**100**	**8**	**100**	**9**	**100**	**17**	**100**	**203**	**100**

While more than one-fifth of traders (22.2%) replied to have never used plastic bags, zero or negligible percentage of respondents (less than or equal to 2.1%) from other sector replied similarly.

Table 67 Plastic bag usage during shopping, by ethnicity

Response	Oromo		Amhara		Guragie		Tigrie		Others		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Always	24	64.9	49	51.6	29	63	14	73.7	3	60	119	58.9
Some times	13	35.1	45	47.4	14	30.4	5	26.3	2	40	79	39.1
Never	0	0	1	1.1	3	6.5	0	0	0	0	4	2
Total	37	100	95	100	46	100	19	100	5	100	192	100

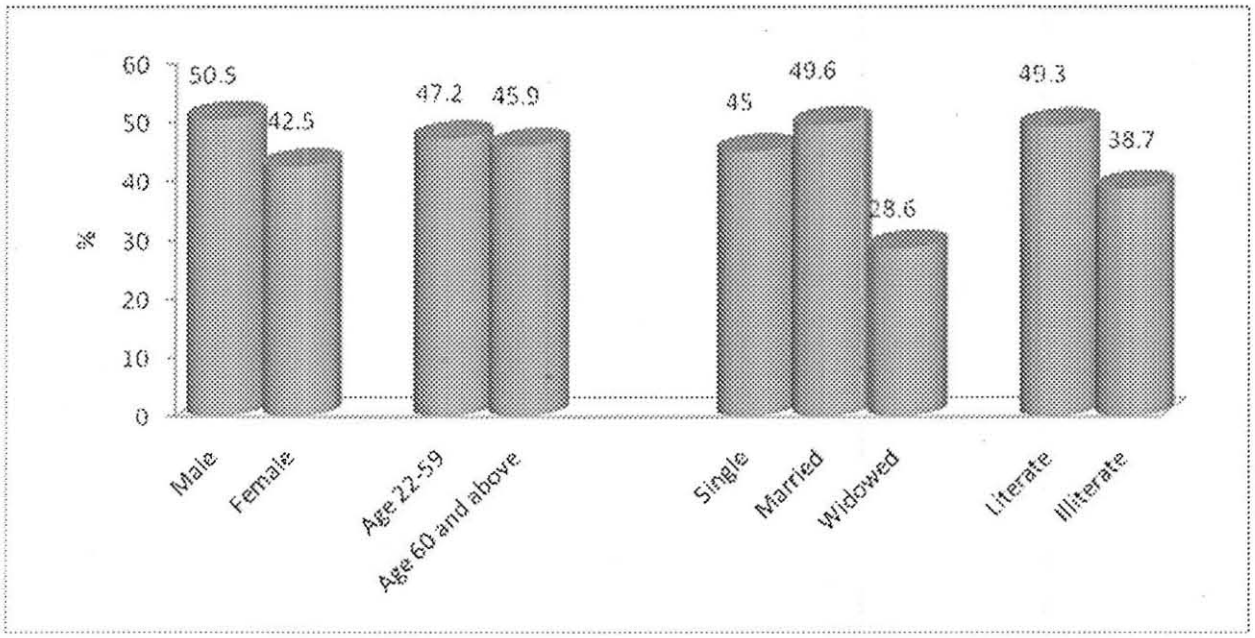
While respondents who came from all ethnic categories other than Guragie behave similarly in using plastic bags, relatively higher proportion of respondents from Guragie ethnic group are found to behave better. About 7% of Guragies replied to have no practice in using plastic bags. All other respondents however have responded to have "Always" or "Sometimes" experiences.

3.5.1 Level of Environmental Behavior

Like knowledge and attitude, the level of respondents' behavior, is also assessed through assigning a value "1" or "0" to each and every one of the selected 16 behavioral questions. An equal weight of one point is given to each of the 16 questions. Each individual value has therefore been summed up and evaluated out of 16.

The minimum, maximum and mean values of behavior score are 2, 15, and 9.5 with a standard deviation of 2.8. More than half of the individuals (53.0%) scored below the mean value in environmental behavior.

Figure 7 Percentage of respondent who score above the mean in environmental Behavior by socio-demographic characteristics.



As it can be seen from the above figure (Figure 7) male respondents (50.5%), literates (49.3%), and those who are found in the age category of 22-59 years (47.2) scored higher in environmental behavior when compared with their collogues in other categories. The result is more or less similar to environmental knowledge. Unlike these findings, comparison by marital status indicated that married respondents scored slightly higher values than those who are single (49.6% and 45%). The variation with widowed (28.6%) however is so wide.

Figure 8 Percentage of respondent who score above the mean in environmental Behavior by Ethnicity and religion.

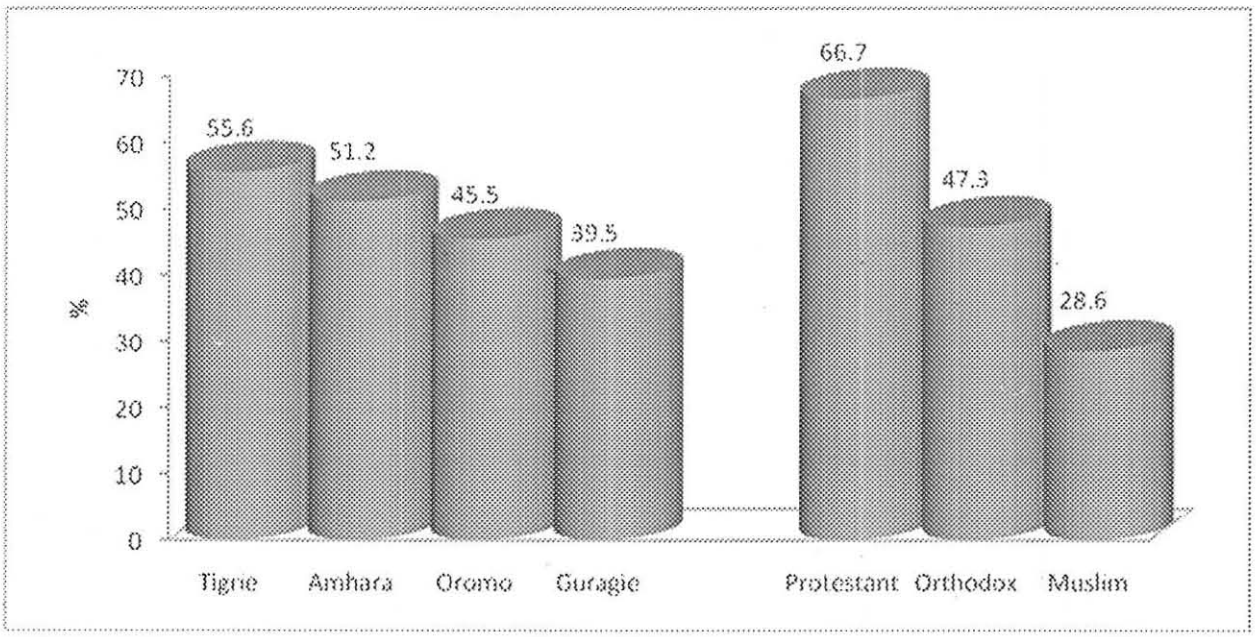


Figure 8 indicated that, Tigrie ethnic group scored the highest (55.6%) followed by Amhara (51.2%). Guragie is found to have the least behavioral score (39.5%). Environmental behavior across the three religions is one of the few characteristics consisten throughout. Morethan two-third of Protestants (66.7%) scored above the mean in environmental behavioral, followed by Orthodox (47.3%). The least score is recorded among Muslims (28.6%).

CHAPTER FOUR

4. Nexus of Environmental Knowledge, Attitude and Behaviour

Although the effect of knowledge is not conclusive, there have been several studies suggesting that knowledge plays an important role in enhancing the environmental attitude and behavior relationship by providing individuals with the ability to better formulate alternative views and present arguments to support their believes and behaviors[11]. *(EORG, 2002)*

For over sixty years the strength and direction of the link between attitudes and behaviour has been subject to critical examination (eg. La Piere 1934, Wicker 1969, East 1993, Foxall 1993, Kraus 1995, Foxall 1997).

This chapter will therefore be devoted to assessing possible relationships among enviromental knowledge, attitude and behavior of respondents.

The Pearson's correlation coefficient is used to access possible bivariate relationships among knowledge and attitude, knowledge and behavior, and attitude and behavior. The Pearson's correlation coefficient is a measure of linear association between two variables. Two variables can be perfectly related, but if the relationship is not linear, Pearson's correlation coefficient is not an appropriate statistic for measuring their association. It is useful for determining the strength and direction of the association between two quantitative variables. Correlation coefficients range in value from -1 (a perfect negative relationship) and +1 (a perfect positive relationship). A value of 0 indicates no linear relationship. When interpreting our results, we should be careful not to draw any cause-and-effect conclusions due to a significant correlation.

Table 68 Pearson's Correlation Test Between Environmental Knowledge and Attitude

		Knowledge	Attitude
Knowledge	Pearson Correlation	1.000	.321**
	Sig. (2-tailed)		.000
	N	202.000	202.000
Attitude	Pearson Correlation	.321**	1.000
	Sig. (2-tailed)	.000	
	N	202.000	202.000
**. Correlation is significant at the 0.01 level (2-tailed).			

The above table shows the relationship between knowledge and attitude towards environment. The Pearson's correlation *r* is found to be .32 (*p-value* <0.01). The relationship is both positive and significant. However, it is not very strong.

Likewise, the relationship between environmental attitude and behavior of respondents was measured and the following resul obtained.

Table 69 Pearson's Correlation Test Between Environmental Attitude and Behavior

		Attitude	Behavior
Attitude	Pearson Correlation	1.000	.160**
	Sig. (2-tailed)		.000
	N	202.000	202.000
Behavior	Pearson Correlation	.160**	1.000
	Sig. (2-tailed)	.000	
	N	202.000	202.000
**. Correlation is significant at the 0.01 level (2-tailed).			

The correlation between attitude and behavior is observed to be weak. The analysis has resulted in a Pearson's correlation coeeficient of 0.16 (p-value <0.01).

Finaly the relationship between environmental knowledge and behavior of respondents was also assessed and the following result observed.

Table 70 Pearson's Correlation Test Between Environmental Knowledge and Behavior

		Knowledge	Behavior
Knowledge	Pearson Correlation	1.000	.450**
	Sig. (2-tailed)		.000
	N	202.000	202.000
Behavior	Pearson Correlation	.450**	1.000
	Sig. (2-tailed)	.000	
	N	202.000	202.000
**. Correlation is significant at the 0.01 level (2-tailed).			

In this regards, our analysis has resulted in a relatively stronger possitive relationship between knowledge and behaviour. The calculated Pearson's correlation coefficient, i.e., 0.45 (p-value <0.01) is stronger as compared with the correlations among knowledge and attitude as well as attitude and behavior.

4.1 Conclusion and Recommendations

4.1.1 Conclusion

The findings of the study showed that although the majority of the residents of Addis Ababa (95.5%) are aware of existing environmental problems of the city, the level of their knowledge is observed to be still very low (58.9% of them scored below the mean value). When looked across the different socio-demographic characteristics Male, literate, single, and protestant Christian respondents are observed to be better in environmental knowledge (69%, 78.3%, 67.1%, 68.8% respectively scored above the mean value) than their colleagues in other categories.

The above results are also supported by findings obtained from different studies. For instance, studies by Aklilu (2006), Ibrahim and Babayemi (2010), Arcury (1990), and Mansaray *et al.* [1998] have asserted that their respondents generally demonstrated a low level of environmental knowledge. Likewise, studies done by McEvoy (1972) also showed that men are more concerned about environment than women due to their higher level of education and involvement with the communities and political issues.

Looking into environmental attitude, above half of the respondents (52.9%) has also scored below the mean attitude value. The result is similar to findings of different researches conducted in our country as well as abroad. For instance a study by Atlabachew (2007), Asmare (2007), Ibrahim & Babayemi, and Mansaray et al. (1998) hve shown that a very low percentage of respondents surveyed had positive attitude towards the environment.

Different literatures have indicated that age, education, gender, occupation, place of residence and income is the most explanatory variables related to environmental attitudes (Mohai and et al., 1987, Vogel, 1994, Cottrell and et al., 2002, EORG, 2002).

While only 43.5% of female respondents in our study scored above the mean attitude value, the majority of male respondents (59%) are observed to score more than the mean attitude score. Unlike environmental knowledge, widowed and illiterate respondents are found to be in a better situation (53.3% and 66% respectively scored above the mean attitude) than those in the other categories.

Significant differences are also observed among the different categories of age. More than two-third the respondents in the age category of above sixty years are observed to score above the mean attitude score (69.7%). This percentage is much higher than the percentages of 22-59 year age categories (48.9). Oromo ethnic groups and protestants are also observed to have better pro environmental attitude (64.5% and 66.7% of Oromo and Protestant respectively scored above the mean attitude value) than Amhara, Tigrie, and Guragie Ethnic groups and Orthodox Christians and Muslims.

Examining into environmental behavior, most respondents are observed to behave negatively towards the environment (53% have scored below the mean value in environmental behavior). Male respondents and protestants are consistently found in a better position. More than half (50.5%) and about two-third (66.7%) of male and protestant respondents respectively are observed to score morethan the mean in environmental behavior. Like what has been

observed in knowledge literates are also found to be better in environmental bevavior than illeterates. 49.3% of literates have scored morethan the mean behavior score.

As regards the correlation between environmental knowledge, attitude and behavior a relatively weak correlation (Pearson's correlation of 0.16) is observed between environmental attitude and behavior. The highest correlation is recorded among environmental knowledge and behaviour (a Pearson's correlation of 0.45) followed by correlation between knowledge and attitude, i.e., a Pearson's correlation of 0.32.

4.2 Recommendations

1) The majority of Addis Ababa residents (58.9%) scored below the mean value on environmental knowledge. In Ethiopia, environmental problems cannot be solved by few groups or experts. Unless people from all walks of life have deep understanding, involving in various decision making processes, the problem will stay with us. Hence, there is a critical need to ensure that every body should be equipped with the required environmental knowledge.
2) As the results of this study shown Environmental knowledge, attitude and behavior of female respondents as compared to males is very low. The main Environmental Problem in Addis Ababa, as sited by most of the respondents of this study, is improper waste disposal. They have also confirmed that the major source of the waste is household activities. Mostly females are more involved to household activities than male.

Therefore, in order to take an intervention and bring radical change to this improper waste disposal the main target groups have to be females thus increasing their environmental knowledge, attitude and behavior must be one of future intervention focuses.

3) Looking into the level of environmental attitude and behavior, above 60 years age category individuals are observed to have better attitude and behavior towards the environment than the age categories 22-59. This is very critical. It is the young population group that is supposed to bring changes in the current environmental problems. However, they are the ones who still hold negative attitude and behavior towards the environment. Therefore, to improve this critical problem, the issue of environmental problem has to be incorporated into the school education curricula. To bring practical behavioral change the issue should also be addressed through skill building peer education sessions. There is also diferent level of results seen between diferent ethnic and religios categories. Specially, Muslims has scored low in environmental knowledge, attitude and behaviour than other religions categories thus much has to be done to improve the status of this sect of the society.
4) Further studies should also be conducted to asses the level of knowledge,attitude and behaviour by socio-demographic variables which needs to identify the gap and treat environmental knowledge, attitude and behaviour in an integrated and balanced manner.

5) To change the existing reality,environment experts should prob the most eclectic environmental approach and give training to the community.

6) Most people are unfamiliar with environmental problems, its consquenses and how nation's environmental perspective changes positively. This efficient inputs should, thus be communicated effectively, using all the available media optimally that the nation uses.

References

Aklilu Amsalu (2001). "Natural resource management in Ethiopia:Making Good Use of Indigenous knowledge." Vol.2 (3).

Aklilu daleo (2006)."Principles and practice of environmental education: Focus on Ethiopia" un published teaching material, Addis Ababa university.

Alebel b. and Dawit W (2006)."Integrated solid waste management in Addis Ababa "In proceedings of the Third international conference on the Ethiopian Economy. Volume II.

Arcury, T.A., (1990). Environmental Attitude and Environmental Knowledge. Human Organization, 49: 300-304.

Arcury, T.A. and T.P. Johnson, (1995). Public environmental knowledge:A statewide survey. J. Environ. Edu. 18: 31-37.

Arcury, T.A., (2000). Environmental attitude and environmental knowledge. Human Organ., 49:300-4.

Asmare Demilew (2007). The contribution of Environmental Education In raising students' knowledge, attitude and practice in selected first cycle secondary school.

Atlabachew Getaye (2007). Learners Acadamic staffs' Environmental knowledge, Attitude and behavior (The case of Adama university)..

Azene Bekele Tessema (2001)."Status and Dynamics of Natural Resources in Ethiopia". In Taye Assefa (ed). Food Security through sustainable

land use policy On institutional land Tenure and Extension Issues in Ethiopia NOVIB partners. Forum on sustainable land use. Addis Ababa.

Beletu M and Yosef B. (1990). A look at the activities of the Environmental education project in Ethiopia. Addis Ababa MOE.

Berger, Ida (1993). The Relationship between Environmental Attitudes and Behavior. Canadian Journal of Marketing Research, 12, 36-43.

Buttel, Fredrick (1996). "Environmental and resource sociology: Theoretical issues and opportunities for synthesis", Rural Sociology, vol. 61, No.

Caiazza, A. and A. Barrett, (2003). Engaging women in environmental activism: recommendations for Rachel's network. Institute for Women's Policy Research. IWPR Publication, Washington, Dc.

Capital Ethiopia News (2004). Air pollution, the invisible issue in Addis. Vol 13, No_639.

Cottrell, S.P. and A.R. Graefe, 2002. Testing a conceptual framework of responsible environmental behavior. The J. Environ. Edu., 29:17-27.

C.S.A (2004). Welfare Monitoring Survey

Demil (2003) state of the environment in Ethiopia the past and future perspective. Paper presented for civic society and for environment unpublished, Addis Ababa Ethiopia.

Desalegn Mesfin (2003). "Global Environmental issues and impacts on." Environment and Environmental change in Ethiopia. Forum for social science studies Number

Dunlap, Riley and Rik Scarce (1991), "The polls-poll trends: environmental problems and protection", *Public Opinion Quarterly,* vol. 55.

Dunlap, E.R. (1994). International Attitudes Towards Environment and Development , in Helge Ole Bergesen and Georg Parmann (eds.), Green Globe Yearbook of International Co-operation on Environment and Development 1994 (Oxford: Oxford University Press), 115-126.

Dunlap, Riley E. and Kent D. Van Liere. "The 'New Environmental Paradigm.'" Journal of 1978 Environmental Education. 9(Summer):10-19

East, Robert (1993).*Changing Consumer Behaviour.* London: Cassell Educational Limited.

Eckberg, D.L. and T.J. Blocker, 1996. Christianity, Environmentalism and the theoretical problem of fundamentalism. J. The Scientific Study of Religion, 35: 343-355.

Eckholm, E.P (1992) Down to Earth; Environment and Human Needs (1st ed),First East-west press, New Delhi.

Eder, Klaus. The Social Construction of Nature: A SociologyEcological Enlightenment. 1996 Sage Publication, London.

Enda-Ethiopia (1999). The cycle of waste in Addis Ababa. Enda-Ethiopia, Addis Ababa.

Environ Am. J. Sci., 3 (2): 67-74, 2007, Investigating Factors Affecting Environmental Behavior of Urban Residents: A Case Study in Tehran City- Iran, 2007 Science Publications

Ethiopia Environment Journalists Association (2009), Air quality in Addis Ababa worries experts as car emissions rise.

Foxall, Gordon R. (1983). Consumer Choice. London: Macmillan; New York: St Martins.

Foxall, Gordon R. (1997). Marketing Psychology: The Paradigm in the Wings. London: Macmillan Press.

Gill, James D., Crosby, Lawrence A., and Taylor, James R. (1986). Ecological Concern, Attitudes, and Social Norms in Voting Behavior. Public Opinion Quarterly, Winter, 50 (4), 537-554.Public Opinion Quarterly, Summer, 50 (2), 270-279.

Fishbein, M. & Ajzen, I. (1975). Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. Reading, MA: Addison-Wesley

Forskningsnytt · nr 2 · (2005). the meaning of living environmental knowledge in productive activities: the case of a Finnish dairy farm

Foxall, Gordon R. (1983). *Consumer Choice.* London: Macmillan;New York: St Martins.

Hannigan, John A. Environmental Sociology: A Social Constructionist 1995 Perspective. Rutledge, London and New York

Ibrahim F.M. and . Babayemi 2O.F.,(2010). Knowledge and Attitude of a Group of Nigerian Undergraduates towards Environmentalism, Global Journal of Environmental Research, IDOSI Publications, 2010

Jacobi, P., Kjellen, M., & Castro, Y. (1998). Household environmental problems in Sao Paulo. Stockholm: Stockholm Environment Institute.

Kaiser,F.G,Wolfing, S.and V. fuhrer (1999)."Environmental Attitudes and behavior in of students in Singapore." International research in Geographical and Environmental education. Vol 7(3).

Kalantari, Kh. and Asadi, A. (2009). Designing a Structural Model for Explaining Environmental Attitude and Behavior of Urban Residents (Case of Tehran). Int. J. Environ. Res., 4(2):309-320, Spring 2010.

Katz, D., 1960. The Functional Approach to the Study of Attitudes. Public Opinion Quarterly, 24: 163-204.

Kibret,N.C (2000). An Analysis of the correlation between the altitude, behavior and knowledge components of environmental literacy in undergraduate university students. A thesis presented to graduate school of university of Florida in partial fulfillment of the requirements for the degree of masters of Science, university of Florida USA. Retrieved from http://www.cce.ufl.edu/nicole-kibret-thesis for formatted pdf.

Konemund, T. (2002). "The house hold Energy crisis in Ethiopia: A possible way out." In proceeding of Energy conference 2002.UNCC, Addis Ababa.

Kraus, Stephen J. (1995). Attitudes and Prediction of Behavior: a meta-analysis of the empirical literature. *Personality and Social Psychology Bulletin*, 21 (1), 58-75.

Kuhlemeier, H., V.D.B. Huub and L. Nijs, (1999). Environmental knowledge, attitudes and behavior in Dutch secondary education. J. Environmental Education, 30: 4-15.

La Piere, R. T. (1934). Attitudes versus actions. *Social Forces*, 13, 230-237.

Malcolm Wright and Babs Klÿn (1998). Environmental Attitude – Behavior Correlations in 21 Countries, Journal of Empirical Generalizations in Marketing Science, Volume Three, 1998.

Mainieri, Tina and others (1997). "Green buying: the influence of environmental concern on consumer behavior, The Journal of Social Psychology, vol. 137, No. 2.

Mansaray, A., J.O. Ajiboye and U.F. Audu, 91998).Environmental knowledge and attitudes of some Nigerian Secondary School Teachers. Environmental Education Res., 4: 329-339

Martin, Bridget and Simintiras, Antonis C. (1995). The Impact of Green Product Lines on the Environment: Does what they know affect how they feel? *Marketing Intelligence & Planning*, 13 (4), 16-23.

McGranahan, G. (1991). Environmental problems and the urban household in third world countries. Stockholm: Stockholm Environment Institute.

McGuire, W. J. (1985). Attitudes and attitude change. In G. Lindsay &E. Aronson (Eds.) Handbook of social psychology 3rd ed., 2, 233-346.

Mohai, P. *et al.*, (1987). Age and environmentalism: An elaboration of the Buttel model using national survey evidence. Social Sciences Quarterly.

Naess, Arne. "Deep Ecology" The Green Reader: Essays toward a Sustainable Society 1991 Ed: Andrew Dobson. Mercury House, Incorporated, San Francisco.

Peattie, Ken (1995). Environmental Marketing Management: Meeting the GreenChallenge. London: Pitman Publishing.

Rosa, E. A., & Dietz, T. (1998). Climate change and society: Speculation, construction and scientific investigation. International Sociology, 13, 421-425.

Sabah A. Abdul-Wahab, (2008). A preliminary investigation into the environmental awareness of the Omani public and their willingness to protect the environment. American Journal of Environmental Sciences

Stern, P. C. (1997). Toward a working definition of consumption for environmental research and policy. In P. C. Stern, T. Dietz, V. R. Ruttan, R. H. Socolow, & J. L. Sweeney (Eds.), environmentally significant consumption: Research directions (pp. 12-35). Washington, DC: National Academy Press, 1997.

Stern, P. C., & Gardner, G. T. (1981). Psychological research and energy policy. American Psychologist 36, 329-342.

Stern, P. C., Young, O. R., & Druckman, D. (Eds.). (1992). Global environmental change: Understanding the human dimensions. Washington, DC: National Academy Press.

Stern, P. et al.,(1998). Value orientations, gender and environmental concern. Environ. Behav., 25:322-348.

Stoorvogel, J.J , E.M.A Smaling, and B.H Janssen (1993). "Calculating Soil Nutrient Balances in Africa at Different scales." Supranational Scale, Fertilizers Research, 35-22-23.

Stutzman, T.M. and S.B. Green, (1982). Factors affecting energy consumption: two field tests of the Fishbein-Ajzen model. J. Social Psychol.,117:183-201.

Tarrant, M. and K. Cordell, (1997). The effects of respondent characteristics on environmental Attitude - behavior correspondence. The J. Environ. Edu. 29: 618-637.

The European Opinion Research Group (EORG), (2002). The attitudes 0f Europeans towards the environment. The European Opinion Research Group.

Tommy, G. et al., (2002). Moderating effects of social value orientation on determinants of pro environmental behavior intention.

UNEP (2009). Addis Ababa highlights, combating noise pollution in Addis Ababa, vol.6,No_6.

UNESCO_UNEP (1988). Educational Education in vocational agriculture curriculum and teacher Education in Michigan, U.S.A UNESCO _UNEP NewYork.

Uitto, A., Juuti, K., Lavonen, J., and Meisalo, V. (2003). Who is responsibl for sustainable development? Attitudes to environmental challenges: A survey of Finnish 9th grade comprehensive school students. Department of Applied Sciences of Education, University of Helsinki, Finland.

Van Liere, Kent and Riley Dunlap (1981). "Environmental concern: does it make a difference how it's measured?", *Environment and Behavior*, No. 13.

Vayda, A. P. (1988). Actions and consequences as objects of explanation in human ecology. In R. J. Borden, J. Jacobs, & G. L. Young (Eds.), Human ecology: Research and applications (pp.9-18). College Park, MD: Society for Human Ecology.

Vogel, S., (1994). Environmental attitudes and behavior in the agricultural secto as empirically determined by use of an attitude model. Institute Fur Wirtschaft, Politik and Recht, Univrsitat, Bodenkutur Wien.

White, Lynn, (1967). The Historic Roots of Our Ecologic Crisis. Sci., 155: 1203-7

Wicker, A. W. (1969). Attitudes versus actions: The relationship of verbal and overt behavioral responses to attitude objects. Journal of Social Issues, 35, 41-78.

[a],http://www.unhabitat.org/content.asp?typeid=19&catid=499&cid=3207

[b],http://www.globenet.org/preceup/pages/ang/chapitre/capitali/transver/ethiopie.htm

[c],http://www.etheja.com/index.php?option=com_content&view=article&id=59:air-quality-in-addis-ababa-worries-experts-as-car-emissions rise&catid=34:environmental-news-cat&Itemid=57

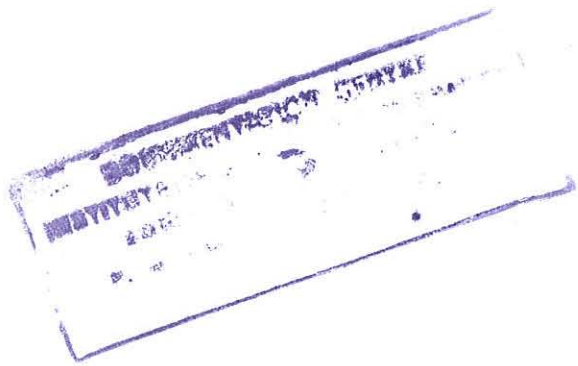
[d],http://jharenvis.nic.in/files/Protect%20our%20environment.pdf

[e], http://www.irs.aber.ac.uk/omiard

[f],http://www.drs.wisc.edu/documents/articles/heberlein/EnvironmentalAttitudes. Pdf

[g], http://www.unesco.org/education/mebam/module_4.pdf

[h],http://www.unep.org/roa/Addis_Ababa_Site/Documents/Highlights/Highlight2009/Jun09.pdf



ANNEX- I

Addis Ababa University

College of Developmental studies

Study on the Environmental knowledge, attitude and behavior (KAB) of Addis Ababa residents.

The purpose of this questionnaire is to examine respondent's level of environmental knowledge, attitudes and behavior. There is no need to write your name, and the information you provide is highly confidential. It only serves for the research purposes. Hence, would you mind filling the questionnaires? I would like to thank in advance for your cooperation.

Section I

Background information of the head of households

Age: _____

Sex:_____

Ethnicity:_____

Occupation:_____

Marital status:_____

Education:_____

Religion:_____

Section II

Instruction: Choose the best answer which fits to you

1. Did you observe any environmental problem in Addis Ababa?

   a. Yes b. No

2. If your answer is yes, what environmental problem did you observe in Addis Ababa?

   a. Decreasing water resources d. Air pollution

   b. In proper waste disposal e. Water pollution

   c. Noise pollution f. Others (specify) __

3. What is the cause of the environmental problem that you observe in question No 2?

   A. Luck of responsible body b. Luck of awareness

   c. carelessness d. weak controlling system e. others (specify) --

4. Do you think that the rivers in Addis Ababa are polluted?

   a. Yes b. No

5. If your answer is yes, what do you think that the main cause of river water pollution in Addis Ababa?

   a. Overpopulation c. industrial waste e. smoke from cars

   b. Household waste d. animal waste f. other (add) ------

6. The rivers are convenient places for disposing waste.

A. agree B. disagree

7. What is the most cause of air pollution in Addis Ababa?

a. Household waste b. cars c. cigarettes

d. industrial waste e. other (add)

8. Controls should be placed on industry to protect the environment from pollution, even if it means that things will cost more.

a. Agree b. disagree

9. Consider the problem of pollution and crowding, we need to decrease the use of cars. A. agree B. Disagree

10. Strong control by the government is the most effective way to reduce pollution problems. A. agree B. disagree

11. Most of solid waste in Addis Ababa are produced by: -

a. Residential activities b. Agricultural activity

c. Industrial activities d. others (specify) ------

12. How often you do you throw rubbish when nobody is watching?

a. Always b. sometimes c. never

13. The conservation of natural resources is totally the government's responsibility. A. Agree b. disagree

14. Humans must live in harmony with nature in order to survive

A. Agree b. disagree

15. The remaining forests in the world should be conserved at all costs.

a. Agree b. disagree

16.Did you participate in any environmental protection activities like planting tree, tracing etc?

a. Yes always b. No c. sometimes

17.Which o f the following sources of energy contribute the least to environmental problems?

a. solar b. petroleum c. nuclear

18.To save energy, did you turn off lights at home when they are not in use?

a. Yes always b. Never c. Sometimes

19.Do you have refrigerator? a. Yes b. No

20.If yes, do you leave the refrigerator open while you decide what to get out?

a. Yes always b. No c. sometimes

21.Did you discuss with others how can you reduce pollution?

A. Yes always B. No C. Some times

22.What is the advantage (importance) 0f planting tree with respect to environmental protection?

a. conserve soil c. for recreation

b. Balance a climate d. Charcoal production

23.Do you like planting tree?

a. Yes b. No

24..What is the main causes of increase noise level in Addis Ababa?

a. Industrial development c. Air craft

b. Growth in vehicle numbers d. video and music shops

25.Do you have T.V? a. TV b. Radio c. Both of them d. none of them

26.If yes, did you watch T.V or listen to radio program about the environment?

A. Yes always B. Yes, sometimes C. No

27.What sources do you use to obtain environmental information?

a. News paper d. internet g. radio j. from neighbors

b. Magazines e. books h. from friends

c. Television f. lectures i. from family

28. From the above that you choose, which is the top one that you use?

29. How often do you use plastic bag during shopping?

a. Always b. sometimes c. never

30. Do you reuse one plastic bag (festal) for long time?

a. Yes always b. No c. Sometimes

31. Did you reuse glass/plastic bottle for other purposes or like to buy oil, etc?

a. Yes always b. No c. Sometimes

32. Where does most of the garbage go after it is damped from the garbage trucks?

a. It is damped in to rivers

b It is recycled

c to a land fill where it is buried (Koshe)

d to farmers to use as fertilizers

33 .Where did you use a toilet?

a. Water carriage latrine b. Pit latrine d. Bowel, festal, popo, etc

c. open space, rivers, etc. e. Others (specify)

34. At an individual level, which measure can you take to control minimize water pollution?

a. Collecting water for washing and cooking and spilling in to waste disposal pipe line

b. Spilling water used for house hold purposes in to a nearby streams

c. Spilling water used for washing and cooking in to a ditch so that it could be taken some where

d. Other (please specify) ----------

35. Do you read stories that are mostly about the environment?

a. Yes always B. No C. sometimes

36. Have you attended any environmental exhibition, symposium, work shop?

a. Yes always b. No c. sometimes

37. Are you upset when you see people use too much water (more than necessary)? a. Yes b. No

38. What types of energy do you use for cooking food?

a. Electricity b. power saving stoves c. kerosene gas

d. cylinder gas e. normal charcoal stove f. Others (specify)

39. When the vegetation cover is removed, all of the following happens expect? a. soil erosion b. a change in climate

c. Loss of biodiversity d. an increase agricultural product

40.. Which of the following frequently occurs in Ethiopia?

a. Earth quake c. drought

b. Volcanic eruption d. all

41. What is the cause of deforestation?

a. poverty b. Overpopulation c. Luck of awareness

d. Others (specify)

42 In Ethiopia, deforestation is caused by?

a. Charcoal production c. cultivation

b. Construction of infrastructure d. fire wood use

43. Most of the electrical energy used in Ethiopia is produced by:

a. Oil burning power plant c. Natural gas power plant

b. Hydropower plant d. Others (specify)

44. An example of a non- renewable energy is:

a. Petroleum b. water c. sunlight

45. How often do you talk about problem related to the environment?

a. Always b. sometimes c. never

46. Have you ever been a member of environmental club (organization)?

a. Yes b. No

47. How often do you visit parks?

a. Always b. sometimes c. never

48. In order to reduce our use of oil, people should be allowed to own only cars that have low petroleum consumption.

a. agree b. disagree

Section III

Familiarity with environmental concepts

Instruction: - After reading the following environmental concepts, put a tick mark (√) under heard if you heard only, under read if you read it, under never heard or read if you don't read or heard.

Environmental concept	Heard	Read	Never heard or read
- Ozone layer			
- Ecology			
- Green house effect			
- Biodiversity			
- Renewable energy			
- Climate change			
- Air pollution			
- Water pollution			
- Sustainable development			

Declarations

I, the undersigned, declare that this is my work and that all the sources of materials used for this thesis have been duly acknowledged.

Eleni Tenaw

Name of student

Signature

Yohannes Abera

Name of Advisor

Signature