

## THE SUSTAINABILITY OF RURAL MALAWI HOUSEHOLDS' ENERGY CONSUMPTION PRACTICES AMIDST PREVAILING SOCIO-ECONOMIC CONDITIONS

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### ABSTRACT

In rural Malawi, household dependence on fuelwood as a form of energy and as a source of income is contributing to alarming rates of deforestation with detrimental climate change consequences. The research aimed to generate empirical evidence of household energy consumption practices that are fundamentally part of their lifestyles, as well as their consciousness of sustainable consumption practices and their discursive consciousness concerning climate change. This study was conducted in the form of a survey and gathered evidence from two of the more densely populated rural areas in the southern part of Malawi. The quantitative survey was conducted in personal interview format among 231 non-randomly sampled households across the two districts. The results show that fuelwood and biomass are still the predominant sources of energy for diverse household activities, mostly due to accessibility and affordability. Females predominantly perform the tedious task of wood gathering from nearby woodlots and forests, which negatively influences the time they can devote to their families. Households' practical consciousness of sustainable energy consumption practices seemed fairly good and their discursive consciousness, specifically with regard to the effect of climate change on rainfall patterns, and micro and macro factors that are responsible for climate change, was fairly impressive. This probably resulted from their first-hand experience of local environmental challenges in recent years. Lack of knowledge concerning the implications of their current behaviour for the country's economic growth confirms the complexity of a phenomenon that citizens find difficult to comprehend. Concerted

effort is thus required by both local and national government bodies to educate and empower communities socially and economically, and also to support them in the use of safer sources of energy. Results showed that rural Malawi households' current consumption of wood and less desirable energy sources is largely beyond their control.

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**SOCIOECONOMIC CHALLENGES FOR HOUSEHOLDS IN RURAL MALAWI**

Malawi is one of the countries in Sub-Saharan Africa that have been severely affected by climate change in recent years. Dry spells, seasonal droughts, intense rainfall and flooding (Fiorenza, Jangda, Malcomb and Mao, 2013) have had devastating consequences for the energy sources used in these countries. This includes a reduction in water flow to the major hydropower dams crucial for energy production, as well as a decline in the biomass sources commonly used as an affordable, accessible source of household energy. Energy provision in Africa remains critical. World Bank data indicate that in 2017, an estimated 16% of the world's population still did not have access to electricity (Malawi Power Africa Fact Sheet, 2017). In 2013, almost 95% of households that did not have electricity lived in Sub-Saharan Africa – including Malawi – and Asian developing countries (Javadi, Rismanchi, Saffar, Afshar, Saidur, Ping & Rahim, 2013). Apart from structural challenges with regard to the generation of electricity in Malawi specifically, the energy supply is in general unreliable and expensive (Hailu, 2012). The future scenario for Malawi therefore seems bleak as a more reliable and sustainable energy supply for the country seems unlikely due to lack of financial resources to upgrade and expand the existing electricity supply. Research that could provide some understanding of households' energy needs and their capacity to adapt and improve future prospects is therefore long overdue.

Indisputably, energy is a critical resource and a

cornerstone of the economic and social development of any country, as it facilitates vital services that could improve the quality of life (Adkins, Eapen, Kaluwize, Nair and Modi, 2010; Kowsari and Zerriffi, 2011). The provision of adequate, reliable and affordable energy is thus a precondition for meeting basic human needs (Bhattacharyya, 2012). There is accordingly general consensus that none of the Millennium Development Goals (MDGs) focusing on poverty alleviation (Amigun, Musango and Stafford, 2011) are achievable without the availability of adequate and affordable energy (Sovacool, 2012). This explains why issues of sustainability and the reduction of energy poverty have become prominent matters in the public policy agenda (Pachauri and Spreng, 2011).

Malawi, which is the focus of this study, is a landlocked country in south-eastern Africa, bordered by Tanzania to the north, Zambia to the west and Mozambique to the south and east. Malawi's economy is heavily dominated by agriculture (Jumbe, 2004; Wood and Moriniere, 2013; Chirambo, 2016) which provides 85% of the population's employment and contributes 35% of the country's GDP. It is a very poor country with 50% of its population living on less than 2 USD per person per day (Zalengera *et al.*, 2014). It is one of the least developed countries in the world, lacking sufficient domestic resources and institutional capacity to address climate change-related challenges effectively (Fiorenza *et al.*, 2013).

The Malawian population grew from 13 million in 2008 to 19,8 million in 2019, with 83,2% living in rural areas (Worldometer, 2019). The country's population growth is described as unmanageable, as the population has quadrupled over the past forty years (World population review, 2019). As a direct consequence, the country's need for agricultural production and its demand for energy sources (mostly firewood and charcoal) have escalated. This has detrimental implications such as a further increases in deforestation considering households' reliance on fuelwood for their energy needs - particularly in rural areas. Another dilemma is that the fuelwood and charcoal industries in Malawi provide much-

needed employment, confirming the importance of fuelwood and forests in the context of household survival (Openshaw, 2010). Balaka and Phalombe, the two rural areas that were targeted in this study, are located in the southern region and were included because they are relatively densely populated, which made it easier for researcher access to households to conduct the survey.

A report of the International Energy Agency report (IEA, 2017) acknowledges that energy poverty encompassing lack of access to electricity has the unfortunate consequence that households have no alternative and rely on affordable and accessible traditional biomass fuels for most of their energy needs. In Malawi, only 10,8% urban, and 1% of rural households are connected to the electricity grid, which is supplied and operated by the state-owned Electricity Supply Corporation of Malawi (ESCOM) (Malawi Power Africa Fact Sheet, 2019). However, rural Malawi households mostly still depend on fuelwood for their energy needs because even those that can afford to be connected to the grid, often have to deal with an intermittent electricity supply (Zalengera *et al.*, 2014).

### RESEARCH PROBLEM AND CONTRIBUTION OF THE STUDY

The growing consumption of fuelwood by households in Malawi, as a form of energy for household use and as a source of income, is placing immense pressure on forests and woodlands around villages, and in other communities, causing deforestation with detrimental climate consequences (Shackleton, Shackleton and Cousins, 2001; Ngwira and Watanabe, 2019). The problem is exacerbated by a general lack of controlled access to forest areas, as well as poor management and lack of coordination between local and traditional governance in terms of the management of local woodlands and forests. Consequently, Malawi is losing up to 2,8% of its forests annually, which reduced the country's land surface forest cover by 13% between 1990 and 2005: this was principally due to household demand for

fuelwood (Stringer, Dougill, Dyer, Kalaba and Mngoli, 2012). While fuelwood consumption is an integral part of the Malawian rural social context, it is unfortunately not clear how informed households are about the consequences of this. What complicates matters further, is that deforestation is forcing households to travel longer distances to get the fuelwood that they need. In the end, any behavioural change that is recommended, such as the use of alternative energy sources, will have financial implications that households can ill afford. Theoretically, households will be expected to make sacrifices for the sake of a higher order need, namely, to save and preserve global/natural resources while their own basic needs are unmet. Inescapably, this is an idea that poor communities may struggle to comprehend. In addition, it will be unreasonable to expect of poor communities, who are already struggling to cope with limited resources, to make sacrifices that will further complicate their lives. Without empirical evidence of households' prevailing energy consumption practices, and the probability that they could make sacrifices or adapt existing behaviour, it would be difficult to convince the Malawi Government to make climate change the primary issue on their agenda or encourage households to use alternative energy sources to curb further deforestation. An analysis of household energy consumption practices in rural areas of Malawi - where the majority of the population is located (Taulo, Gondwe and Sebitosi, 2015) - will enable an understanding of the practical challenges that households encounter on a daily basis with regard to their basic energy needs. Accordingly, context-specific recommendations could be made for the adoption of more sustainable energy consumption practices. The study hence focused on selected rural areas in southern Malawi, namely Balaka and Phalombe and aimed to generate empirical evidence of households' energy consumption practices as a consequence of their socioeconomic conditions and the way of life that they are accustomed to. As prerequisites for facilitating and promoting behavioural change among these households, the study further aimed to gather evidence of households' practical and discursive consciousness concerning what sustainable

consumption practices and climate change entail and imply.

The following section provides an overview of the theoretical perspective that guided the research in terms of the literature review, the formulation of objectives and the interpretation of results that were derived from the data.

## THEORETICAL PERSPECTIVE

The formulation of research objectives, design of the measuring instrument, as well as the interpretation of data and formulation of the findings were guided by the principles of Giddens' (1984:346) structuration theory. As a social theory, it allowed a study of the relationship between the practices of households as the so-called human actors within existing social systems. This entailed the study of the interaction between agency (households) and structure (the community and related establishments), and how this interaction shapes everyday household practices (Middlemiss, 2011:1158). Structuration theory can be explained in terms of a social cycle in which agents and structures mutually endorse particular social systems as part of a duality, whilst continually reflecting on particular social practices. In the case of this investigation, household energy consumption practices would therefore not occur in isolation, but rather reflect what is accepted and acknowledged in a particular context as the way of life. Social practices hence constitute the way in which households operate. Thus the structure, logic and interaction within the particular social system are replicated over time in the particular context. In essence, set structures represent the rules that apply within a social community (in this instance, the rural area in Malawi) and the resources at their disposal (that are rooted in agents' memory) and provide frameworks for how they operate (their social practices) in that particular social system (Giddens, 1984:346; Spaargaren, 2003).

According to structuration theory, household practices are not simply ordinary acts but constitute habits and practices that constantly

recreate the social ordering depending on their circumstances (Hobson, 2003). Identifiable routine practices reflect consumers' "hidden" knowledge (thus their practical consciousness) that culminates as habits that constitute daily, almost automated, activities and decisions that are made without constantly contemplating an issue before acting (Middlemiss, 2011:1157, 1158). The awareness with which individuals think and talk, thus their ability to explain what they are doing and why, indicates their discursive consciousness. It signifies a body of understanding that is anchored in knowledge, values and experience, which reflect people's concerns and understanding of specific phenomena such as what sustainable energy consumption practices entail, or what global warming means and implies (Hobson, 2003; Middlemiss, 2011:1157, 1158).

## CONCEPTUAL BACKGROUND

### Negative consequences associated with the use of certain energy sources

A 2011 study conducted in Malawi identified forest reserves as the country's second most important source of fuelwood, contributing to 26% of the country's total energy consumption (Jumbe and Angelsen, 2011). Malawi's forest resources have gradually declined from a 50% land cover in the 1960s to 34% in 2010 (Saka, Siable, Hachigonta and Thomas, 2012). Over time, the annual rate of deforestation has averaged approximately 2,3% loss in forest cover (Mauambeta, Chitedze and Mumba, 2010). This net loss of up to 40 000 hectares per year is the highest deforestation rate in the Southern African Development Community (SADC) region (Ngwira and Watanabe, 2019). Rural households in Malawi rely on fuelwood for nearly all their energy needs. On the other hand, urban and semi-urban households have increasingly turned to charcoal, which unfortunately does not necessarily improve the predicament of air pollution and deforestation because charcoal is also produced from wood (Jumbe and Angelsen, 2011).

As deforestation increases, households have to walk longer distances to collect wood and have to pay more for the charcoal and firewood sold nearby. The only other alternative is to use accessible biomass for cooking and heating purposes (Openshaw, 2010), even though the use of biomass is associated with dangerous indoor air pollution (Gamula, Hui and Peng, 2013). The smoke from burning biomass fuels contain high concentrations of particulate matter, carbon monoxide and other pollutants that are blamed for increased rates of infant mortality and respiratory disease. Worldwide, more than 4,3 million people, mostly women and children, die annually from inhaling the noxious fumes produced by biomass and coal (Burke and Dundas, 2015; WHO 2014). Biomass is the last resort when other forms of energy are not available or too expensive. It creates a lot of smoke and extends the cooking times.

According to Zhang and Smith (2007), when crop residues are burnt for one hour, which typically occurs when cooking or heating water, carbon monoxide (CO) concentrations of 241 parts per million (ppm) are produced. This exceeds the maximum exposure limit of 30 ppm recommended by the World Health Organization (WHO) Air Quality Guidelines (WHO, 1999). The WHO refers to this practice as the single leading environmental risk factor in terms of female mortality rates in developing countries, causing 5% of all female deaths resulting from the inhalation of indoor smoke (Miller and Mobarak, 2013). Deaths caused by indoor air pollution are reported to exceed those caused by malaria and tuberculosis (International Energy Agency, 2017; WHO, 2006). Furthermore, indoor pollution can cause acute respiratory infections, tuberculosis, chronic respiratory diseases, lung cancer, cardiovascular disease, asthma, low birth weights, diseases of the eye and adverse pregnancy outcomes (Sovacool, 2012). It is projected that between 2005 and 2030, 10 million women and children will die from the inhalation of smoke produced by cooking stoves in Sub-Saharan Africa apart from also being exposed to health-related risks during the burdensome and time-intensive process of collecting fuelwood (Sovacool, 2012). In tobacco growing areas of Malawi, tobacco stems are

often used for cooking, with even more devastating health consequences – especially for infants who are carried on their mothers' backs while they are cooking and tending fires (Jantunen, Jaakkola and Krzyzanowski, 1997).

Increased household reliance on biomass collected from agricultural lands moreover enhances soil erosion and deprives livestock of fodder, threatening agricultural productivity particularly for farmers who cannot afford chemical fertilisers, and who rely on crop residues as compost to replenish soil nutrients (Heltberg, 2005).

### **Energy consumption and economic growth**

Economic growth, especially during the European Industrial Revolution in the 18th and 19th centuries, marked the rise of fossil fuels to replace the fuelwood that was previously the most important source of energy. Knight and Rosa (2012) explain that over the following centuries, the use of alternative fuels in developed countries eventually reduced the use of fuelwood and charcoal as a basic form of energy to as low as 1 to 2%. However, this still stands at up to 80% in developing countries (Fisher, Chaudhury, and McCusker, 2010). In Malawi, Mozambique, Tanzania and Zambia, charcoal is produced from the Miombo woodlands (Syampungani, Chirwa, Akinnifesi, Sileshi, and Ajayi, 2009). These woodlands are therefore very important for the livelihoods of the people in terms of their household consumption, as well as a source of income when the wood is harvested to be sold in urban areas. The demand for fuelwood is, however, not restricted to rural households in developing countries. Lower income urban households also consume fuelwood when they do not have access to, or cannot afford alternative energy sources such as gas which is part of the existing energy mix. The energy sources used by households and industries in urban areas are accessed in a hierarchy, starting from fuelwood at the bottom, through charcoal, kerosene and gas, to electricity as the ultimate source. People generally progress through these levels as their income increases (Brouwer and Falcão, 2004). Charcoal is seldom used in rural areas where

wood can be obtained for free, but it is quite popular among higher income urban households because it is lightweight and relatively smokeless (Brouwer and Falcão, 2004). The type and amount of energy eventually used by households is influenced by affordability and availability, household size and type, food consumption patterns (Gram-Hanssen, 2010), the geographic location of the household – whether rural or urban (Ekholm, Krey, Pachauri and Riahi, 2010) - and the presence of inter-regional trade, as well as social and cultural factors (Tukker, Cohen, Hubacek and Mont, 2010; Waitt, Caputi, Gibson, Farbotko, Head, Gill and Stanes, 2012).

The impact of future climate variability on Malawi and its subsequent economic growth will depend on rural households' ability to adapt (Mukherjee and Benson, 2003; Devereux, 2006:2, 3), as well as progressive initiatives by political, social and economic institutions (Nangoma, 2007). Ultimately, curbing climate change in Malawi is also a development challenge (Brown International Advanced Research Institutes, 2011). Admittedly, Malawi has already undertaken several actions and projects to indicate its concerns about climate change. For instance, it is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) which was negotiated in 1992 at the United Nations Conference on Environment and Development. The country is also a signatory to the Convention on Biological Diversity (CBD), while the National Environmental Action Plan was developed in 1994 following the adverse effects of droughts and floods that were essentially attributed to climate change (Bie, Mkwambisi and Gomani, 2008). The Government of Malawi has adopted two primary strategies, namely, the National Adaptation Programme of Action to Climate Change (NAPA, 2006) and the Malawi Growth and Development Strategy (Malawi Growth Development Strategy, 2017), to mitigate climate change and to encourage sustainable development. The NAPA is a follow-up to the UNFCCC, which seeks to guide least developed countries to identify and prioritise critically important activities to mitigate the adverse effects of climate change in vulnerable areas of the country (Brown

International Advanced Research Institutes, 2011).

### **Strategies in Sub-Saharan Africa to address climate change**

Previous studies have shown that sometimes, rural households and governments optimise forests to mitigate the effect of climate inconsistencies. For example, in Senegal, which has experienced successive droughts since the 1970s, agroforestry is practised, using trees as windbreaks to help protect soil, create micro-climates for a variety of crops and to reduce desertification (Oxfam International Report, 2006). In drought-prone areas of north-eastern Nigeria, farmers intentionally protect trees on farms and in forests to manage biodiversity and to reduce desertification (Mortimore and Adams, 2001). As part of the NAPA, the government of Burkina Faso has initiated large-scale reforestation programmes, planting fast growing, drought tolerant trees to control desertification (Kalame, Nkem, Idinoba and Kanninen, 2009). In Kenya and Tanzania, six out of sixteen strategies for dealing with drought, entailed the planting and use of indigenous plant species that are generally available in their forests (Eriksen and Brown, 2011).

In 2003, the Malawian Department of Energy Affairs compiled a National Energy Policy to shift energy use away from traditional biomass toward modern energy sources. The aim was to reduce poverty, stimulate economic development and improve labour productivity (Government of Malawi, 2003:12). Unfortunately, the government's plans were jeopardised by monopolistic structures, under-developed services, poor management, lack of competition and cultural inertia, over-dependence on imported, expensive petroleum products, as well as over-dependence on fuelwood sourced from indigenous forests (Zalengera *et al.*, 2014). The 2003 Malawi Energy Policy stipulated that it would reduce the proportion of households using the highly inefficient three stone fireplaces to 50% by 2020. By contrast, the Malawi Biomass Energy strategy of 2009 admitted that fuelwood would remain the major source of energy for cooking in

the foreseeable future because alternative sources of energy were not yet readily available in Malawi (Kaunda, 2013; Zalengera *et al.*, 2014). Despite existing initiatives that are meant to improve the standard of living of the rural population in Malawi, which constitutes 85% of the country's population, only about 2% of the rural population have access to electricity. Moreover, those who have electricity have to bear with a very unstable electricity supply (Gamula *et al.*, 2013; Taulo *et al.*, 2015).

### RESEARCH AIM AND OBJECTIVES

The study focused on selected rural areas in southern Malawi, namely Balaka and Phalombe. It aimed to generate empirical evidence of household energy consumption practices as a consequence of their socioeconomic conditions and the way of life that they are accustomed to. As prerequisites for facilitating and promoting behavioural change among rural households, the study further aimed to gather evidence of households' practical and discursive consciousness concerning what sustainable consumption practices and climate change entail and imply. Simply stated, practical consciousness refers to the "how" of consumers' everyday consumption practices, while discursive consciousness, refers to "why" households act in a particular way (Hobson, 2003; Middlemiss, 2011).

Specific objectives were threefold, namely to:

1. investigate and discuss rural households' lifestyles, specifically relating to their daily energy consumption practices, attending to the origin and types of energy used for different activities, the associated financial implications, and household members' involvement in the acquisition of available energy sources.
2. investigate and discuss respondents' practical consciousness of sustainable energy consumption practices as that would eventually culminate in terms of responsible choices and thoughtful practices (or not) concerning the use of different energy sources.
3. examine and discuss respondents'

discursive consciousness, specifically their ability to explain their choice and consumption of different energy sources, in addition to the impact of their energy consumption on climate change.

### RESEARCH DESIGN AND METHODOLOGY

The quantitative survey that was conducted among the rural households in Malawi, is a typical cross sectional study that collected data, relevant to the selected context, at a specific point in time (Creswell, 2014:224). Logistical issues due to the spread of homes across the selected areas, and limited educational status of residents resulted in the survey being conducted in interview format using a structured questionnaire. Interviews were done by trained research assistants who were trained not to force or influence respondents, nor to interfere with responses, apart from ensuring that all the questions were answered and captured correctly. Evidence pertaining to particular issues that were relevant to achieve the anticipated outcomes of the investigation was collected, including selected demographic information and a description of household energy consumption practices, which constituted their lifestyles due to the impact of the availability and accessibility of energy sources on the way they live and interact socially. In addition, evidence was gathered on respondents' practical consciousness of environmental issues as demonstrated by their everyday energy consumption practices, as well as an understanding of the consequences of their energy consumption behaviour considering the sustainability of natural resources and climate change. The quantitative investigation allowed for data to be summarised and statistically analysed to potentially produce useful topics of discussion during negotiations with local governance and businesses who have the capacity to make a positive contribution in terms of household energy choices to address and hopefully improve the circumstances of rural households.

**Population and sample:** Urban households were targeted in the Phalombe (N = 272) and

Balaka (N = 280) districts, which are situated in the more densely populated southern regions in Malawi. They are also among the six districts in Malawi that have been most heavily affected by climate change (Nkomwa, Kalanda-Joshua, Ngongondo, Monjerezi and Chipungu, 2013).

**Measuring instrument:** The survey entailed a structured questionnaire, designed for completion in interview format. It distinguished measurable and common categories of constructs that are well defined in the literature and were meant to capture the perspectives and experiences of respondents in predetermined response categories (Winter, 2000), using easy-to-complete Likert-type or nominal scales. Numbers were assigned to indicate responses that could be summarised and statistically analysed. The sections included:

- A: Demographic characteristics, 8 questions (gender; age; education level; household size; income; marital status; area of residence; type of home);
- B: Lifestyle characteristics that reflected on households' energy consumption practices, 34 questions inquiring about the type of energy used for different activities, expenditure on energy sources, acquisition of fuelwood;
- C: Discursive consciousness about climate change and sustainable practices, 12 questions, adapted from Marx-Pienaar and Erasmus (2014);
- D: Practical consciousness of sustainable consumption practices, 25 self-developed questions that aimed to include a minimum of four items to cover each aspect of daily life in households that require the use of energy sources, namely cooking, heating, lighting, and socialising.

**Sample and sampling:** The sample sizes of the two relevant communities, the Phalombe and Balaka districts, constituted 272 and 280 households respectively. A non-random sampling procedure was used (Creswell, 2001:34), whereby research assistants targeted every second household in a particular social community, or at least half of the homes within a specific area, to recruit willing respondents for inclusion in the sample. For the purpose of

statistical analysis, a minimum of 100 households per area was envisaged, as well as inclusion of a more or less equal representation of both communities in the sample. The researcher and assistants invited the main decision makers in a selected household to participate in the inquiry and approached adjacent households whenever those that were initially targeted could not participate for whatever reason (Creswell, 2014:158). All the time, only willing households were included and respondents were allowed to withdraw at any point in time during the inquiry if they wished to do so. The final sample involved a total of 231 households, of which 113 were located in Phalombe, and 118 were from Balaka, which constituted 41,5% and 42,1% of the respective communities.

**Pretest and data collection:** The researcher trained teachers to act as research assistants (RAs), attending to the research objectives and design, proper data collection techniques, ethical issues such as sensitivity and confidentiality, as well as consistent administering of the questions (Creswell and Clark, 2011:179). The training included a pretest of the baseline questionnaire in close-by villages, with the intent to refine the questionnaire and to map out field logistics. Respondents selected for the pretest resembled those for the final study, namely, decision-makers of households, preferably adults, or an informed proxy (Creswell and Clark, 2011:189). Without exception, only females were available to respond when recruiting for the pretest as men were elsewhere to generate an income.

In the final survey, which took four months to complete at an approximate rate of six interviews per day, a total of 231 households (113 in Phalombe and 118 in Balaka) were interviewed. None of the willing respondents were able to complete the questionnaires independently. It should also be noted that mostly, only females were available for questioning as the men were working away from home to earn an income. The RAs requested that individuals who were mostly responsible for households' decisions concerning their use of energy sources, to participate in the survey.

Almost without exception, females were identified as the main decision-makers. Only a few men were available and willing to contribute. Apart from consulting with communities personally before data collection commenced, the researcher supervised and monitored the data collection process in person. The three RAs worked jointly in one village before moving on to another. At the end of every day, the questionnaires were coded and entered into SPSS for analysis by the researcher and one data entry assistant.

## DATA ANALYSIS

Descriptive analyses applied to the demographic and the lifestyle information included the calculation of frequencies, percentages, means and standard deviations to summarise the data quantitatively. Consumers' practical consciousness of sustainable energy consumption practices and their discursive consciousness about climate change were investigated through a combination of questions (items) that reflected on different dimensions of the respective phenomena in Sections C and D of the questionnaire. Responses to these questions were subjected to exploratory factor analysis (EFA) to distinguish pertinent factors/dimensions pertaining to the phenomena in the context of this study. SPSS was employed to perform the EFA, using principal component analysis as the extraction method, with oblimin rotation, and Kaiser normalisation. A scree plot with eigenvalues  $> 1$  were used to identify the number of factors/dimensions for each investigation, attending to relationship coefficients between the factors and variables (items) that sensibly distinguished coherent factors (Fricker, Kulzy and Appleget, 2012). The discrimination of the relevant dimensions for the two types of consciousness through the factorial procedures were followed by the calculation of Cronbach's alpha to verify the internal consistency of the dimensions of the respective scales (Santos, 1999), as well as the calculation of means to interpret the relevance of every dimension and related standard deviations.

## DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLE

The total sample size ( $N = 231$  households) included 113 from Phalombe and 118 from Balaka, represented by 225 females plus six males. The over representation of females is not surprising because men are mostly working away from home to generate income. Moreover, traditionally females are responsible for fuelwood collection. Therefore, they were more eligible and willing to respond to the questions about households' energy consumption practices. The six male respondents clearly indicated that they acted as willing proxies in the absence of the females in the selected households who were not at home at the time of the inquiry.

The respective mean ages for Phalombe and Balaka were 36,6 and 36,9 years, ranging from 16 to 81 and 15 to 85 years respectively. Respondents' level of education was relatively low: 88,7% across the sample had completed less than 10 years of formal schooling, including 25 (10,8%) who had only attended up to four years of schooling. Studies done elsewhere report that the education level of household members generally affects households energy choices, as higher education levels are associated with higher incomes, which improve access to, and the affordability of alternative energy sources (Rahut, Behera and Akhter, 2016). At a time when the exchange rate was 42 MK (Malawi Kwacha) to 1 ZAR (South African Rand), the mean monthly household incomes of the respondents were 15 500 MK (R369) and 40 250 MK (R958) in Balaka and Phalombe respectively, ranging from 1000 MK to 30 000 MK (Balaka) and 500 MK to 80 000 MK (Phalombe). Poverty is therefore rampant in rural Malawi as many households live below the poverty line, surviving on less than \$2 (R32) a day. The sample included 3,5% full-time employed, 36,4% part-time employed, 22,5% self-employed and 37,7% unemployed respondents. The average household size for both districts was 6,5 people.

## RESULTS

### Households' prevailing lifestyles

Lifestyle is defined as a way of living. On the one hand it influences, and on the other hand it reflects a household's consumption behaviour, including their consumption of energy sources (Spaargaren and Van Vliet, 2000). Contextually, a combination of multiple factors affect households' energy consumption, for example prevailing attitudes and beliefs within households in established communities, household size, housing type, as well as income and location (Bin and Dowlatabadi, 2005). In the case of the Malawi population - the focus of this study - household incomes were highly relevant as low income limits options concerning the types of energy used. The geographic location of rural households further jeopardised their freedom of choice as electricity was only available to nearby businesses. In this area, none of the houses had access to electricity yet at the time of the study. Therefore, the availability of wood that could be collected for free from nearby forests offered an affordable, viable solution to the energy needs of most households. The next section provides evidence of the array of energy sources that rural Malawi households are acquainted with, and their use for various household activities as a demonstration of what seems practical for them to sustain their daily way of life.

### Energy sources used for different activities

For **lighting**, rechargeable solar batteries are the predominant form of energy used in both districts (86,2%), while paraffin lamps and candles are used occasionally. For **cooking** purposes, collected fuelwood is apparently used by 96,6% of the households across the sample. This concurs with a study by Rahut *et al.* (2016) that also reported a strong reliance on fuelwood by Malawi households, which is supplemented with charcoal by those who can afford it, and crop residues when households are financially constrained (Karimu, 2015). Only 2,2% of households on average across the two areas purchased charcoal for cooking purposes. Owing to greater deforestation in Phalombe

where wood is no longer freely available to collect, households' use of wood for **space and water heating** differs extensively between the two districts. For the purpose of space heating, 80,8% of households in Balaka compared to 27% of households in Phalombe use wood. For the purpose of water heating, 94,2% of households in Balaka, versus 40% in Phalombe use wood. Crop residue is used for water- and space heating when wood is scarce: in Phalombe, 52% of households compared to 12,4% of households in Balaka, use crop residue for space heating; 46% of households in Phalombe versus only 4,8% of households in Balaka use crop residue for water heating. Alternative energy sources such as empty sacks or old tyres are often used (Balaka: 51,1%; Phalombe: 47.6%) for **beer brewing**, which is an important social activity. It is clear that during the course of their everyday lives, households mostly opt for energy sources that are readily available for free, such as crop residue, grass and even tyres when wood is not available.

### Types and origin of energy sources used by households

**Fuelwood** is collected from four prominent sources, namely, communal (28,4%) or own woodlots (28%), nearby unfarmed areas (22,6%), as well as kumunda and kudimba (18,9%) which are pieces of land where communities grow different crops for consumption. The majority of households (57,1%) collect wood weekly, although 32,5% collect wood daily, which means that the collection of wood forms a very important part of households' routines. More than 80% of the sample indicated that they could collect fuelwood within two hours; only 40,7% could do so within an hour, and for close to 10% of the sample, fuel wood collection takes longer. This tedious task is performed 93,5% of the time by women who are also the nurturers in the families; children are involved to a lesser extent (5,2%), while men's involvement is minimal. In summary, collected fuelwood, that is a free source of energy, is predominantly used for cooking, space and water heating (96,6%; 53,9%; 67,1% respectively across the sample), and is seldom used for lighting (5,6%) or beer

brewing (1,3%).

**Charcoal** is used as an exception in these two districts because it is highly commercialised and expensive (Neufeldt, Langford, Fuller, Iiyama and Dobie, 2015). In Malawi, charcoal is produced unsustainably by chopping down trees for the purpose, which further contributes to unwanted deforestation. Results indicate that rural households do not use charcoal to provide light, while the use of charcoal for cooking, space and water heating seems the exception as less than five percent of sampled households admitted to using it for these activities. Not surprisingly also, is that charcoal, Unsurprisingly, as it is relatively expensive, charcoal is not used for beer brewing.

**Gas** is expensive and beyond the reach of the rural population. It is mainly restricted to urban areas where vendors sell it to the urban middle class. Therefore, none of the households in this study indicated that they use gas in their households.

**Paraffin** is a carbon-based energy source that is relatively costly and therefore seldom used. As a result of the smoke releases solid particles into the air, it is regarded a dirty source of energy that has serious health effects such as respiratory, eye and skin irritations (Eales, Frame, Dauenhauer, Kambombo and Kamanga, 2017). In this study, paraffin was used for lighting by only a few households: 2,6% in Balaka, and 1,8% in Phalombe.

None of the 231 respondents in this study had access to **electricity** in their homes, although 9,1% indicated that their villages had access to electricity provided by ESCOM (Electricity Supply Corporation of Malawi), which is mainly supplied to small businesses in the areas. Even so, 99,1% indicated that electricity is very expensive and that they would not be able to afford it anyway. Moreover, the construction of their homes was often not suitable for electric wiring.

Results show that, apart from batteries that are popularly used for lighting as they could simply be recharged by putting them in the sun, and

the occasional use of paraffin lamps, households primarily opt for energy sources they do not need to pay for, which include wood, crop residue, grass and even old tyres. Mostly, scarcity of wood, the tediousness of wood collecting, and the involvement of family members to collect the wood, would influence households' decision to sometimes use crop residue and grass for cooking and heating purposes, as they also do not have to pay for it. However, these are less desirable energy sources because of the smoke produced and health problems associated with smoke inhalation. Of all the other sources of energy that households have to pay for, charcoal is the most popular, although it is only used for space and water heating. For all the households in this sample, electricity is beyond reach for reasons previously mentioned.

### **Consumers' practical consciousness of sustainable energy consumption practices**

Practical consciousness encompasses the tacit knowledge that households possess, thus their taken-for-granted knowledge applied in everyday social life (Giddens, 1984:346, 402). Household members are, for example, socialised about how to use different sources of energy and how to cook food, not necessarily understanding why, although they may be demonstrating responsible choices and conduct when using energy sources, being behaviour that they have become accustomed to. Essentially, practical consciousness deals with household habits and daily life, including their energy consumption behaviour (Marx-Pienaar and Erasmus, 2014). Twenty five questions explored respondents' practical consciousness of sustainable energy consumption practices in Section D of the questionnaire in terms of four increment Likert-type scales (ranging from 1 = Never; 2 = Seldom; 3 = Sometimes; to 4 = Always). The responses were subjected to exploratory factor analysis to distinguish the relevant dimensions/ factors in the context of this study. The outcome of the EFA procedure is presented in Table 1.

**TABLE 1: STRUCTURE MATRIX FOR CONSUMERS' PRACTICAL CONSCIOUSNESS**

ITEMS	FACTOR					
	1	2	3	4	5	
Do you change cooking methods in order to save energy?	,778	-,010	,163	-,284	-,419	
Do you shift to food that takes less time to cook in order to save energy?	,757	-,015	,194	-,153	-,205	
Do you closely tend and manage fire to reduce fuelwood consumption?	,547	-,257	-,194	-,411	-,491	
Do you cook fewer meals in a day in order to save energy?	,492	-,160	,259	-,483	-,297	
Do you cover pots with lids when cooking?	,468	,104	-,328	,330	,159	
Do you save fuelwood by extinguishing the fire when finishing cooking?	,454	,098	-,320	-,299	-,105	
Do you use energy saving cook stove?	,098	,828	-,010	-,167	-,319	
Do you use a three-stone fireplace for cooking?	-,253	,734	,145	-,087	-,126	
Do you save charcoal by extinguishing the charcoal when finishing cooking?	,276	,495	-,136	-,196	-,484	
Do you add more fuelwood to the fire than what is required for cooking?	,131	,463	-,185	,065	,153	
Do you bath in cold water in order to save energy?	-,173	-,152	,711	-,237	,109	
Do you heat water in the sun in order to save energy?	,031	-,022	,651	,174	,053	
Do you reduce water heating in order to save energy?	,292	,026	,592	-,172	-,323	
Do you switch off lamps when no one is in the room?	,347	,040	-,133	-,769	-,328	
Do you switch off lamps when going to bed?	,157	,153	-,140	-,745	-,125	
Do you save energy by opening window coverings to allow natural light into the house to reduce the use of artificial light?	,223	-,192	,065	-,601	-,458	
Do you soak food such as beans to reduce cooking time?	-,069	,065	,212	-,498	,076	
Do you chop off/cut natural trees for cooking?	,290	,305	-,098	-,082	-,835	
Do you chop off/cut plantation/forest trees for cooking?	,085	-,002	,108	-,087	-,817	
Do you plant trees to counter deforestation?	,207	,312	-,056	-,366	-,511	
	<b>Mean</b>	<b>2,58</b>	<b>2,53</b>	<b>2,49</b>	<b>2,49</b>	<b>3,13</b>
	<b>Standard deviation</b>	<b>,57</b>	<b>,44</b>	<b>,66</b>	<b>,86</b>	<b>,54</b>
	<b>% Variance explained</b>	<b>21,95</b>	<b>11,11</b>	<b>9,07</b>	<b>8,06</b>	<b>6,12</b>
	<b>Cronbach's Alpha</b>	<b>,69</b>	<b>,62</b>	<b>,53</b>	<b>,66</b>	<b>,70</b>

Five factors were extracted and the respective Cronbach's alpha values (0,69; 0,62; 0,53; 0,66; 0,70) were regarded as acceptable (Field and Miles, 2010:583) as they could not be improved despite several attempts to manipulate the factors based on the scree plot (eigenvalue > 1). The context in which the study was undertaken, thus admitting the low educational levels of the respondents, as well as the complexity of the topic investigated, may have contributed to the difficulty of eventually achieving more satisfactory reliability outcomes. The percentage variance explained amounted to 56,31%, which is an acceptable percentage (Beavers, Lounsbury, Richards, Huck, Skolits and Esquivel, 2013). Standard deviations were small, indicating small fluctuation in the responses, thus strong consensus on the

answers to the questions (Salkind, 2014:237, 238).

The five factors that constitute the use of energy, were labelled in accordance with the content of the respective factors, namely, Factor 1: Food preparation practices (6 items); Factor 2: Cooking systems (4 items); Factor 3: Water heating practices (3 items); Factor 4: Energy saving practices (4 items); Factor 5: Fuelwood consumption practices (3 items). Five items that either cross loaded or did not fit within factors logically, were removed to achieve the final factor solution. The deleted items were: *Do you add more charcoal to a burner although remaining charcoal is sufficient for cooking? Do you use metal pots unlike clay pots in order to conserve energy? Do you reduce space heating*

*in order to save energy? Do you dry clothes naturally in the sun in order to save energy? Do households cook together in a "shared pot" to reduce individual fuelwood consumption – communal cooking?*

Consumers' practical consciousness of sustainable consumption practices demonstrated by the sources of energy used for different activities, as well as the optimisation of resources during use, was interpreted based on the means that were calculated for the different dimensions distinguished through EFA. The means (Maximum = 4) for the five factors (see Table 1) were interpreted as follows:  $M > 3,5 \leq 4$ : highly conscious;  $M \geq 3 < 3,5$ : fairly conscious;  $M \geq 2,5 < 3,5$ : moderately conscious;  $M \geq 2 < 2,5$ : weak (low) consciousness;  $M < 2$ : very weak (low) consciousness. The factor means for the first four factors, namely Factor 1: Food preparation practices ( $M = 2,58$ ); Factor 2: Cooking systems ( $M = 2,53$ ); Factor 3: Water heating practices ( $M = 2,49$ ) and Factor 4: Energy saving practices ( $M = 2,49$ ), demonstrate a moderate consciousness of sustainable practices among households. Therefore, how they use fuelwood seem fairly responsible. The results for Factor 5: Fuelwood consumption practices ( $M = 3,13$ ), suggests an above average consciousness to curb wasteful practices in terms of fuelwood consumption for different activities.

Therefore, households' practices reflect a moderate practical consciousness of what sustainable practices imply, in terms of how they *generally prepare food* (Factor 1, such as cooking methods used, the amount of food cooked, covering of pots); the *cooking systems* used (Factor 2, such as using an energy saving stove, efforts to save charcoal after use, limiting the size of the fire); *water heating practices* (Factor 3, such as rather bathing in cold water and heating water in the sun in order to save energy) and a general demonstration of *energy saving practices* (Factor 4, such as switching off lamps when no one is in the room and when going to bed, as well as opening window coverings to allow natural light into the house to reduce the use of artificial light). It is encouraging that households were above

average in their consciousness of sustainability in their *fuelwood consumption practices* (Factor 5).

In conclusion, practical consciousness of sustainable household practices – based on how they operate and their decisions with regard to the use of energy sources in their homes – suggests some level of responsible sustainable behaviour, although not remarkable or a demonstration of highly recommendable practices. Many respondents (52,8%), for example, indicated that they always switch off lamps in vacant rooms; 64,1% of respondents indicated that they switch off lamps when going to bed, while 30,7% attempted to save energy by opening window coverings to allow natural light into the house to reduce the use of artificial light. As many as 58% of the respondents indicated that they closely tend and manage fires in order to reduce fuelwood consumption. That suggest intentional effort to reduce energy consumption, to save money, or to save fuelwood in order to reduce the need to collect fuelwood frequently. However, 82,7% indicated that they never cook together in a "shared pot" to reduce individual household fuelwood consumption. While this could be encouraged, one should appreciate the fact that households might prefer to exercise their own choices in terms of what and when to eat as household compositions differ. Also, not all the houses are so closely located that it would be practical to cook together.

It should be noted that household behaviour (practical consciousness) may be jeopardised by the availability of resources and is not necessarily driven by what they know or what they understand about the phenomenon. This was investigated through respondents' *discursive consciousness* of climate change and the sustainable use of resources, which was captured in Section C of the questionnaire, and is reported in the following section.

### **Consumers' discursive consciousness of climate change and sustainable consumption practices**

Consumers' discursive consciousness about

climate change and sustainable consumption practices refers to their actual knowledge about this complex topic, thus their ability to rationalise their everyday choices and energy-related household activities. While their practical consciousness may suggest contemplated practices, admittedly, their behaviour may be the result of habit and not necessarily an understanding of why alternative actions are more wasteful (or more conserving).

Respondents were asked to respond to a list of 12 items that measured their understanding of climate change and related sustainable consumption practices, with responses being to *True*, *False* or *Do not know*. Giving respondents the opportunity to indicate that they did not know the correct answer provided evidence of a self-confessed need for education along with the elimination of potential incorrect or missing responses.

The respective Cronbach's alphas of the three factors that emerged (0,63; 0,64; 0,72) illustrate acceptable internal consistency within the factors (Field and Miles, 2010:583) given the

context in which the study was conducted, i.e. the low educational levels of the respondents, as well as the complexity of the topic of investigation. The percentage variance explained was low (35,97%), but was the best outcome in the context of this study. Further attempts to improve the factor structure did not contribute to a better outcome and the only explanation is that the context of the study was challenging. Standard deviations were relatively small for two of the factors (Factor 1: Micro and macro factors; Factor 2: Rainfall patterns), while a larger fluctuation in the responses for factor 3 (Energy consumption and economic growth factors) confirmed the complexity of a topic such as economic growth. The outcome of the EFA procedure is presented in Table 2.

The three factors that were extracted through the EFA procedure were labelled in accordance with their content, namely: Factor 1: Micro and macro factors (7 items); Factor 2: Rainfall patterns (2 items); Factors 3: Energy consumption and economic growth factors (3 items).

**TABLE 2: STRUCTURE MATRIX FOR CONSUMERS' DISCURSIVE CONSCIOUSNESS**

	Factor		
	1	2	3
Brick baking causes deforestation	,637	,159	-,225
The average citizen can do much to reduce climate change	,549	,112	-,337
Climate change is currently one of the most critical problems that Malawi is facing	,485	,072	-,227
Environmental pollution taking place in South Africa has an impact on Malawi	,463	,033	-,409
Tobacco curing causes deforestation	,458	,262	-,097
An increase in the Malawi population will put further strain on our natural resources	,385	,163	-,246
Climate change does not affect me personally to the same extent that it affects fellow citizens in Malawi*	,268	,080	-,168
Climate change causes dry spells	,139	,846	-,020
Climate change causes flooding	,372	,621	-,197
The economic growth of Malawi is influenced by environmental problems	,333	,017	-,752
The amount of energy used by the household has a significant impact on Malawi	,296	,149	-,678
Saving energy in our everyday living will contribute to saving our planet	,437	,048	-,611
<b>Mean</b>	<b>85,78</b>	<b>97,67</b>	<b>71,47</b>
<b>Standard deviation (SD)</b>	<b>14,97</b>	<b>11,60</b>	<b>33,52</b>
<b>% Variance explained</b>	<b>21,39</b>	<b>8,99</b>	<b>5,59</b>
<b>Cronbach's Alpha</b>	<b>,63</b>	<b>,64</b>	<b>,72</b>

\* Reverse coded

The means are indicated as mean percentage correct (maximum 100) and were interpreted as:  $M = \geq 90$  Excellent/Outstanding;  $M = \geq 70 < 90$  Good;  $M = \geq 55 < 70$  Above Average;  $M = \geq 45 < 55$  Average;  $M = \geq 35 < 45$  Below Average;  $M = < 35$  Poor.

Based on the means (percentages) calculated for the three factors, households' discursive consciousness is outstanding ( $M = 97,67$ ) regarding the *implications of rainfall patterns*, i.e. respondents have an exceptional understanding that climate change causes dry spells and flooding. Despite some fluctuation in the responses ( $SD = 11,60$ ) the outcome is in a range that can be interpreted as very good to excellent.

Respondents' knowledge pertaining to *micro and macro factors influencing climate change* also seems very good ( $M = 85,78$ ), indicating an understanding that brick baking and tobacco curing (using wood) cause deforestation; that the average citizen can make a worthwhile contribution to reducing climate change; that climate change is currently one of the most critical problems faced by Malawi; that environmental pollution emanating from industrialised countries in Southern Africa has an impact on Malawi; that an increase in Malawi's population will put further strain on its natural resources; and that climate change affects one personally to the same extent that it affects fellow citizens. A larger fluctuation in responses ( $SD = 14,97$ ) suggests that this phenomenon is not as well understood as the preceding rainfall issue.

The lowest mean ( $M = 71,4$ ), although an above average score but with considerable fluctuation in responses ( $SD = 33,57$ ), was calculated for *Energy consumption and economic growth factors* (Factor 3), indicating that many respondents do not realise that the economic growth of Malawi is influenced by environmental problems; that the amount of energy used by the household has a significant impact on the country; and that saving energy in our everyday living will contribute to saving our planet. This is probably because households in these rural areas are not highly educated and find it difficult

to frame their situation within a bigger context that they know little about.

While the overall score for the different dimensions of respondents' discursive consciousness (Table 2) was encouraging (therefore indicating that respondents were fairly cognisant of the issues at hand), pertinent areas of concern emerged when scrutinising individual items. An investigation of individual statements revealed encouraging results for the following items: The vast majority of respondents (more than 90%) affirmed that brick baking causes deforestation, that climate change causes dry spells as well as flooding, and that climate change is currently one of the most critical problems in Malawi, as well as that an increase in the Malawi population will put further strain on the country's natural resources. More than 75% of the respondents in both districts also affirmed that the average citizen could do more to reduce climate change, for example by saving energy, and that saving energy in everyday living will contribute to saving the planet.

Some responses evoked concern as it indicated a noteworthy lack of knowledge: 77,1 % of respondents in Balaka said that climate change does not affect them personally to the same extent that it affects fellow citizens in Malawi, while 42,5% in Phalombe reported the same. Reasons for this discrepancy could be investigated further. Unfortunately this structured quantitative questionnaire did not allow opportunity to further explore respondents' lack of knowledge. Nearly a third of the respondents were not aware that the amount of energy used by households has a significant impact on the environment and that environmental pollution in South Africa also affects Malawi. Almost half of the respondents were not aware that the economic growth of Malawi is influenced by environmental problems, which should be addressed to encourage responsible consumption behaviour. Furthermore, a third of the respondents were unaware that environmental pollution emanating from neighbouring countries affects Malawi.

While respondents are apparently better informed about certain topics, topics such as the relevance of energy consumption in terms of

economic growth are not well understood, which may jeopardise responsible consumption practices. These issues mostly require higher cognitive reasoning, indicating that formal education and concerted effort by governmental bodies are required to inform citizens about their potential role in addressing a complex issue that will affect the well-being of future generations.

## DISCUSSION OF SURVEY RESULTS AND RECOMMENDATIONS

Respondents' practical consciousness of sustainable consumption practices seemed relatively good, demonstrating practices that largely optimise the limited resources that they have. They could, however, be taught to be more attentive to the sustainable use and consumption of different energy sources to improve existing practices. For instance, in terms of cooking practices, they could be encouraged to use cooking utensils that retain heat better for cooking purposes (such as cast iron) and to use others that conduct heat faster (such as aluminium) to boil water to maximise the energy sources. They could also be taught different water heating practices to reduce the amount of fuelwood used. Lifestyle practices could be addressed, for example women are primarily responsible for fuelwood collection, which overburdens them in terms of their family and household responsibilities. If empowered to optimise their time for economic activities, it might be possible for them to earn money to afford alternative energy sources and to adopt consumption practices that are less wasteful and more environmentally friendly. Some matters are however more difficult to address and should be investigated further, such as tobacco curing that is part of an important social rite, and brick baking practices, both of which are harmful to the environment. It is important to empathetically educate households to become more aware about the causes and consequences of climate change, as well as the importance and long term advantages of sustainable household energy consumption practices.

The findings of this study differ from those of Ferreira, Marx-Pienaar and Sonnenberg (2016),

who reported that South African respondents' knowledge about climate change was barely average (49,5%) when considering their knowledge and understanding of selected issues that were included in the basic knowledge test. Marx-Pienaar and Erasmus (2014) also found that consumers were generally detached from the issue of climate change in their everyday lives. To the contrary, this study concluded that rural Malawi households' practical consciousness of sustainable energy consumption practices is fairly good, probably because they have first-hand experience of the effects of climate change. For instance, they know the importance of cooking fewer meals per day in order to save fuelwood, and realise that soaking certain foods such as beans before cooking, will conserve energy. This confirms the notion within structuration theory that "structure" influences "agents" (Giddens, 1984:346, 347). "Structure" in this case is the external environment that has a fundamental impact on the behaviour of "agents" (households'). Influence of the "structure" on the "agent", i.e. the social pressures that cause the women to walk long distances to collect fuelwood, are undeniable and deserves attention. Although households apparently possess above-average knowledge of climate change and possible mitigating practices, there is much room for improvement concerning certain dimensions of the phenomenon, as was also reported by Ferreira (2014) in a South African study. A useful contribution provided by this study to our understanding of rural households' energy consumption practices, is that rural Malawi households are fairly responsible in their conduct and quite knowledgeable about climate change. Unfortunately, their conduct is mostly the product of economic limitations/ challenges and the socioeconomic environment that have little control over and which deserve the attention and support of government and business. With existing means, rural households can do little to remedy their current situation.

## CONCLUSION AND RECOMMENDATIONS

Factual evidence about deforestation in Malawi, statistical evidence of the country's population

growth, and limited resources, including financial resources, severely affect the social conditions of rural households. Indisputably, these have severe consequences for rural households' lifestyles, particularly with respect to their energy consumption practices. This predicament has far reaching consequences. On a micro level, multiple health problems are the consequence of the use of inferior energy sources in enclosed environments, while the time required to gather firewood negatively affect the time women have available to devote to their families and to improve their educational status so that they could become part of the economically active society. On a meso level, urban households are captured in poverty with limited opportunity to become part of the economy so as to uplift their living conditions. On a macro level, rural households' unsustainable energy consumption practices have consequences for the future of Malawi's natural resources, as well as that of the global environment, which was found to only partly reflect in residents' frame of reference. Based on evidence gathered in this research, the solution can possibly best be contemplated in terms of the structuration theory that proposes a concerted effort among all the role players to acknowledge their respective roles and contributions in finding a long-term solution that would benefit all.

This research affirms that rural Malawi communities are affected by an apparent failure of the prevailing structure, i.e. the community leaders and government, to facilitate change. The negative consequences that households and communities are confronted with as a consequence of their current consumption of available energy sources, include deforestation, and health problems, which are issues that households actually have little control over. On a practical level, they can hardly change their behaviour and the consequences thereof on their own, despite evidence of some understanding of the implications of their behaviour as came to the fore in this research. For example, rural households seem aware of environmental changes and the dire consequences of climate change probably based on first-hand experience of drought and flooding in their immediate environment. Their

practical consciousness of sustainable household practices concerning the use of appropriate energy sources in their homes was also found to be admirable given the limited availability of resources. An understanding of their role in environmental change was also reflected in their discursive consciousness of environmental issues that revealed shortcomings in terms of an awareness of their potential to contribute to curb the devastating consequences of pollution, environmental degradation and climate change that they are suffering from on a daily basis. Nevertheless, these households have no option other than to continue with "business as usual", which includes undesirable everyday practices as affordability and availability are primary challenges that largely seem beyond the control of the households (actors). Facilitation deserves more attention within the larger system of provision due to the intricacy of the associated topics. A need exists for formal structures, i.e. governmental bodies and local governance to convert the issue of climate change and environmental degradation into practical conversation that households can participate in, and can identify with, as that would instil a sense of comfort that their needs are attended to. The existence of regulation and government's concern about the deforestation in Malawi is unfortunately not enough to change households' behaviour on ground level and until the systems of provision take hands to drive a solution, there is not much that will alter rural households' current lifestyles and energy consumption practices.

This article was based on one stage of a PhD research project that focuses on the quantitative survey. The qualitative phase that captured the inputs of role players as is recommended in structuration theory, will be dealt with in a follow-up article.

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