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ASSESSING INDIVIDUAL'S PERCEPTION ON ENVIRONMENTAL EFFECTS OF USING FIRE WOOD IN DUTSIN-MA TOWN KATSINA STATE NIGERIA

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Abstract
This assessment study examines individual perception on the environmental effects of using fuel wood in Dutsin-ma town, Dutsin-ma Local Government Area, Katsina State, Nigeria. Data was collected through the use of structured questionnaire using random sampling method. The survey covered a sample population of 300 drawn from the five selected areas of: Uguwar Yandaka, Hayingada, Bakin and Tasha. The studied variables included the demographic characteristics of respondents including their ages, sex, educational attainment, family size and types of energy sources for homes. The result showed that of the respondents, 28% are secondary school students, 64% attained tertiary level of education, 84% households use fuel wood as source of energy, 54% due to affordability, 24% due to their large family size, 14% due to unavailability of substitutes and 6% base on cultural believes. 50% get firewood from market, 30% from near-by bushes and 20% from the forest, also 40 % attribute fuel wood health risk to burning sensations, 30% to eye irritation while 10% and 12% to asthma and other health issues. Also, 66% and 34% agree and disagree respectively with the notion of environmental consequences of fuelwood usage while 20% and 80% are concerned and unconcerned respectively. The research recommends the provision of cheap, clean and readily available energy substitutes while education and public enlightenment is stepped on the myriads of adverse associated with the use of fuel wood while working at achieving a banning its indiscriminate sale/use of fuel wood.

Key Word: *Assessment, Individual, Awareness, Environmental, Consequence, Fuelwood*

Introduction

Fuel wood energy demand and consumption is a popular phenomenon in Africa and most other developing countries. It remains the major source of domestic fuel as well as the main source of energy for the micro economic enterprises. Over the years, the demand

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and consumption of fuel wood has increased with increases in human population. As population increases, the indispensable nature of wood energy has resulted in increasing demand, supply as well as consumption in most countries although statistics on consumption rate varies from place to place. According to USAID (1992), daily consumption rate in the developing countries is equal to 21 million barrels of oil. Fuel wood consumption in Nigeria in the 1980s was estimated at 43 million metric tonnes per annum, giving a per capital consumption rate of 500kg (Morenikeji *et al*., 2006). Although the rate of consumption varies over space, the importance of fuel wood energy is tremendous such that Earl (1975) estimated the world consumption as greater than that from hydroelectric power, nuclear power and geothermal sources combined. The consumption of ecosystem services has exceeded the productive capacity of world's ecosystems by as much as 50%. However, the share of the biosphere's resources and ecosystem services consumed by humanity will continue to increase. Fuel wood consumption is a particularly important problem, since approximately half of the world's population uses fuel wood in their daily lives. Total average annual fuel wood production in developing countries increased approximately 16.5% over the past decade to about 1.55 billion cubic meters. (Food and Agriculture Organization, 2001).

Deforestation has many negative impacts on both the biodiversity and environment by leading to soil erosion and climate change among others. In Nigeria for example over ninety percent (90%) of the populace rely heavily on fuel wood for cooking, heating and provision of assorted energy needs. This has resulted to high rate of deforestation with various negative impacts on environment including erosion and climate change, which have come to represent major global concerns. The research aimed at assessing individuals' perceptions on the environmental and health hazard effects of utilizing fuel wood in the study area and explore key factors that contributes to choose of use of fuel wood in the study.

Human population is growing rapidly especially in developing countries. Environmental resources are over exploited in Nigeria without proper replacement of vegetation especially trees (National Bureau of Statistics, 2009). Fuel wood extraction has caused environmental degradation in the environment such as erosion, desertification (Nnaji, 2012). Most of the fuel wood extraction are largely in the rural areas and then sold to people in other areas. These fuel woods demands are mostly deployed for domestic/commercial uses such as cooking in homes and food processing industries such as restaurants and bakeries. As ubiquitous and deep seated as the challenge fuel wood is particularly in developing countries of the world, mitigating remedies to address the problems must include the provision of alternative energy sources such as electricity generation from hydro, gas and solar plants that is good, stable and very accessible. Other alternative includes the availability and affordability of household and industrial LPG cylinders as well as solar panels/accessories. This research gives clear view on the environmental effect of using fuel wood in Dutsin-ma town and provides strategies for tackling the many challenges it engenders.

Theoretical Framework

Hubert Peak (1959) theory has been used as the framework of the research. The theory is named after American Geologist M. King Hubert which states that for any given geographical area, from individual oil producing region to the planet as a whole, the rate of petroleum production tends to follow a bell-shaped curve. (Peebles *et al*., 2017) This theory can be applied to fuel wood extraction and utilization which is one of many natural resources. When a forest is discovered, deforestation will commence to satisfy utilization demand of fuel wood for home and other uses. The harvesting of fuel wood will be slowly reducing the forest resource (wood) at which point, the extraction yield will begin to decline; this will eventually in fuel wood scarcity and the forested area is transformed into to non- forested area which exposes the land to various precipitous environmental degradation such as erosion and desertification. This is explanation is a key link between fuel wood consumption and desert encroachments issues of Northern Nigeria.

Theoretical Linkages between Fuel wood Adoption in Developing Countries

Based on extraction and utilization of wood or deforestation, countries are classified into two:

Many countries have a rapid population growth, which adds greater pressure to their often-meagre resources, and lack the capital and technology to develop or buy alternative resources. Moreover, wood remains the preferred energy source for most urban households in the capital of Burkina Faso. The demand for wood energy is closely linked to the household income. The utilization of fuel wood is reduced by increasing household income (Ouedraogo, 2006).

In China, fuel wood and coal are major sources of energy for rural households, particularly in poor areas. In combination with population and economic growth, the increased use of firewood leads to deforestation. A survey conducted in a poor rural area of China showed that households with more educated members consume less fuel wood (Chen *et al*., 2006).

In Lithuania, the wood is the main energy source for the population living in suburbs, small towns and villages. Lithuanian households increased over the last decade the consumption offuel wood five times (Mizaraite *et al*., 2007).A survey conducted in a rural area of Bangladesh showed that the number of family members, income, rate and hours of cooking affect the quantity of fuel wood used per household per year (Miah *et al*., 2009).

In Maputo, Mozambique, consumers are increasingly using fuel wood and make better use of different combinations of energy sources. Household consumers are generally the largest consumers of fuel wood. In Sokoto town in north western Nigeria for example, family income, type of dwelling house and convenience determine the type of cooking fuel used where greater percent use fuel wood. In research conducted in 1986, it was shown that 62% used fuel wood, 26% kerosene, 10% gas and 2% electricity. Some 70% of fuel wood consumers indicated their willingness to change to kerosene if the price of fuel wood continued to rise (Nnaji *et al*., 2012).

People in developing countries use wood predominantly for fuel wood and charcoal rather than for industrial energy.

Increased energy price in the developed world has caused a slight increase in industrial countries that consume large quantities of wood and world wood consumption increased by 67% between 1963 and 1983 (Olusegun *et al*., 2000).

Currently, about half of all wood harvested each year world-wide is used as fuel. Eighty – five percent (85%) of that fuel is harvested in developing countries, whereas three-quarters of all industrial round wood (lumber, poles, beams and building materials) is harvested and consumed in developed countries. The poorest countries such as Ethiopia, Bhutan, Burundi and Bangladesh depend on biomass for 90 percent of their energy. Often the harvest is sustainable, consisting of deadwood, branches, trimmings and shrubs. In Pakistan, for example, some 4.4 million tons of twigs and branches and 7.7 million tons of shrubs and crop residue are consumed as fuel each year with destruction of very few living trees (William and Cunningham, 2006).

Evans (1982) stated that world consumption of wood was forecasted by the year 2000 to be 2000 million m^3 of industrial wood, 1500-2000 million m^3 of fuel and other domestic wood uses. By 2030 industrial wood consumption each year is expected to have risen to 2600 million m^3. Even at a level of consumption of 4000 million m^3 it would take 75 years to use up the world's resource of wood, and this assumes no increment, no regeneration and no planting at all.

1. Eighty to Ninety percent of the wood removed from tropical forests is used for fuel; 80 percent of this for cooking and heating homes;
2. One-and-a-half billion people depend on wood for more than 90 percent of their energy needs;
3. An additional 1 billion people depend on wood for 50 to 90 percent for their energy needs;
4. One-half of the world's population relies on wood as primary energy source;
5. One-and-a-half billion people are cutting more fuel wood annually than the annual growth rates of forests in their country;
6. One hundred million people now face an acute scarcity of fuel wood; and
7. About 11.3 million hectares or 28 million acres are now being deforested annually.

Although Nigeria is a wealthy country in terms of human and natural resources, its social and economic development is quite slow. This fact can be illustrated by the country's high level of poverty, lack of basic social infrastructure and above all, the indisputably high level of corruption. For example, about 65 percent of the country's approximately 160 million people are living below the poverty line (on less than US$1.25 a day) (United Nations Development Programme UNDP, 2010: p. 162). A UNDP report further confirmed that the poverty figure in Nigeria (over 90 million people), is higher than the combined population of 10 other West African nations excluding Ghana and Cote D'Ivoire.

The country is ranked 139 on the list of 176 countries in terms of corruption (Transparency International, 2012).) In a Punch newspaper edition of January 31st, 2013, reported how the country struggled in 2012 to generate even 5,000 megawatts (MW) of electricity for its 160 million population, as compared to at least 40,000 MW, which is required to sustain the basic needs of such a population (UNDP, 2010). The electricity generating figures suggest

that Nigeria produces less than half of the Ghanaian average, nine times less than the African average, and 22 times less than the world average (Sambo, 2008). As Sambo (2008b) has indicated, the electricity sector in the country would require an annual investment of more than US$ 6.46 billion to meet the UNDP's (2010) requirements. This is unlikely to happen in the near future, given the level of corruption in the country (Kar and Freitas, 2012).

Methodology

Study Area

Dutsin-Ma Local Government Area is located at the central part of Katsina state, and lies between latitude 12°26'North and longitude 07°29'East. (Abaje *et al*., 2012) It is bounded by Kurfi and Charanchi Local Government Areas to the north, Kankia Local Government Area to the east, Safana and Dan-Musa Local Government Areas to the west, and Matazu Local Government Area to the southeast (Figure 1). Dutsin-Ma Local Government Area has a land size of about 552.323 km^2.The people of Dutsin-ma are predominantly farmers, cattle rearers and traders. The climate of Dutsin-ma LGA is the tropical wet and dry type (tropical continental climate) classified by Koppen as Aw climate. Rainfall is between May and September with a peak in August. The average annual rainfall is about 700 mm. The pattern of rainfall in the area is highly variable. This can result in severe and widespread droughts that can impose serious socio-economic constraints (Abaje *et al*., 2013). The mean annual temperature ranges from 29 - 31°C. The highest air temperature normally occurs in April/May and the lowest in December through February. Evapo-transpiration is generally high throughout the year. The highest amount of evaporation occurs during the dry season. The vegetation of the area is the Sudan Savanna type which combines the characteristics and species of both the Guinea and Sahel Savanna (Tukur *et al*., 2013)

The vegetation of the area is sudano - sahelian types with predominantly grass and few scattered trees. The study area lies within the sudan savanna vegetation dominated mostly by fine leave Acaciaspecies and their associates such as African baobab (Adonsoniadigitata), the African locust bean (parkia bigloboza), African birch (Anogussum leiocara), red kapok tree(bombax costatum),The common shrubs species include Kirni (*Bridelia ferruginia*), *Gardenia* spp, (Tukur *et al*., 2013). Also there is flood plain grass along Zobe Dam. Also people of Dutsin-ma engage in agricultural practices due to the nature of their soil. Most of the farming is subsistence farming and few of them are commercial farmers, mostly they practice irrigation farming. (Sokoto Rima River Basin Development Authority (SRBDA), 2000).

Dutsin-ma town has a projected population of 118, 234 people in the year 2020 (Primary Healthcare, 2020). People of Dutsin-ma are predominantly farmers. Dutsin-ma town residence is a low middle-income community with poor industrial activities despite the local agricultural practices (subsistence farming).

The major socio-economic activities of Dutsin-ma town includes, trading, irrigation, fishing, marketing of agricultural output, and transportation of people, commodities and services from one place to another.

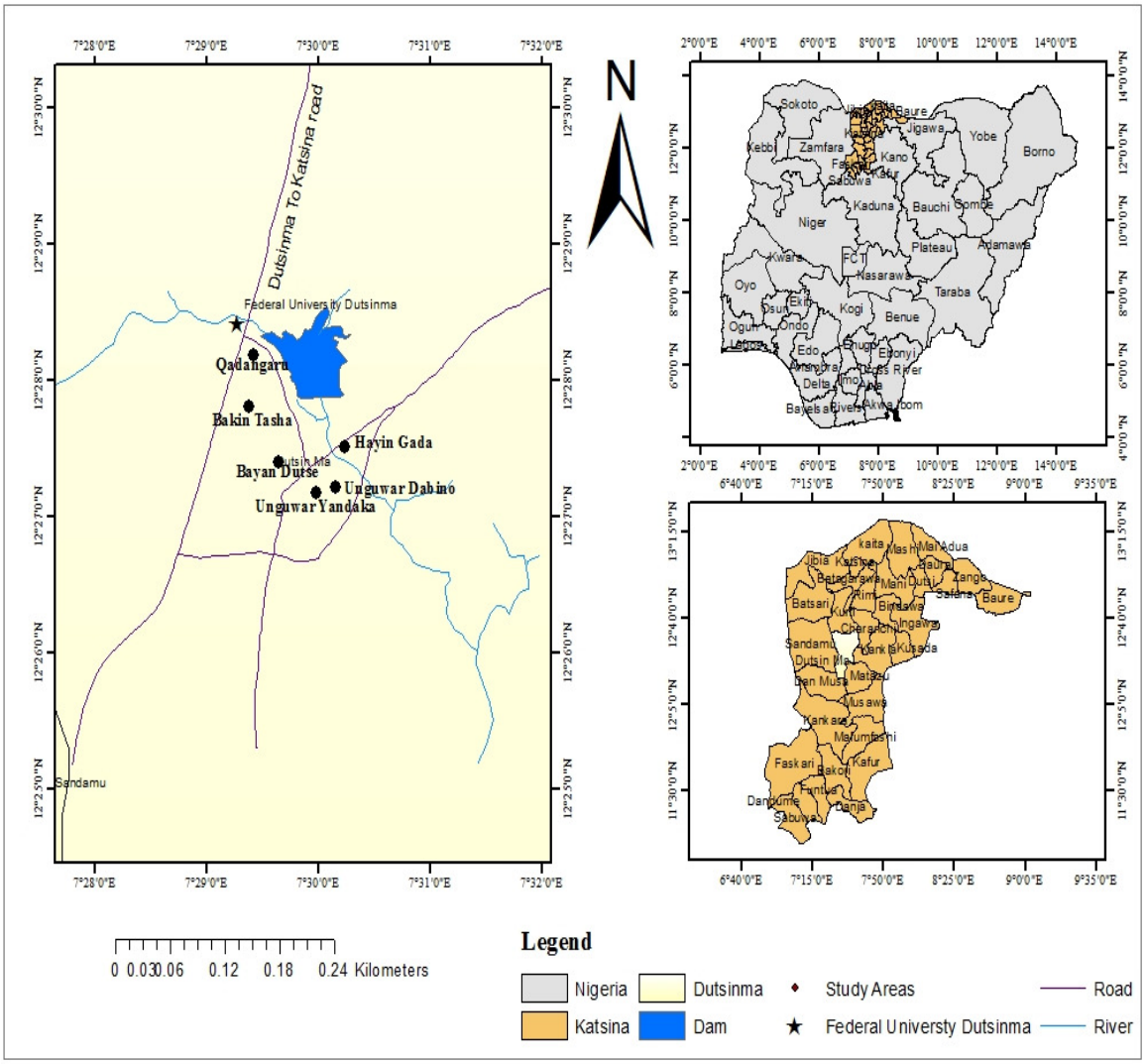

Fig. 1: Map of Dutsin-ma town showing the study area

Data Collection

Two main sources were used for the collection of data for this study. They are the primary and secondary sources. The primary source was through the administration of copies of a questionnaire. The secondary data were obtained through archival and published materials.

The population size of the study area under consideration is large; it is therefore not possible to cover the entire population due to the constraints of time, finance, socio-economic and human factors. A structured questionnaire was designed for this study. Respondents were farmers of 19 – 55 years of age. Data about the respondents Age, Sex, Educational level,

Type of farm practice, Socio-economic activities, the sample was taking from the firewood selling point, using Purposive Random sampling technique.

Data Analysis

The quantitative data collected were presented in a tabular form displaying frequency distribution and percentages calculated with the aid of using the Statistical Package for Social Science application (SPSS). The qualitative data were presented in a narrative statement.

Results and Discussion

Table 1 below shows the sex of the respondents, males constitute (66%) while female constitutes (34%). Figure 2 shows the age of the respondents, those with age range from 26-35years constitutes (46%), respondents with age ranges of 36-45 years one made up of (20%), age group 46 years and above and 18-25 years with (18%) and (16%) respectively. This result is supported with the study of Tee *et al.* (2015) where the gender composition of respondents was male dominated (62.73%). Most respondents (56.36%) were within the productive age range of 20-40 years with majority of the households (80.00%) being large; comprising at least six dependants upwards.

Table 1 Sex composition of the respondents

Sex	Frequency	Percentage (%)
Male	66	66 %
Female	34	34%
Total	100	100%

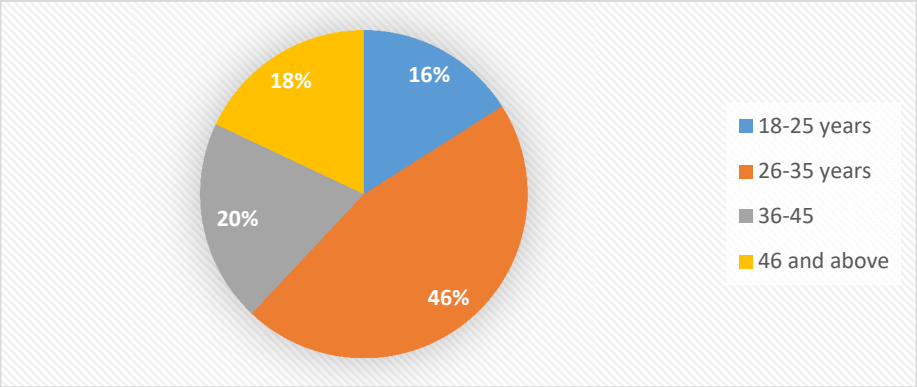

Fig. 2: Age Composition of the Respondents

Table 3 reveals the level of education of the respondents, those with secondary education constitute (28%), the majority of the respondents had or are still pursuing tertiary education (64%) and those with no formal education had no response. According to Mutalova and New (2002), men in urban areas generally have a higher level of education than their rural counterparts: 22% compared with 11% having some university-level education or higher.

Table 2: level of education of the respondents

Level of Education	Frequency	Percentage %
Primary	8	8 %
Secondary	28	28 %
Tertiary	64	64 %
Non formal education	No response	0 %
Total	100	100 %

Izekor and Amiandamhen (2017) found out that the results from the various forms of energy utilized within the study area revealed that majority of respondents indicating 50% of the population depends on fuelwood as source of domestic energy. While this study discovered 86% of the respondents use fuelwood as a source of energy in their households while 14% indicated that they do not use fuelwood in their households as shown in figure 3 below.

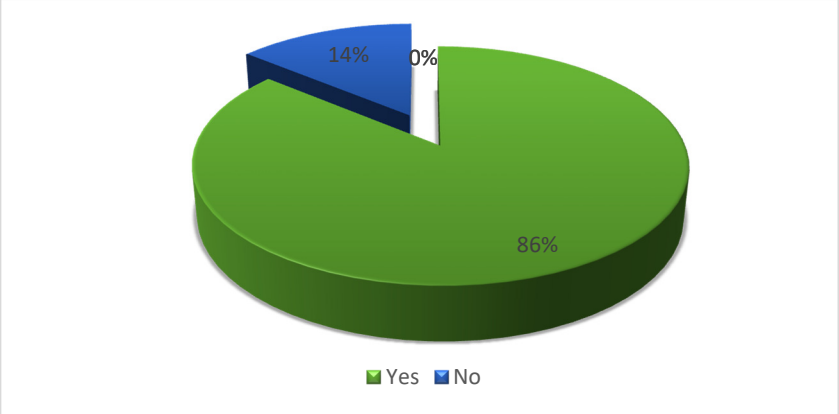

Fig. 3: Fuelwood as a Source of Energy for Household

Izekor and Amiandamhen (2017), discovered in their study 30% of respondents that utilize fuelwood preferred fuelwood due to its relative cheapness, 49.5% of the respondents prefers fuel wood to other energy sources due to its ability to cook faster while 12% of the respondents prefer fuel wood because of its ready availability. However, 8.5% of the respondents that utilize fuelwood preferred it due to high prices of alternative energy sources such as kerosene, gas, electricity etc. While in this study the 54% of the respondents used fuelwood due to its affordability, 24% of the respondents indicated their large family size is the reason they choose to adopt fuel wood as a source of energy in their households. 14% and 6% indicated unavailability of other substitutes and cultural believes as the reason they use fuel wood respectively as shown in table 3 below.

Table 3: Reasons for Using Fuelwood as Energy Source for Household

Reason	Frequency	Percentage %
Affordability	54	54 %
Culture	6	6 %
Large family size	24	24 %
Unavailability of other substitute	14	14 %
Others	No response	0
Total	100	100 %

Maina *et al*. (2020) revealed that both the rural and urban households fetched their fuelwood from four sources own wood, unfarmed areas, forest and from around the community area. In this study the respondent's access fire wood in various ways. 50% get fire wood from market, 30% get from nearby by bushes and 20% from nearby forest. Fire wood are mostly purchased by the respondents as shown in table 4 below.

Table 4 Source of Fuel wood for Household

Access	Frequency	Percentage %
Market	50	50 %
Nearby bushes	30	30 %
Nearby forest	20	20 %
Total	100	100 %

Childhood respiratory infections such as pneumonia and otitis media have been highly associated with fuel wood combustion. Among women, there is a high association between fuelwood combustion and high risk of chronic bronchitis and chronic obstructive pulmonary disease, especially asthma and cataract. Indoor combustion of fuelwood has been called the 'kitchen killer' because about 1.6 million deaths have been registered as a result, accounting for 2.7% of global disease burden (WHO, 2007). The figure below shows, health risks of using fuelwood, 40% of the respondents being the majority indicated that burning sensations are the health risk involved in using fuelwood, followed by (38%) that believed that the risk involved is eye irritation. 10% and 12% of the respondents indicated that asthma and other health risk are attributed to using fuelwood in the study area (Heltberg *et al.* (2000), Rudel (2005)).

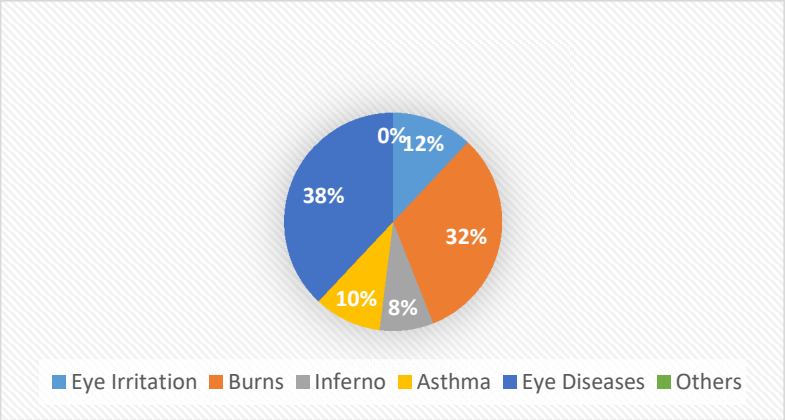

Fig. 4: Associated Health Risk with Fuel Wood Usage

However, the consumption of firewood has some negative influence on the environment beyond its sustainable use such as a complex deforestation), de Shebinin *et al*. (2007), Defies *et al*. (2010) loss of biodiversity and soil erosion. Metz *et al.* (1990) additionally, when these problems persist, desert encroachment is inevitable (Osu *et al.,* 2016).

Environmental consequence associated with the use of fuelwood in the study area, (66%) of the respondents believed that there are no Environmental consequences attributed with the use of fuelwood in the study area, while (34%) indicated there are environmental consequences associated with the use of fuelwood as a source of domestic energy as shown in figure 5 below.

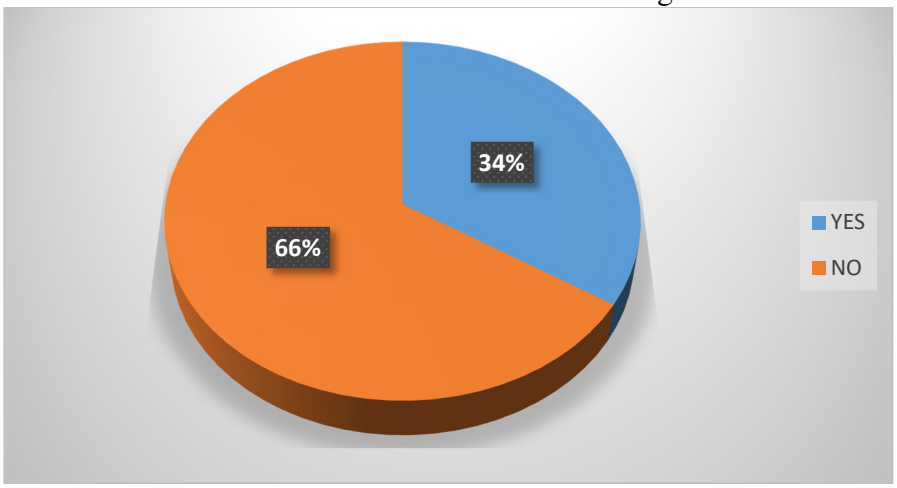

Fig. 5: Consequences for Using Fuel Wood

Consequently, (80%) of the respondents indicated that they are not worried over any Environmental consequence, if there is any, while (20%) indicated there are environmental consequences with the use of fuelwood as a source of domestic energy as shown in table 5 below.

Table 5: Individual Perception on the Treat and Risk Associated with Fuel Wood

Response	Frequency	Percentage %
Yes	20	20 %
No	80	80 %
Total	100	100 %

Conclusion

Environmental issues has increasingly occupy front burner global discus particularly as it concerns degradation and widespread resultant effects on man's wellbeing. Central to the raging debate is the nexus between steady depletion of the all-important ozone layer and its consequences for the general state of and continuous wellbeing of the biosphere. The crucial relevance of the forest of the world to atmospheric equilibrium has long been established as incontrovertible. The research aimed at assessing individual perceptions on the environmental effects of using fuel wood in the study area. The objectives of the study include: to analyze individuals' perception on environmental consequences of adopting fire wood, to identify peoples perceived health hazard of using fire wood in the study area, explore key factors that contributes to adoption of fire wood and strategic measures to mitigate the use of fuel wood usage in the study as, nodoubt, fuel wood is the major source of domestic energy in the study area. The results obtained showed that majority of the respondents are unaware of the diverse consequences of using fuel wood. Finally, Households depends on fuel wood because of affordability and the large nature of their households and the absence of alternative sources of energy.

Recommendations

Based on the findings of this research, the following are recommendations can be proffered:

- There should be provision of cheap and clean energy substitutes by the government and should be made readily available to the people.
- The government should step up on educating and enlightening the public using its agencies to carry out campaigns and programs on the consequences of the use of fuel wood.
- The government should ultimately place a ban on the indiscriminate sale/use of fuel wood.

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