

Assessment of rural household energy access, utilization and sustainability: a case of Mbuyu sub-location of Nyandarua District, Kenya

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The purpose of this study was to assess the rural household energy access, utilization and sustainability in Mbuyu sub-location of Nyandarua District, Kenya. The objectives of the study included: to identify the type of household energy sources used in the study area; to establish the challenges faced in accessing household energy sources; determine various energy efficient technologies utilized by the rural households; determine the constraints towards energy sustainability and to establish interventions for energy sustainability. The study was based on the family system theory by Deacon and Firebaugh (1988). Systematic random sampling technique was used to select a sample of 136 households from the accessible population of 1,367 households from which data was collected. Data collection instruments included interview schedules and observation checklist. Descriptive statistics and cross tabulations were used to analyze quantitative data. Inferential statistics such as Pearson correlation and chi-square were used to test the hypotheses. Data was presented using graphs, charts, means and percentages. Results showed that firewood was the most common source of energy, (95.6%) for cooking. Charcoal was predominant in space heating (71.3%) while kerosene was used by 94.9% of the respondents for lighting. Other sources included solar, biogas and agricultural residues. Challenges in access to energy sources included: frequent price hikes, shortage in market supply especially for the gas (LPG) and kerosene and fear of wildlife attacks and rapes in the forest during firewood collection. Results from Pearson product moment correlation test revealed significant correlation between household income and the expenses of energy used ($r=0.371$, $p=0.001$). Chi-square test results showed a statistically significant relationship in energy efficiency awareness between the male and female respondents ($\chi^2=5.013$, $df=1$; $p=0.025$). The study concluded that access to household energy sources demanded valuable time, money and physical energy. Adoption of energy efficient technologies like solar, biogas and raised hearth was very low with 4.4%, 0.7% and 33.1 % respectively. This was due to installation costs and lack of awareness of the new technologies. It was established that limited interventions for energy sustainability existed. The study recommended the creation of awareness of energy efficient technologies to improve energy saving, time and labour in rural households, use of alternative sources of energy like briquettes for space heating instead of charcoal, and activities such as agro-forestry and afforestation should be encouraged and supported to provide fuel wood, to conserve the environment and to mitigate the effects of global warming.