

# Research on Consumer Behavior and Preferences Regarding Energy Efficiency in Households

**FINAL Report**  
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For Ministry of Environment and Energy





## **Abbreviations and Acronyms**

|      |   |
|------|---|
| MEE  | Ministry of Environment and Energy                |
| LCEI | Strengthening Low Carbon Energy Island Strategies |
| RFP  | Request for Proposal                              |
| CAPi | Computer Assisted Persona Interviewing            |
| FGD  | Focus Group Discussions                           |
| KUL  | Kulhudhuffushi                                    |



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## Executive Summary

This is the initial report of the Research on Consumer Behaviour and Preferences Regarding Energy Efficiency in Households, conducted through funds allocated by the Ministry of Environment and Energy (MEE), under the project Strengthening Low Carbon Energy Island Strategies (LCEI).

The objective of this research is to identify, through both quantitative and qualitative study, the perception of general public regarding energy efficiency in selected locations in the Maldives, covering a representative sample of the Maldives population. The findings would assist the Ministry of Environment and Energy in developing policies, guidelines, standards, and public education and advocacy programs to reduce greenhouse gas emissions through energy efficiency in the building sector.

A Questionnaire was developed, field tested and adopted to obtain quantitative primary data for this research survey. The Questionnaire was designed to elicit quantifiable information on key research areas of the survey, specifically, *Energy efficiency knowledge, Usage patterns, Energy efficiency measures taken in the household, Factors influencing purchase, Barriers to implement energy efficiency measures and Readiness to implement energy efficiency measures*. The research survey was carried out in selected islands in the Maldives, as prescribed in the Request for Proposal (RFP). An area sampling frame of households from the Population and Housing Census (2014), combined with updated house lists from respective Island Council Offices, were used to get the number of households for the sample. Through a multiple stage sampling strategy, a simple random sample of households were selected for this Survey. The sample size of 1873 was statistically significant at 95% confidence level. Using Computer Assisted Persona Interviewing (CAPI) face to face, the primary field data were thus collected and then processed and analysed for this Report. For the purposes of reporting, the results were analysed in 5 categories, namely, *Demographic characteristics, Energy consumption in household, Energy efficiency – definition and promoting activities, Awareness and using of services of energy efficiency info line and info center/office and Implementation of energy efficiency measures*.

The main qualitative method of data collection for this study was Focus Group Discussions (FGD) among key stakeholders who had a direct and indirect stake in this Project. The qualitative data collected through FGDs was cross checked with the secondary and the primary data collected using the Questionnaire. The information collected from FGDs were also subjected to Content Analysis to synthesize the emerging findings. Through triangulation and integration of data, a comprehensive list of indicators were then developed to reflect the baseline situation in relation to the project objectives.

The analysis of the results showed that 72% of the participants were women and 57% of the participants were between the ages of 35-64, followed by 36% falling between the ages of 18-34. Out of the respondents, 46% had completed O'-Levels or a technical/vocational training or higher, with 44% of the respondents being formally employed. In most of the cases, the total monthly income of households ranged from MVR5,001 to MVR15,000 (45%), and 85% of the respondents lived in houses as opposed to apartments, with 77% being the owners of their houses. Significantly, 87% of the households had electricity with a single meter, and 63% incurred an electricity expense of more than MVR1,000 per month, which were generally considered high in relation to household appliance used; and all in all, 85% were thinking about ways to minimize electricity expenses.

In the broader area of energy efficiency awareness, a modest 39% claimed that they understood what energy efficiency entailed in terms of meaning and effective and efficient usage of energy, particularly in relation to electricity, with a slightly lower 35% reported awareness among women in the households. In the area of labelling and ratings of energy efficient consumer products, a high 85% were not aware about energy efficiency labels or ratings (star ratings) often depicted on today's consumer products, while the top most heavily used energy-intensive items in the households were electrical fans (99%), refrigerators (96%), electric ovens (64%), washing machines (54%) and air conditioners (48%).

The primary factors influencing the purchase of an energy-intensive consumer product were *cost* (42%), and *energy consumption* (33%), followed by *brand* (27%). The respondents sought most of the information related to their decision making and consumer purchasing behaviour through TV (69%), Radio (14%) and Websites (10%). Similar results were also obtained in relation to source of information regarding energy consumption and energy efficient behaviour. Barring "Fahi Ali" program which 43% of respondents had heard about, the

awareness of all the other government initiated advocacy programs like, “TV Dramas, “It’s cool @25” and “LED Saves” stood at less than 15%, showing a substantial gap on the reach and impact of advocacy programs in general.

On the prevailing level of awareness and implementation of energy efficiency measures, for ease of reference, the respondents were asked about behavioural, low cost and high cost measures. Of the behavioural measures, it was found that more than 50% of the respondents were aware of all the measures, with the lowest implementation at 43% recorded for keeping the air conditioners at 25° Celsius or above. Interestingly, the analysis also showed that although some of the behavioural measures like “allowing air movement between wall and freezer” were not heard of (73%), they were implemented by 85% of the respondents. With the low to medium cost efficiency measures, the least familiar measure at 42% was the use of insulation stickers on windows to restrict heat and it was also the least implemented measure at 19%. Out of the relatively high cost energy efficiency measures, respondents were familiar with most of the measures except for “insulating walls and ceilings of house/apartments” (48%) and the implementation was lowest for Solar PV Grid (connected) Systems and Solar Water Heater systems, at 4% for the both measures.

More than 70% of the respondents agreed that the above measures were effective and efficient energy saving measures in households. The main barriers to undertaking energy saving measures are reportedly lack of financial resources (57.2%) and information (51.4%). However 95% of the respondents were ready and willing to implement these measures with the right information and ease, and even 72% were ready to implement the same even if they had to pay to participate in an energy efficient program, revealing the awareness individuals have on the connection between inefficient energy measures and their impact on the environment.

The above findings provide insight into public perception and awareness regarding energy efficiency and consumer choices and behaviour in relations to energy consumption in selected households. From the Survey results, it is concluded that 100% of the respondents used diesel powered electricity as an energy-generating product in their households and there is great potential and room for energy efficiency in the building sector. Every second respondent thought about decreasing energy expenses and practiced energy saving behaviour in some form. This showed an existing awareness of efficient and rational energy consumption and willingness to apply some form of energy efficiency measure, with more than 39% assuming an understanding of what energy efficiency entailed, in terms of energy saving and rational consumption. However this number needs to be increased through government programs and more public campaigns on the energy efficiency concept and measures, and possible ways of their application. The existing knowledge needs to be upgraded and activities intensified, and the preferred public dissemination medium shall be TV, radio and websites, in that order as shown to be the preferred source of information for the respondents.

The general interpretation is that the respondents believed that the electricity bill was high compared to the items being used. Therefore the advocacy campaign and activities shall include knowledge and information on how different electricity fee-bands worked and how that could be managed to bring down the cost. Information on energy efficient labelling and ratings, and possibly about products and brands could be incorporated as key components of advocacy programs, including the financial incentives and instruments available in the market to facilitate medium to high cost energy saving measures. The existing levels of implementation of behavioural, low to medium cost and high cost energy efficient measures, to the extent information and financial resources are available, are undeniably evident. The willingness of respondents to adopt the same, even at a cost, is obvious from the results. It appears that the onus is on the Policy makers to take this further.

The priorities for Policy makers, therefore, are to re-develop, enhance and update, enforce, monitor and evaluate existing energy efficiency policies and measures in all sectors. Increase and expand the scope and visibility of existing energy saving program like “Fahi Ali” and “LED Saves”. Bring about necessary changes to building codes to promote energy efficient and natural lighting design and management in buildings. Further, government should develop and implement additional policies wherever lacking, to ensure that energy utilities support cost-effect, verifiable end-use energy efficiency improvements and oblige energy sector entities to develop and deliver cost-effective energy efficiency tools, products and services to end-use consumers.

It appears that the greatest barrier to promoting energy efficiency in the building sector and alleviating the negative impact on climate changes is the absence of a cross-sectoral framework for Energy Efficiency. By setting a cross-sectoral framework for energy efficiency, the Government can help stimulate investment in

energy efficiency and accelerate implementation and monitoring of existing national energy policy and strategy, thus identifying gaps, opportunities and challenges in achieving established targets on energy efficiency.

## **1 Introduction**

The Government of Republic of Maldives represented by the Ministry of Environment and Energy (MEE) has allocated funds under the project Strengthening Low Carbon Energy Island Strategies (LCEI) and this report is the initial report for Research on Consumer Behavior and Preferences Regarding Energy Efficiency in Households.

The Project “Strengthening Low Carbon Energy Island Strategies Project (LCEI)”, implemented by Ministry of Environment and Energy (MEE) with support from UNEP and funded by the Government of Maldives and the Global Environmental Facility (GEF) aims to reduce greenhouse gas (GHG) emissions through energy efficiency in the building sector. The project will focus on increasing energy efficiency in the building sector by developing appropriate policies, guidelines and standards and through public education and advocacy.

Reducing energy use reduces energy costs and may result in a financial cost saving to consumers if the energy savings offset any additional costs of implementing an energy efficient technology. Being energy efficient is also seen as a solution to the problem of greenhouse gas emissions. Improved energy efficiency in buildings could help with emissions of greenhouse gases and it is vital that the general public are aware of this. Hence it was decided to use part of the proceeds from the project to study the knowledge and opinion on energy efficiency in household. This will include collecting information on current factors affecting the amount of energy consumed and knowledge on energy efficiency and conservation choices. To this end, it is proposed to survey a representative sample of the Maldives population.

### **1.1 Objectives**

The objective of the assessment was to identify perception of general public regarding energy efficiency in selected locations in the Maldives.

The outcome of this assessment would assist the Ministry to conduct consumer awareness campaigns, to be able to target groups of consumers within the campaign strategy. Particular information on the consumers and their behaviors would assist in customizing the awareness campaign according to the needs of different consumer groups. This information would also assist in designing future policy instruments, projects and programs related to energy efficiency. Under the direct supervision of the Project Manager of LCEI, the Riyan-consultants were expected to consider and provide methodological approach and justification as to how the scope of work of this assignment is covered in this report.

### **1.2 Approach**

A pre-inception meeting was held to understand the scope. The following schematic diagram summarizes the key steps of the approach developed after this meeting.

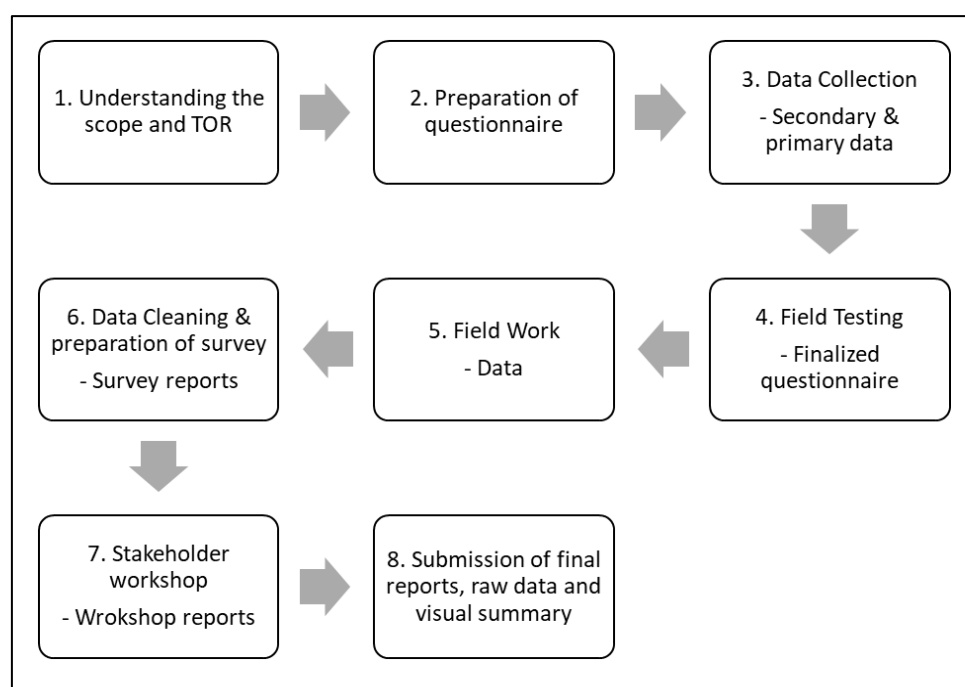


Figure 1: Schematic diagram showing the work methodology

## 2 Research Methodology

### 2.1 The Sampling frame and sampling strategy

The survey was based on two core sets of information, an area frame compiled from the Population and Housing Census-2014 combined with updated house lists obtained from respective offices in the islands. The purpose of obtaining the latter is to compensate for the any datedness of the 2014 census frame.

Overall information on blocks and number of households in a block was gathered from the census listing for the specified islands, which was used to select the blocks from the islands. House lists obtained from the census enumeration were cross checked with assistance from island offices.

Sampling strategy used for this assignment was multiple stage sampling. Since the islands were pre-decided by the RFP, the Primary Sampling Units were the enumeration blocks in these islands. Each block was considered as one strata. The Ultimate sampling units were selected households from the stratum, which would follow simple random sampling method. Stratification and selecting a sample from each stratum stresses the representativeness of the sample selected. A simple random sample is easy to execute and is highly representative if the total population participates. To maximize on this positive quality in the sampling method, utmost care was taken to obtain a comprehensive list of households in the stratum selected.

The sample size was statistically significant with confidence level at 95%.

The suggested sample frame(s) and methodology improves the robustness of the sample estimates by reducing standard errors and also helps absorb some of the random noise that can originate from non-sampling errors.

While the suggested sampling design attempts to reduce the sampling errors to a minimum, the final quality of data can be affected if non-sampling errors are present.

Non-sampling errors may result from a high proportion of non-responses, from systematic errors in replies from respondents, from intentional wrong reporting by respondents and from non-compliance with the sampling design. Errors can also creep in at the data capture / entry stage, during the transfer of data from the questionnaire hard copies to computer readable format. Since the prescribed data collection methodology was a face to face interview, there was a low chance of non-sampling errors creeping in if the questionnaire used was sufficiently simple and a thorough training was conducted for the enumerators. Measures which were taken before hand to minimize errors as much as possible include choosing enumerators with a pleasant personality and easy communication skills, conduct very thorough training for the enumerators and equip them in keeping 'good rapport' with the respondent. Furthermore, the utilization of Computer Assisted Personal Interviewing (CAPI) would minimize the non-sampling errors.

## **2.2 Data Collection**

### **2.2.1 Questionnaires**

Survey questionnaire was developed to elicit the most important quantifiable data for this assessment. Survey was carried out through a structured questionnaire format. The questionnaire includes various research questions that intend to get information for the research areas, specifically;

- Energy efficiency knowledge
- Usage patterns
- Energy efficiency measures taken in the household
- Factors influencing purchase
- Barriers to implement energy efficiency measures
- Readiness to implement energy efficiency measures

Field testing of data collection instruments and refining: The data collection instrument, i.e. survey questionnaire was field tested in K. Thulusdhoo during first week of December 2016; and refined based on the experience gained from the field test. The questionnaire used for the field testing was in local language.

To undertake all these primary data collection activities, a well-designed Logistical Survey Plan was prepared to maximize the utilization of resources and to minimize the time needed for field work. The Table 1 below gives the number of households that were surveyed in each of the location.

Table 1: Details of the field data collection

| Atoll        | Island   | Number of Households ** | Sample Size * | Field Teams | Number of Enumerators | Number of Days |
|--------------|--|-------------------------|---------------|-------------|-----------------------|----------------|
| Haa Dhaal    | Kulhudhufushi  | 1,385                   | 301           | 10.0        | 20.0                  | 3.5            |
| Alif Dhaal   | Dhidhoo  | 34                      | 32            | 4.0         | 8.0                   | 1              |
| Gaaf Alif    | Nilandhoo  | 108                     | 85            | 4.0         | 8.0                   | 2              |
| Kaafu        | Maafushi   | 304                     | 170           | 5.0         | 10.0                  | 3.5            |
| Kaafu        | Greater Male' Area (Male', Villingili and Hulhumale) | 22,326                  | 378           | 10.0        | 20.0                  | 5              |
| Addu Stretch |  |                         |               |             |                       |                |
|              | Feydhoo  | 675                     | 246           | 5.0         | 10.0                  | 6              |
|              | Maradhoo   | 465                     | 211           | 3.0         | 6.0                   | 6              |
|              | Maradhoo-Feydhoo                                     | 242                     | 149           | 2.0         | 4.0                   | 6              |
|              | Hithadhoo  | 1,980                   | 322           | 5.0         | 10.0                  | 6              |

\*the sample size has been obtained using <http://www.raosoft.com/samplesize.html>

\*\*The data for number of households is obtained from National Bureau of Statistics.

## 2.2.2 Focus Group Discussions

Focus Group Discussions (FGD) were one of the major qualitative data collection methods in this assessment. Focus Groups were conducted for different categories of people who had direct and indirect stake in the project. The target groups for the FGDs were identified based on the social groups after reviewing the social strata of the each island.

Composition of FGDs:

- Island Officers/ Councils
- Power providers
- Members of WDCs
- A member of available all CBOs
- School Teachers
- School Students (higher grades)
- Health Officers
- Business men from different kind of business such as shop owners, boat builders, & other profit making enterprises

Apart from Addu stretch one FGDs was carried out in each of the selected island, while 2 FGD's were conducted in Addu stretch. The qualitative data collected through FGDs was used to cross check with the secondary and the primary data collected using questionnaire survey. Please refer section named "Integration of Different Information Gathering Processes" for the triangulation checking and integration of the data collected using different methods.

## 2.3 Data Analysis

### 2.3.1 Data entry, analysis, synthesis and interpretation of data/information

As the questionnaires were filled by enumerators using tablets, the data was automatically entered, coded and fed into the computer. Before analysis, an editing for errors and coding for open ended responses took place according to specifically prepared editing and coding instructions. After obtaining basic tables and cross tabulations, statistical analytical tests were carried out to clarify any valid inferences with regard to important issues related to specific objectives of the assignment.

Data analysis and tabulation were carried out using a set of dummy tables prepared by the Consultants Team. The information collected from the focus group discussions were subjected to Content Analysis to synthesize the emerging findings.

Aimed at the preparation of the survey report, the Study Team interpreted the outputs generated from the above.

A comprehensive list of indicators were developed in view of the expected outcome from the analysis. This indicated the baseline situation, wherever applicable, and the present situation in relation to the project objectives.

### **2.3.2 Integration of Different Information Gathering Processes**

Findings of field research were triangulated and documented to ensure their credibility and validity. Information gathered from the different sources were checked through comparisons and verification discussions. For example, information from surveys were cross checked with information gathered from Focus Group Discussions. As far as this exercise was concerned, project documents, focus group discussions and household sample surveys constitutes as major information sources. Consultant compared data mainly from these three sources prior to making conclusions and reporting. Evidence from secondary sources, stakeholder consultation and interviews were supplementary sources of information and used to support the findings gathered from the above three key sources. Figure 2 illustrates the triangulation process of data gathered from various methods under this study.

## **3 Analysis of Results**

In order to get better insights into public education and strengthening the awareness of the importance of energy efficiency, the quantitative survey carried out included several parts:

- Demographic characteristics,
- Energy consumption in household,
- Energy efficiency – definition and promoting activities,
- Awareness and using of services of energy efficiency info line and info center/office and
- Implementation of energy efficiency measures.



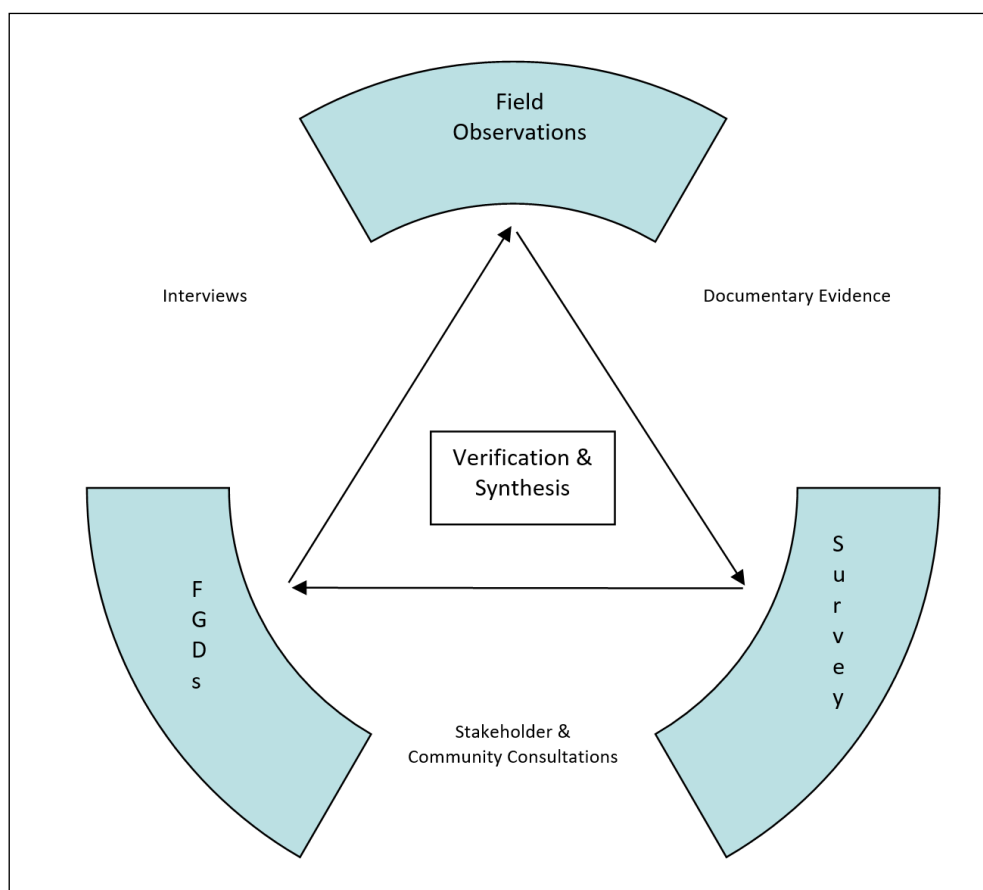


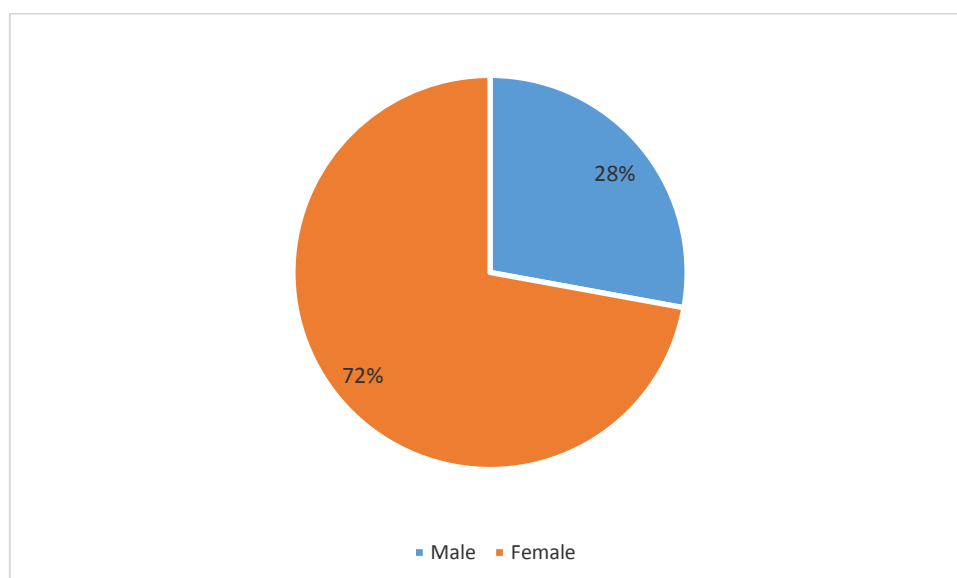
Figure 2: Triangulation of raw data collected from different methods

### 3.1 Demographic Characteristics

The survey was carried out in 6 islands (Addu stretch is considered as one island) of Maldives with 1,873 household representatives. The condition to participate in the survey was to be Maldivians who resided in the selected households.

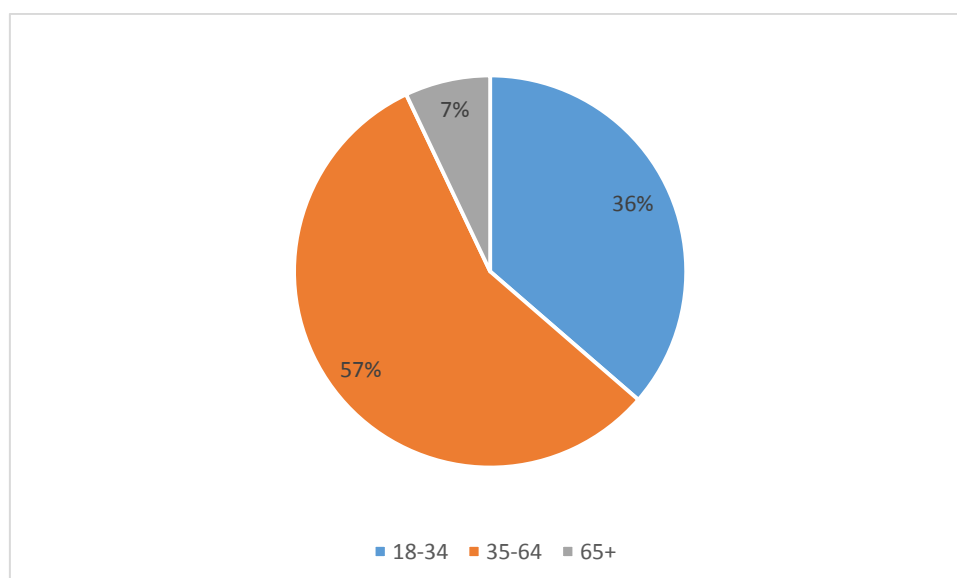
The following series of graphs illustrate the demographic characteristics of respondents. Graph 1 shows the Gender structure of the respondents as 28.0% of men and 72.0% of women.

Graph 1: Gender Structure



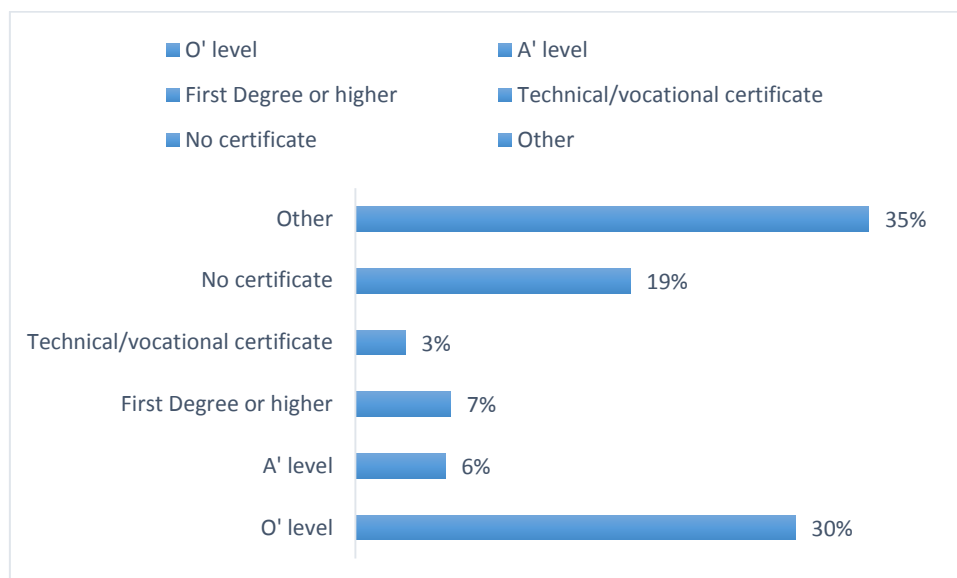
The age distribution of the respondents were categorized into three age groups, mostly between the ages of 35–64 (57%), followed by the age bracket between 18 – 34 (36%) and those senior members above the age of 65 (7%). This distribution is illustrated in Graph 2.

Graph 2: Age Structure



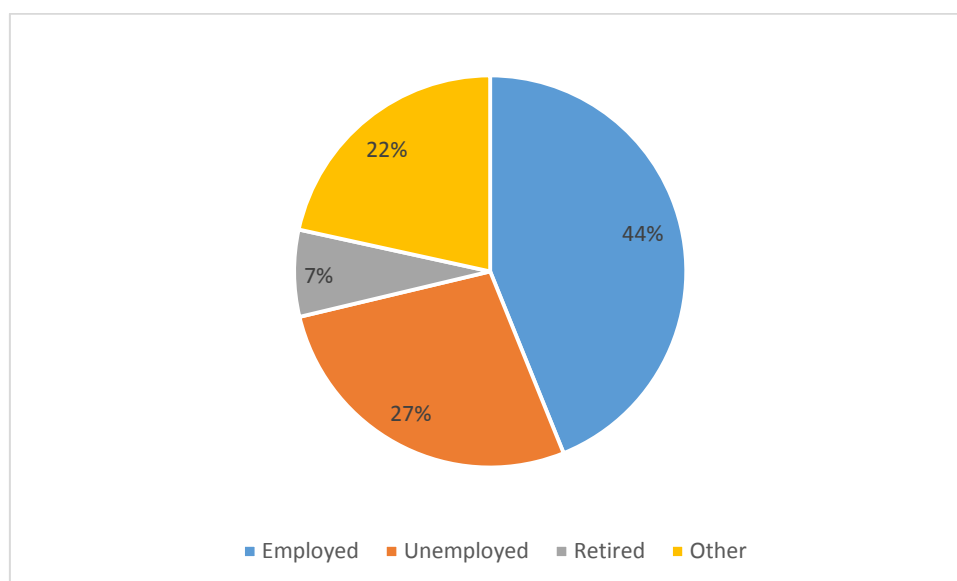
Looking at the educational background, in 30.0% of cases, respondents said they had completed O' level education, followed by "Other" types of education recorded at 35%, which may include non-formal short courses and other local training programs not specified in the categorization listed in the questionnaire. The details of the educational background is depicted in Graph 3.

Graph 3: Education of Respondents



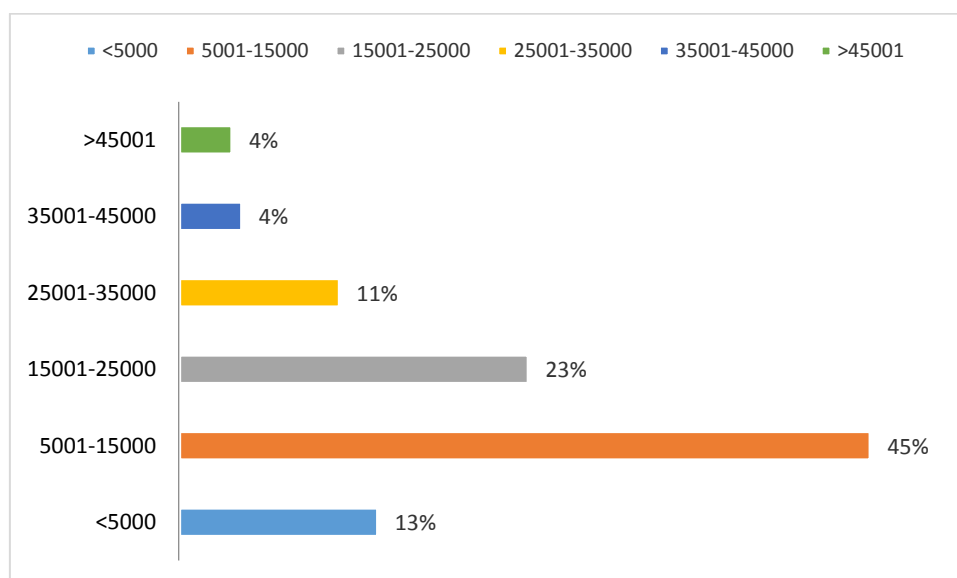
It is noticeable that more than 50% of the respondents are employed and economically active. As illustrated in Graph 4, 44% of the respondents reported as being formally employed. Interestingly, with detail analysis, it could also be found that Addu and Male' had the lowest economically active population with 37% and 44% respectively.

Graph 4: Economically Active Respondents



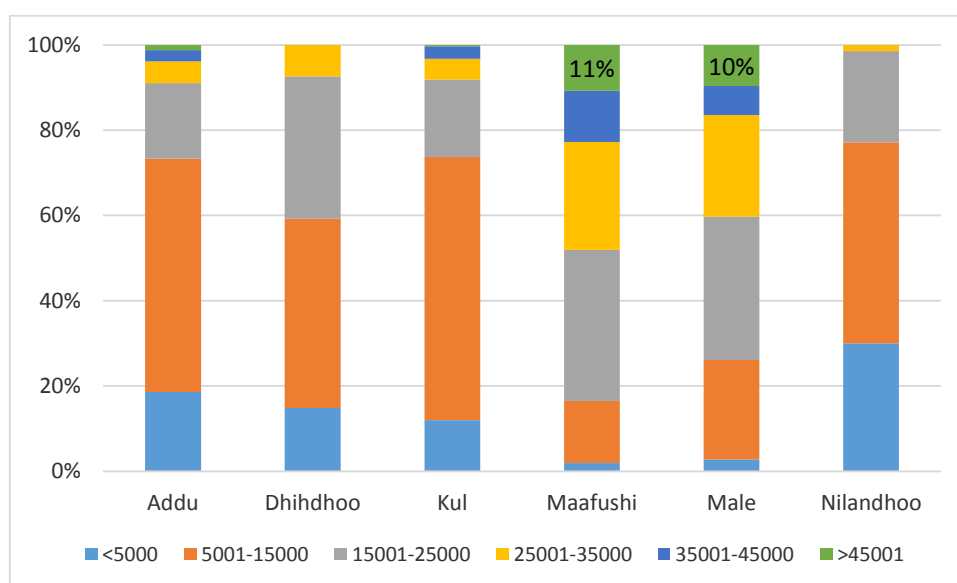
Total monthly income of household in most of the cases ranged from MVR 5,001 to MVR 15,000 (45%) as depicted in Graph 5.

Graph 5: Monthly Household Income



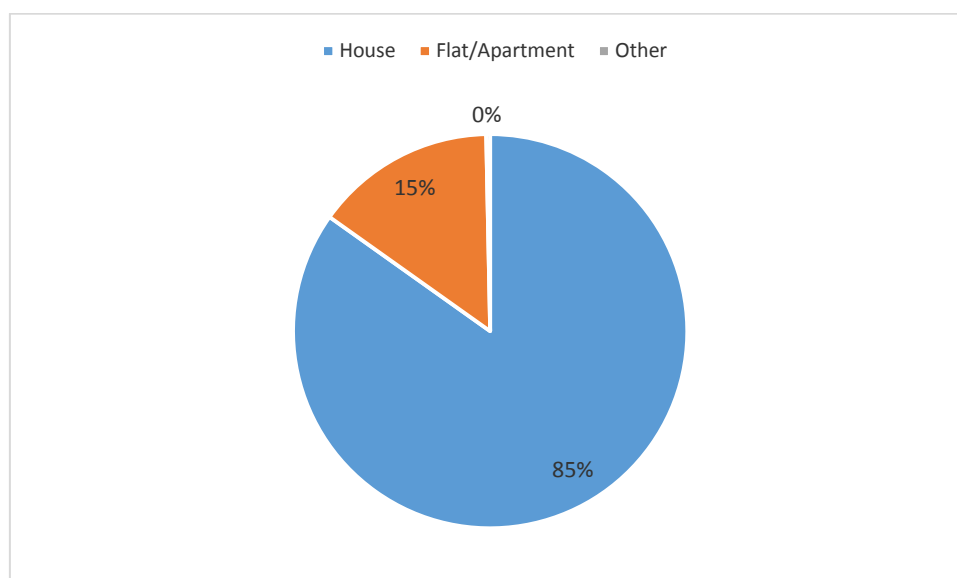
However, the detailed analysis showed that Maafushi and Male' having higher income bands as depicted in Graph 6.

Graph 6: Monthly Household Income, by islands



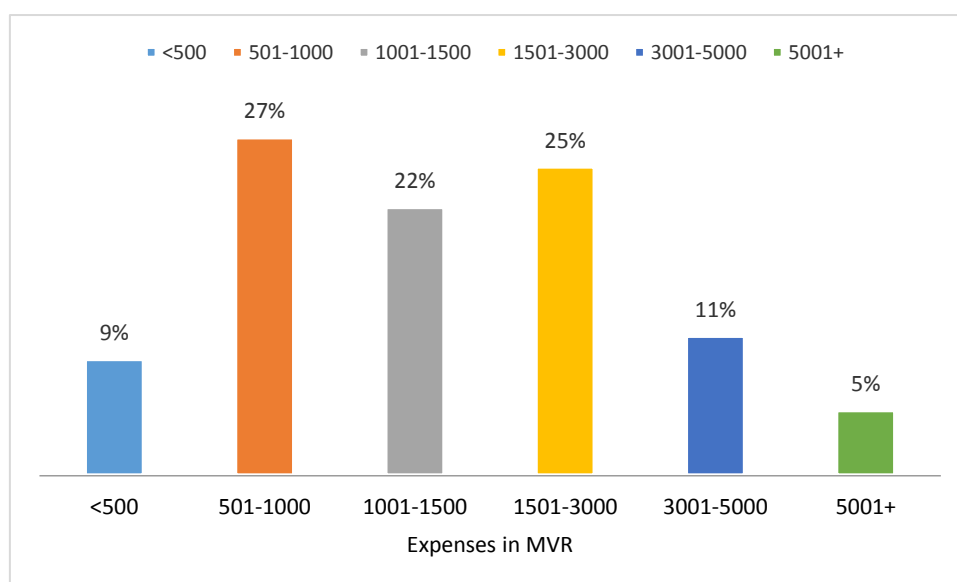
Almost all the interviewed respondents lived in houses than in apartments (85% and 15% respectively), where 77% owned the houses, as can be seen in Graph 7.

Graph 7: Type of Housing



Majority of the interviewed households had one electricity meter (87%). However, the expense on electricity ranged across the expenditure bands as depicted in Graph 8, where 63% of the households incurred an expense above MVR1000 on electricity.

Graph 8: Monthly Expense on Electricity

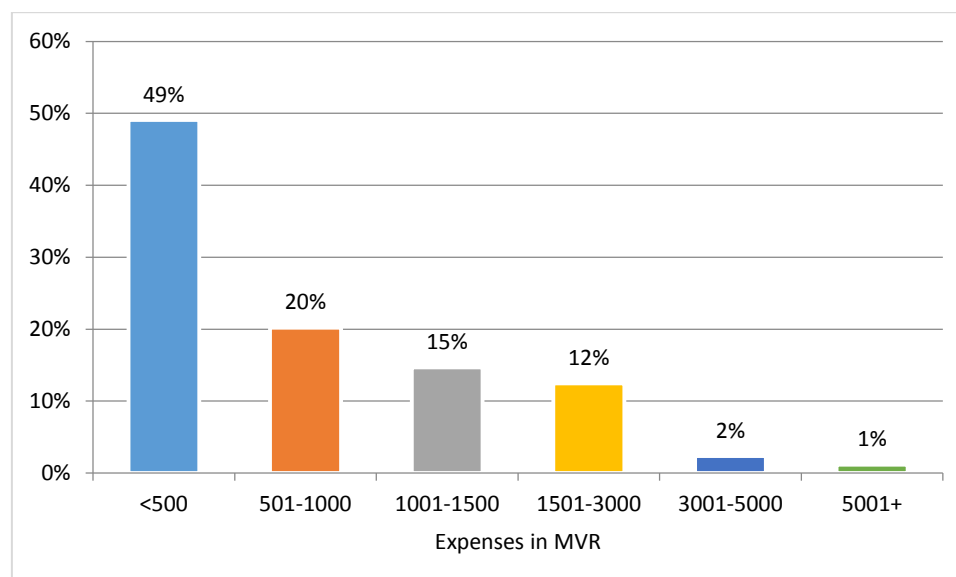


When they were asked whether the expenses were high compared to the electrical items used in the household, only 24% said it was not high and 85% think about minimizing the expenses they make on electricity.

Water network was established in Addu, Male', Maafushi and Kulhudhufushi while Nilandhoo and Dhidhoo did not have a water network connected to the households. Thus, the households in the latter two islands did not

get a water bill. From those interviewed who had water networks connected, the expense on piped water ranged across expense bands as depicted in Graph 9, with 69% paying a value lower than MVR1000 on piped water per month.

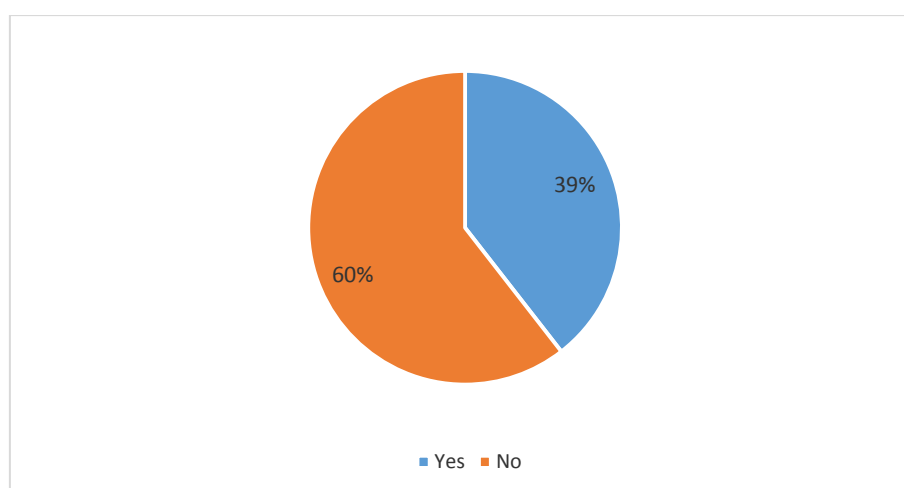
Graph 9: Monthly Expense on Piped Water



### 3.1.1 Energy Efficiency Knowledge

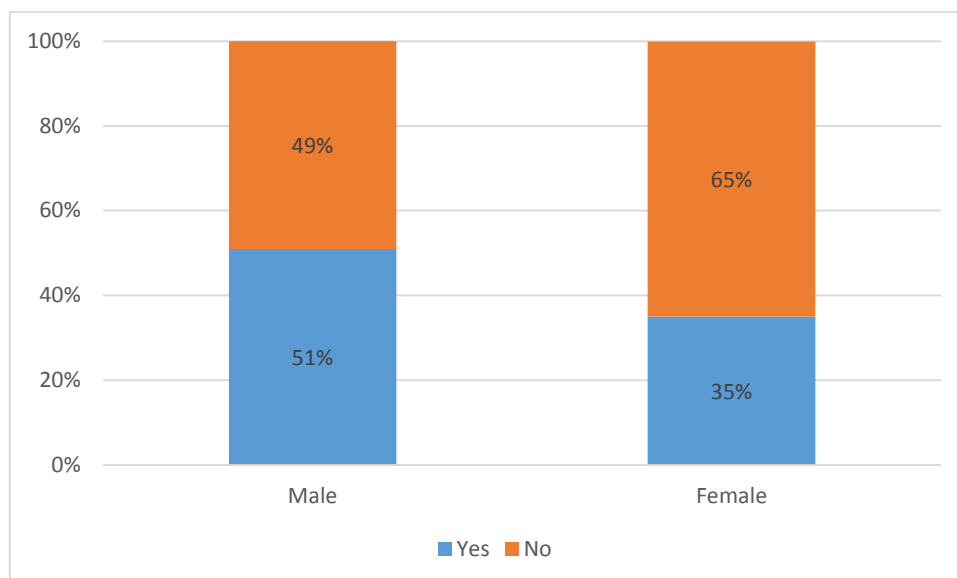
Significantly for this survey, more than one-third of the interviewed (39%), claimed that they knew what the term energy efficiency entailed as shown Graph 10. Most often, they defined this term as rational electricity usage, by using energy efficiency measures such as reducing the electricity wastage by switching off electrical items when not in use.

Graph 10: Percentage of respondents who claimed to know what energy efficiency means



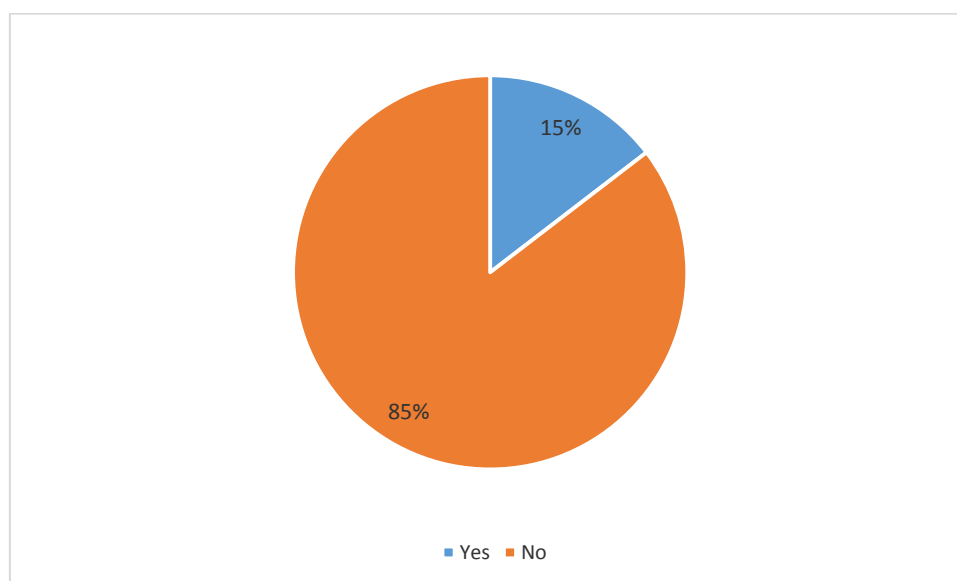
Among the women respondents, 35% claimed they knew what the term energy efficiency entailed, while this percentage stood at 51% for males as depicted in Graph 11.

Graph 11: Percentage of respondents who claimed to know what energy efficiency means, by gender



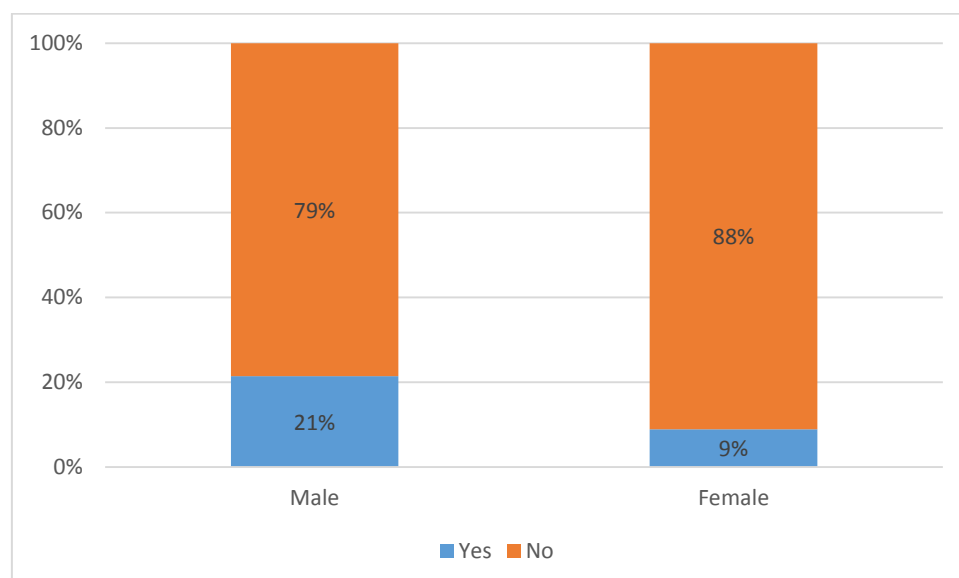
When asked about the signage related to energy efficiency, a high percentage (85%) did not know or hear about energy label or energy star ratings – Graph 12.

Graph 12: Percentage of respondents who claimed to know what energy label is



Among the women respondents, only a mere 9% claimed they knew or have heard about energy label, and this percentage stood at 21% for males.

Graph 13: Percentage of respondents who claimed to know what energy label is, by gender



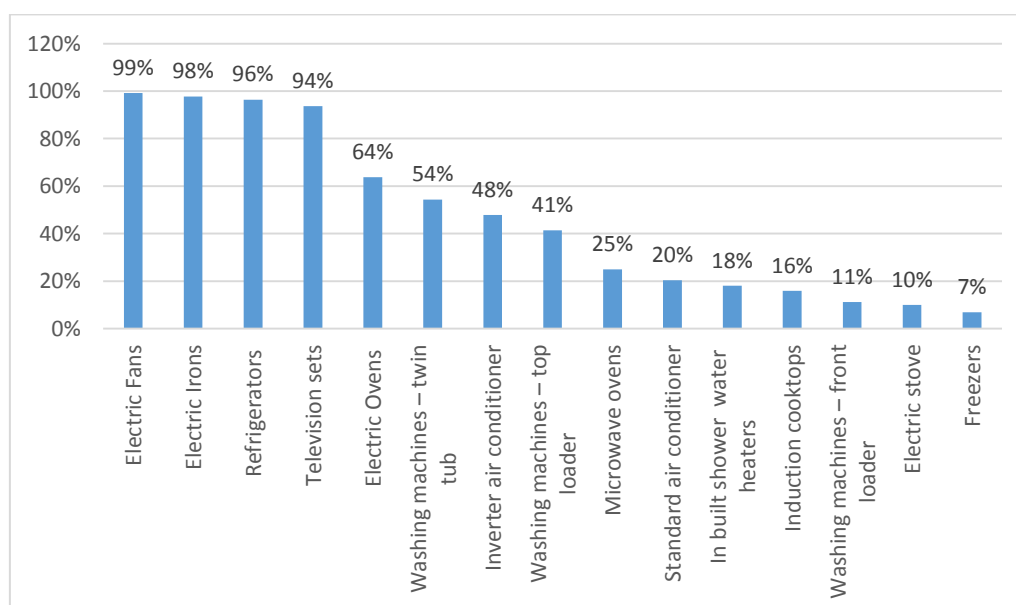
## 3.2 Energy Consumption in Households

### 3.2.1 Usage Patterns

Energy-generating products used in households were electricity and cooking gas (LPG) for cooking.

The selection of energy consuming product used for cooling mostly depends on the residential conditions and standard of living. More detailed insight shows that people with higher income ranges most often choose air-conditioners (82% in Maafushi), while almost all (100%) interviewed used electric fans – Graph 14.

Graph 14: Inventory of electronic items used in households

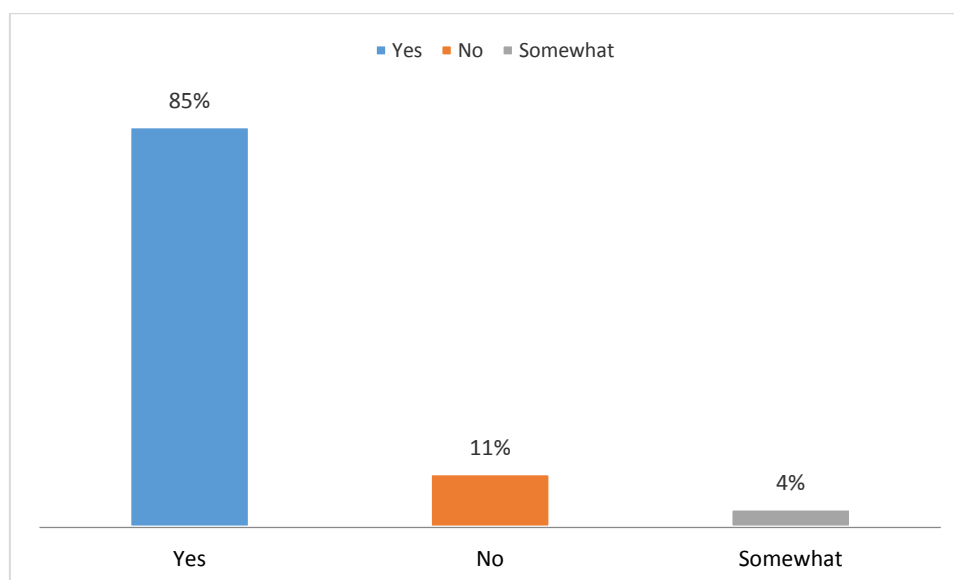


Respondents in 85% of cases stated that they often thought about the ways to decrease their total electricity bill, which is depicted in Graph 15. For that reason, and in order to decrease electricity consumption, every



second respondents stated they used energy saving light bulbs, inverter products, more rational and efficient use of electricity, etc.

Graph 15: Respondents who consider minimizing electricity bill



Further analysis based on gender showed that men and women in almost similar percentage thought about decreasing energy bills. Also, women are the ones who more often, in comparison to men, undertake some of the energy saving measures.

### 3.3 Energy Efficiency

#### 3.3.1 Factors Influencing Purchase

When respondents were asked to rank the factors they consider while making a purchase, cost, energy consumption of the product and brand were ranked in the highest, as illustrated in Graph 16.

Factors that ranked number 1 did not differ from male to female, however under rank 2 and 3 the factors differed slightly and this is depicted in Table 2.

Graph 16: Factors considered by respondents when making a purchase

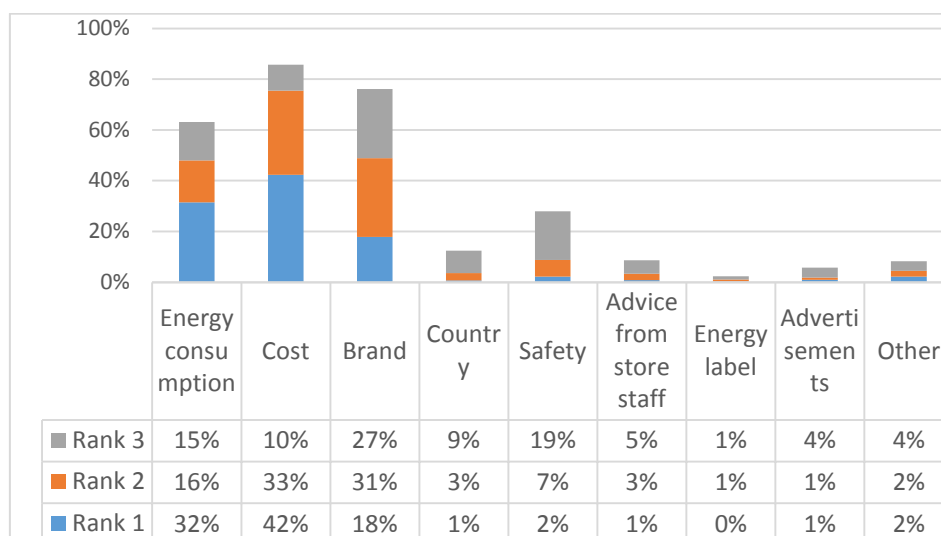
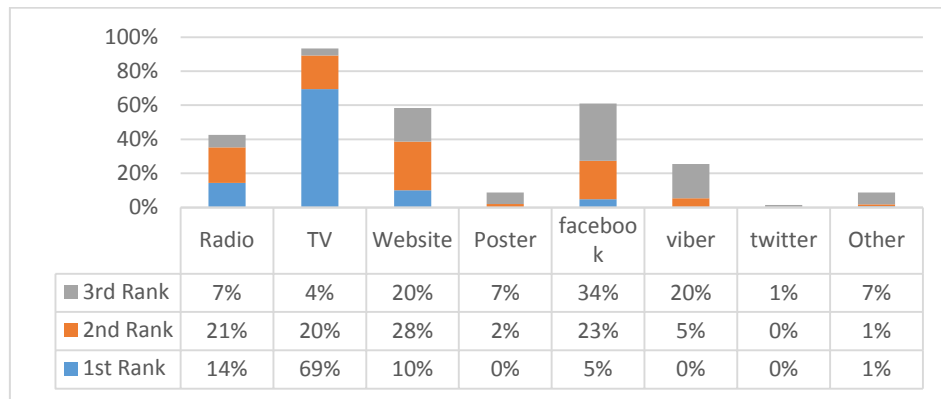


Table 2: Factors considered by respondents when making a purchase, by gender

| Factors affecting purchase decision | Rank 1 |        | Rank 2 |        | Rank 3 |        |
|-------------------------------------|--------|--------|--------|--------|--------|--------|
|                                     | Male   | Female | Male   | Female | Male   | Female |
| Energy Consumption                  | 30%    | 32%    | 18%    | 16%    | 16%    | 15%    |
| Cost                                | 44%    | 42%    | 30%    | 34%    | 11%    | 10%    |
| Brand                               | 18%    | 18%    | 33%    | 30%    | 22%    | 29%    |
| Country                             | 1%     | 1%     | 3%     | 3%     | 9%     | 9%     |
| Safety                              | 2%     | 3%     | 5%     | 7%     | 19%    | 19%    |
|                                     |        |        |        |        |        |        |
| Advice from store staff             | 1%     | 1%     | 3%     | 2%     | 6%     | 5%     |
| Energy label                        | 0%     | 0%     | 1%     | 1%     | 2%     | 1%     |
| Advertisements                      | 1%     | 1%     | 1%     | 1%     | 5%     | 4%     |
| Other                               | 3%     | 2%     | 3%     | 2%     | 6%     | 3%     |
| Non response                        | 0%     | 1%     | 3%     | 4%     | 4%     | 5%     |

The main source of information and the message itself must have played an important role in the decision making process of purchasing behaviors of consumers. In 69% of cases, as illustrated in Graph 17, the respondents said the main source of information that influenced their decision making behavior was obtained from TV, radio and websites (internet). This is particularly revealing and useful for advocacy program developers in deciding and choosing the right medium for communicating the desired message to the consumer.

Graph 17: Main sources of information



Irrespective of the gender, TV was stated to be the main source of information, followed by radio and website under rank 1. Slight differences are recorded between the genders in rank 2 and 3, and is depicted in Table 3.

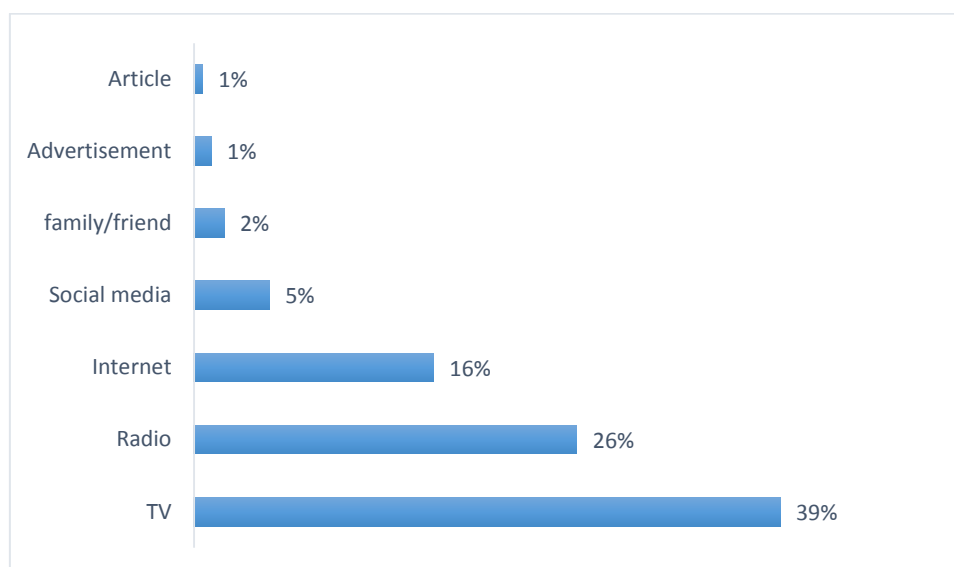
Table 3: Main sources of information

|                 | Rank 1 |        | Rank 2 |        | Rank 3 |        |
|-----------------|--------|--------|--------|--------|--------|--------|
|                 | Male   | Female | Male   | Female | Male   | Female |
| <b>Radio</b>    | 14%    | 15%    | 16%    | 22%    | 8%     | 7%     |
| <b>TV</b>       | 65%    | 71%    | 21%    | 19%    | 4%     | 4%     |
| <b>Website</b>  | 13%    | 9%     | 28%    | 28%    | 15%    | 21%    |
| <b>Posters</b>  | 0%     | 0%     | 2%     | 2%     | 6%     | 7%     |
| <b>Facebook</b> | 7%     | 4%     | 24%    | 22%    | 32%    | 32%    |
| <b>Viber</b>    | 0%     | 0%     | 6%     | 5%     | 20%    | 19%    |
| <b>Twitter</b>  | 0%     | 0%     | 0%     | 0%     | 2%     | 0%     |
| <b>Other</b>    | 1%     | 1%     | 1%     | 1%     | 9%     | 6%     |

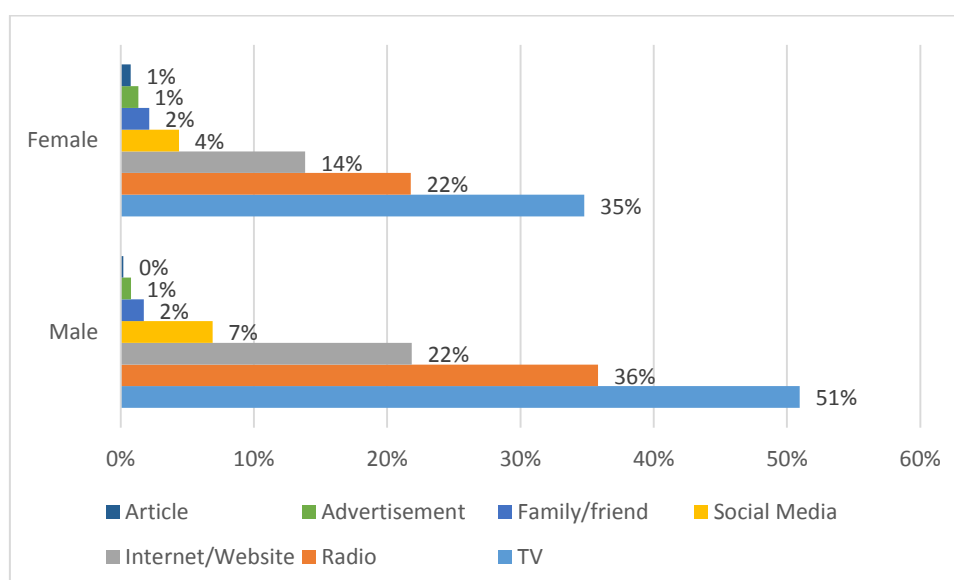
This is similar when asked where they got energy efficiency information. Respondents have had information related to rational energy consumption and applying energy efficiency methods from media. TV, radio, internet and social media are the most frequent sources from which people heard about the subject of energy efficiency (39%, 26%, 16% and 5% respectively, Graph 18). This question was posed for those who positively responded to knowing what energy efficiency meant.

When further analyzed based on gender, the same findings as above is revealed. Both male as well as female respondents had sought and received information related to energy consumption and applying energy efficiency from various media, with TV, radio, internet and social media, in that order, being the most frequent ways people of both genders heard and received information about the subject of energy efficiency. This is graphically illustrated in Graph 19.

Graph 18: Energy efficiency information

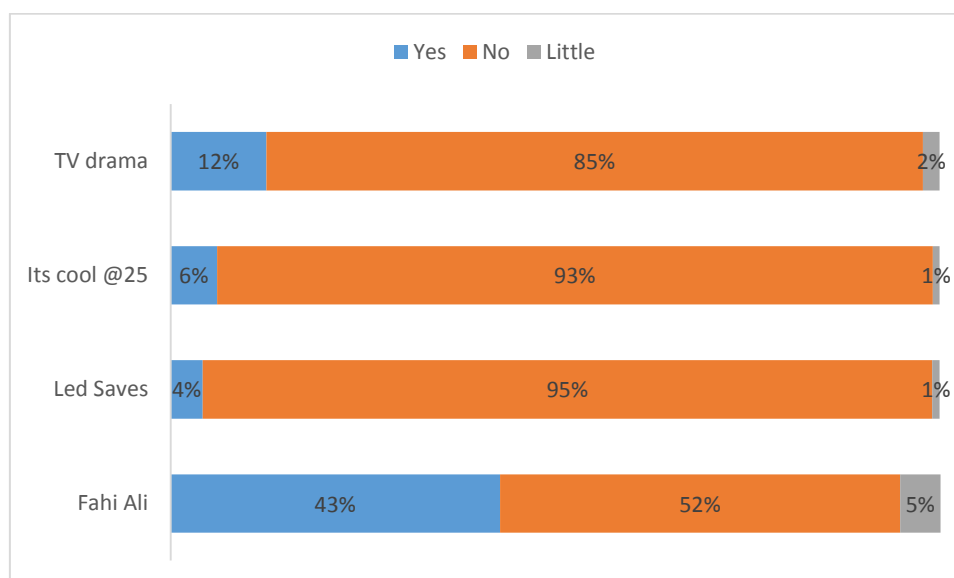


Graph 19: Energy efficiency information



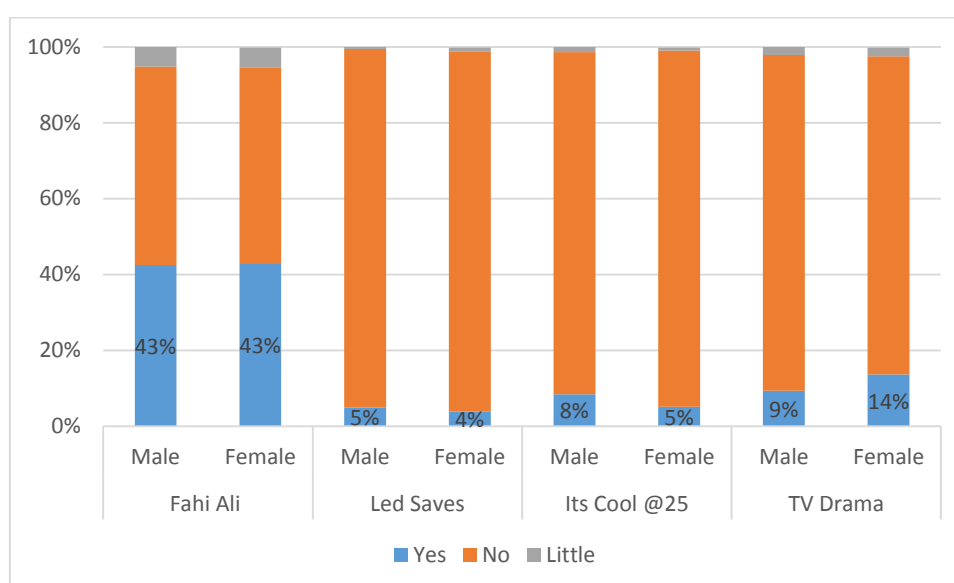
Although, there have been government initiated advocacy programs across Maldives, less than 15% respondents have heard/known about anything at all about “TV drama”, “It’s cool @25” and “LED saves” programs; but around 43% of the respondent have heard about the “Fahi ali” programme (Graph 20).

Graph 20: Information of government advocacy programs



Gender based data displayed that there is not much differences between the genders when “Fahi ali” and “Led saves” programmes are considered. However, more females knew about the TV drama while more males knew about the “It’s cool @25” programme.

Graph 21: Information of government advocacy programs, by gender



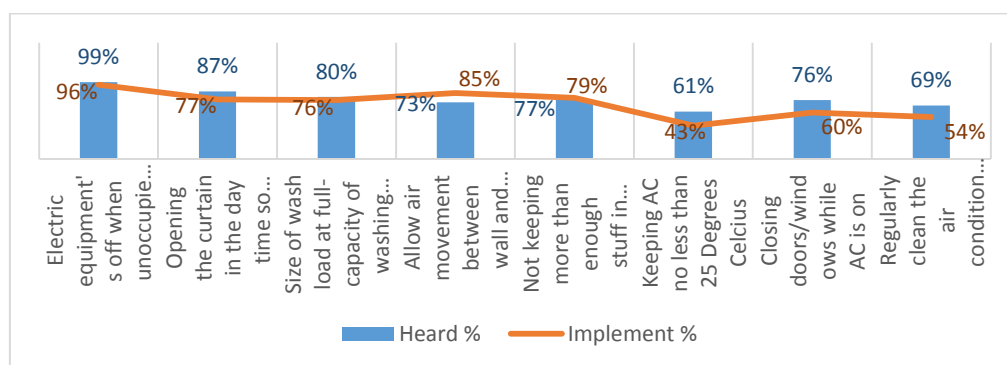
### 3.4 Energy Efficiency Measures

In order to get insight into current awareness and implementation of certain energy efficiency measures, respondents were asked if they have heard and to what extent they were familiar with the same. The measures are categorized into behavioral, high cost and low cost measures for ease of reference.

Respondents showed familiarity with almost all the mentioned energy efficiency measures in the behavioural measures (above 50%) with the least familiarity being in keeping AC not less than 25 Degrees Celsius (61%). Similar trend but with lower percentages of respondents implemented these measures in the household with the least implemented measure being again keeping AC not less than 25 Degrees Celsius (43%).

Similar trend but with lower percentages of respondents implemented these measures in the household, with the exception keeping enough food in the freezer (79%) and allowing air movement between wall and refrigerator (89%). This shows that even though, some have not heard they are already implementing these features at home as seen in Graph 22.

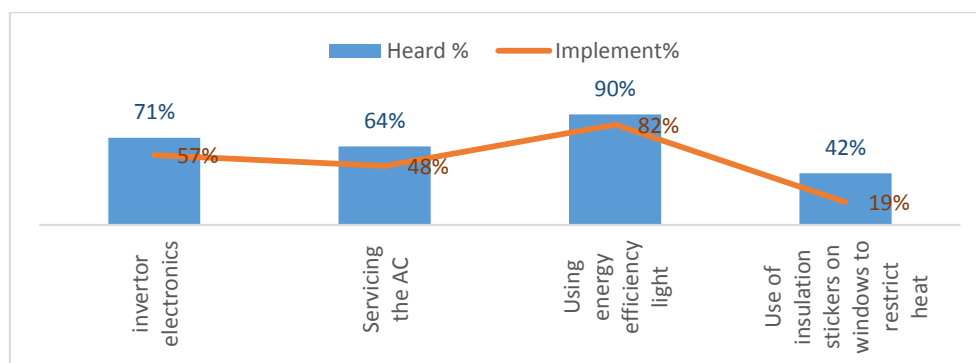
Graph 22: Awareness and implementation of behavioral energy efficiency measures in the household



While 85% respondents allowed air movement between wall and freezer, only 73% were familiar on this energy efficient measure. (Graph 22).

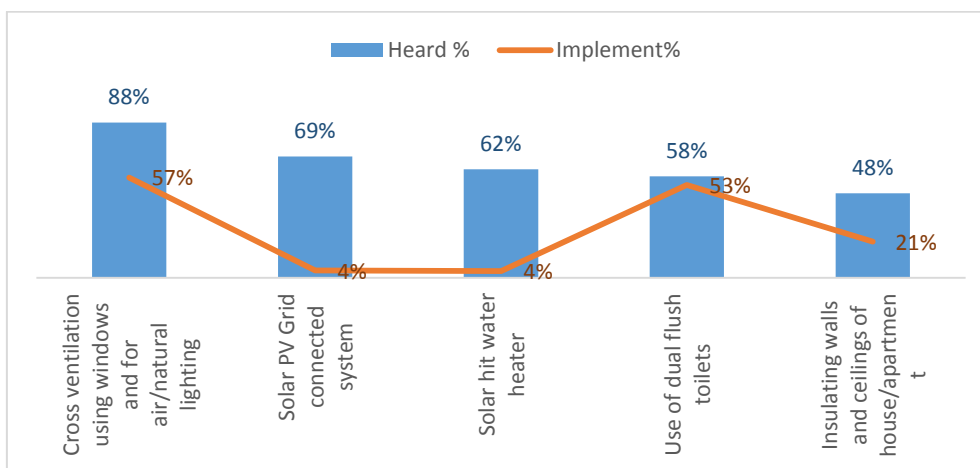
On the Low-Medium cost efficiency measures, respondents showed familiarity with almost all the mentioned energy efficiency measures except for the use of insulation stickers on windows to restrict heat (42%) and less implemented the measure (19%) (Graph 23)

Graph 23: Awareness and implementation of low-medium cost energy efficiency measures in the household



For the High cost efficiency measures, respondents showed familiarity with almost all the mentioned energy efficiency measures except for the Insulating walls and ceilings of house/apartments (48%) and except for the use of dual flush toilets and cross ventilation using windows, all the other measures were less frequently implemented recording below 21% (Graph 24).

Graph 24: Awareness and implementation of high cost energy efficiency measures in the household

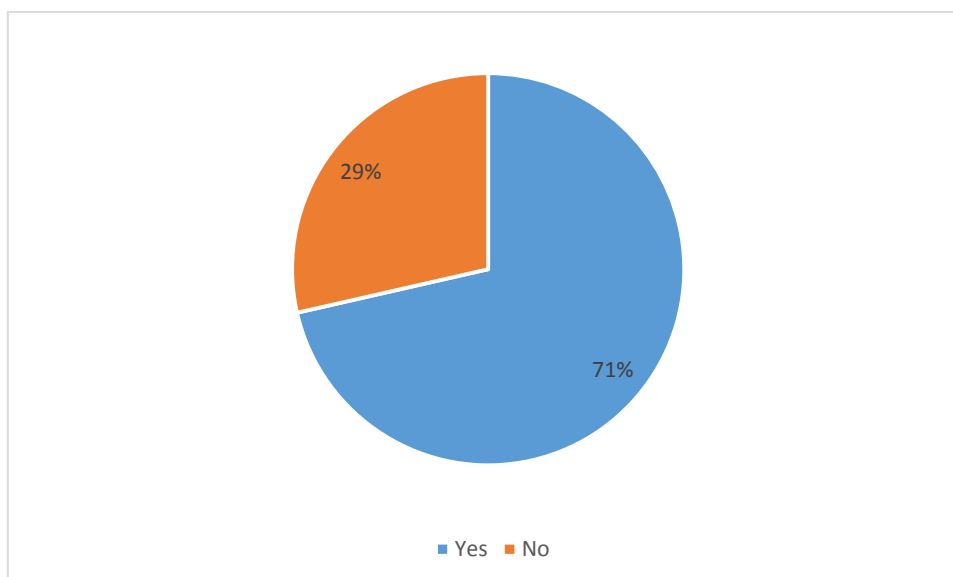


More detailed analysis showed that interviewed respondents from Maafushi had a considerably higher percentage who had heard and are applying the mentioned measures in comparison to those from other islands which is depicted in Box 1 and Box 2 in Annex.

### 3.4.1 Energy Efficiency Measures taken in the Household

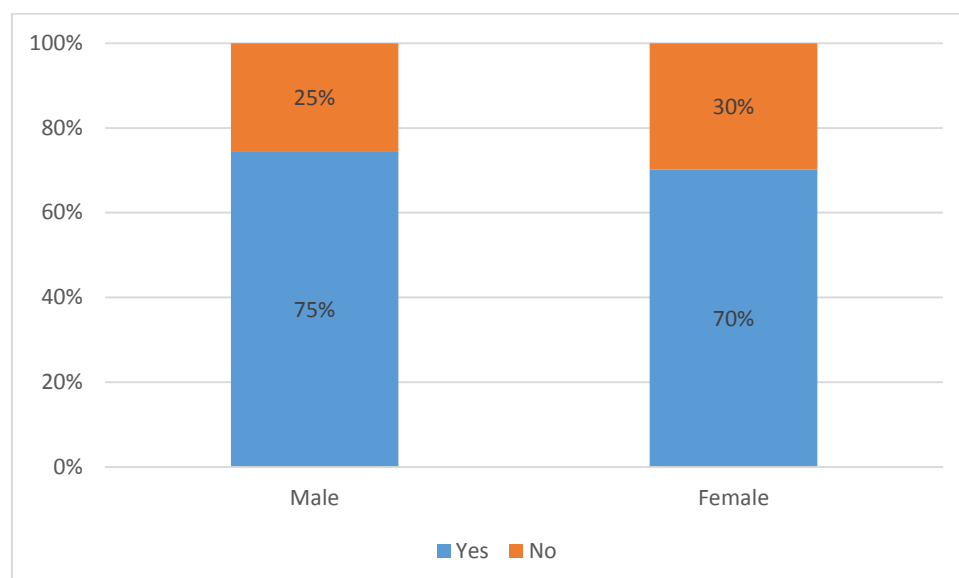
By implementing some of the above familiar methods respondents affirmed that they minimized use and expenses, where a little more than a fourth of the respondents from each locality agree to this as shown in the Graph 25.

Graph 25: Minimized use and expenses due to use of energy efficient methods



Three out of four male respondents affirmed that they minimized use and expense whereas, this proportion is slightly less for the female as shown in the Graph 26.

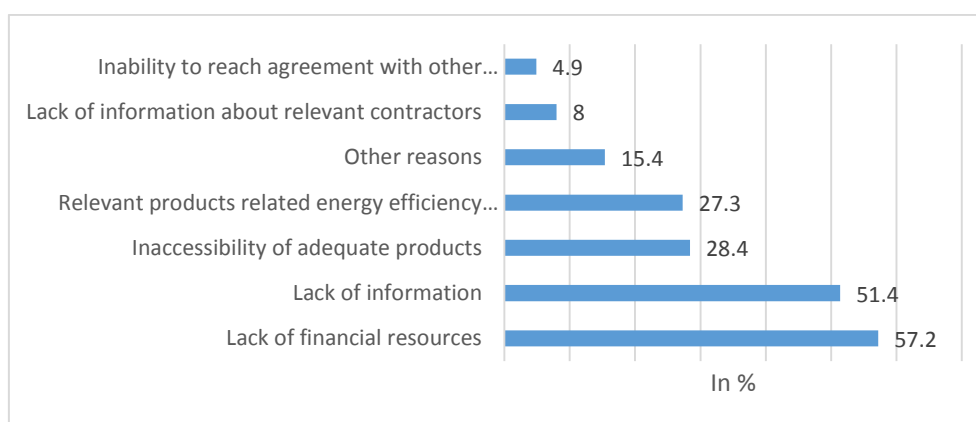
Graph 26: Minimized use and expenses due to use of energy efficient methods, by gender



### 3.4.2 Barriers to Implement Energy Efficiency Measures

The reason for not undertaking some of the mentioned measures was lack of financial resources for 57.2% of respondents (Graph 27). Slightly less responses than that stated the reason as the lack of information.

Graph 27: Reasons for which you are not planning to implement some of energy efficiency measures

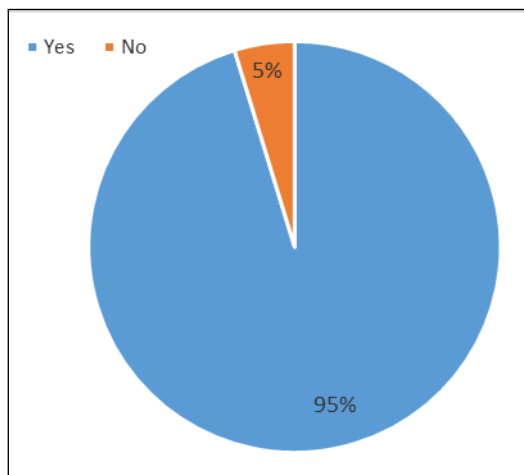


### 3.4.3 Readiness to Implement Energy Efficiency Measures

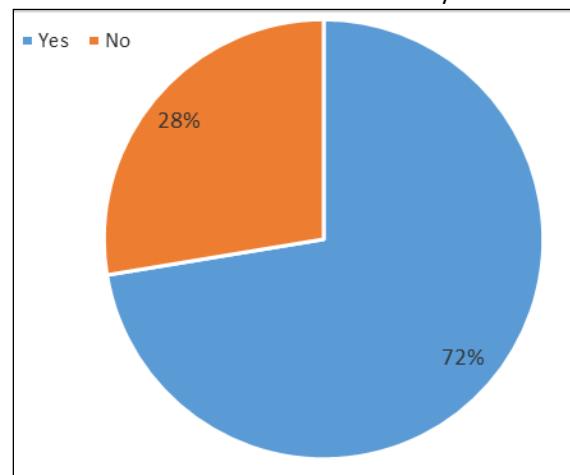
When they were asked about the willingness to implement energy efficient methods, almost 95% of the respondents said they are willing to implement the methods familiar to them, although this figure reduced to 72% when they were asked whether they would be willing to pay to participate in an energy efficient programme as shown in Graph 28 and Graph 29 respectively.



Graph 28: Willingness to implement energy efficient methods

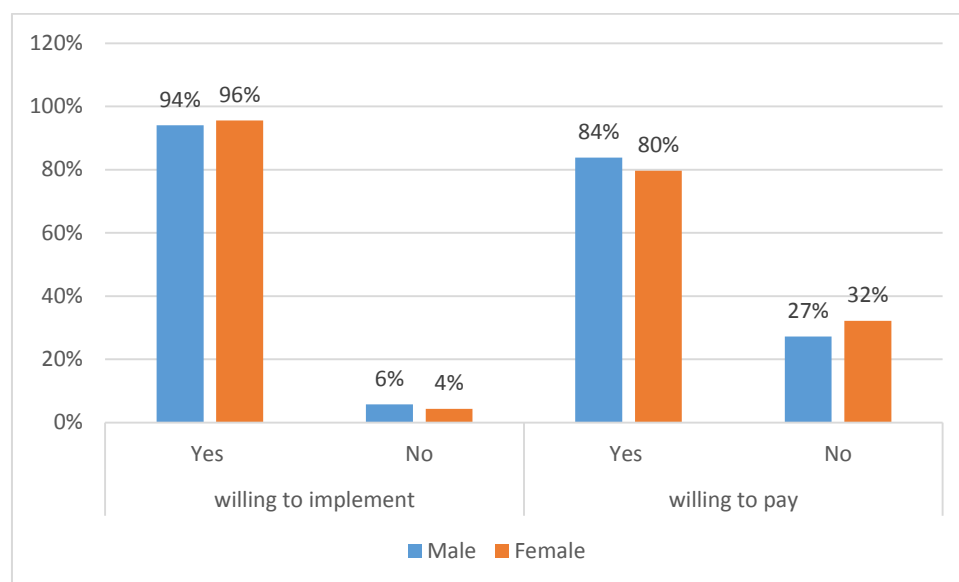


Graph 29: Willing to pay for a service/system/device that would reduce electricity



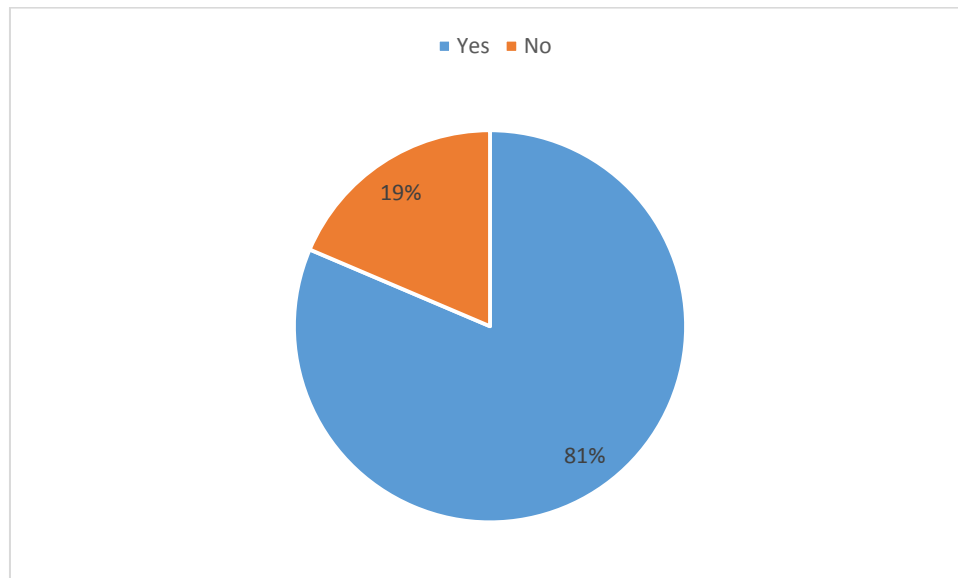
No significant difference is recorded when data is segregated by gender, Graph 30.

Graph 30: Willingness to implement energy efficient methods and willingness to pay for a service/system/device that would reduce electricity, by gender



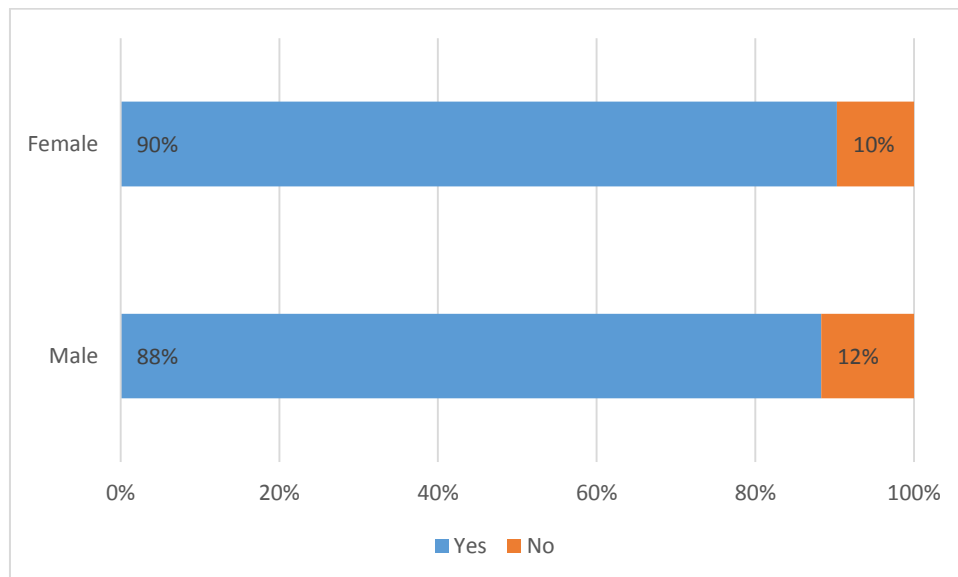
Thus more than 80% of the respondents believe their actions can affect the global warming giving a cyclic effect on the climate change of the world as seen in Graph 31.

Graph 31: Individuals can affect global warming



Slightly more females believe their actions can affect the global warming as seen in Graph 32.

Graph 32: Individuals can affect global warming, by gender



## 4 Conclusion

The research on consumer behavior and preferences regarding Energy Efficiency was conducted for the purpose of getting insight into the level of respondents' awareness on energy efficiency, and gather informing and opinion on consumer choices and behavior in energy consumption in the selected households.

Based on the survey results obtained, the following conclusions were defined:

## 4.1 Areas for Awareness

- The survey was conducted in 6 communities of Maldives on the sample of 1873 respondents.
- Less than 1% of the respondents use solar powered energy for any of the daily uses while 100% of the respondents most often use diesel powered electricity as energy-generating product in their household.
- For cooling, they use electrical fans and standard air conditioners depending on the financial capacities.
- Every second respondent often thought about decreasing energy expenses and for that reason used energy saving light bulbs, consumed energy more rationally and efficiently, performed good practices of energy efficiency.
  - This shows that respondents start to be aware of the importance of efficient and rational energy consumption and due to that show willingness to apply some of energy efficiency measures.
- However, a bit over one third of interviewed (39%) knew and assumed they knew what the term energy efficiency entailed. They define energy efficiency as energy saving and rational consumption.
  - Through public campaigns inform respondents on the energy efficiency concept and measures and possible ways of their application. This is one of the ways to encourage respondents to consider benefits and effects of energy efficiency achievement.
  - The existing knowledge needs to be upgraded and directed towards acquiring additional information, which is the basis for making future decisions to be more energy efficient.
- Respondents define energy efficiency as energy saving and rational consumption.
  - Intensify activities that will make information on how and by applying certain energy efficiency measures respondents can decrease their living costs and thus improve the quality of their life.
- Respondents most often seek information from TV, radio and websites. Similar trend followed when they heard information on energy efficiency through different media channels.
  - Special attention should be given to uses these mediums in awareness campaigns and in commercials (radio, TV, internet).
- Most of the households (87%) had one electricity meter and remaining more than one, where monthly bill ranged from MVR 501 to MVR 3000 in 75% of the cases and they felt the electricity bill was high compared to the items being used.
  - Knowledge and information on how different electricity bands worked and calculated could help respondents manage the usage.
- Respondents showed lower familiarity with the terms energy label and energy efficiency.
  - In the following period inform them better and point to the characteristics of each of these terms.
- In their households respondents have heard of the energy efficient measures although they were not implemented. The most common measures heard and implement include, switching off electrical items when not in use, used energy efficient bulbs and cross ventilations.
- The respondents (71%) believed that using such measures minimized the use and expenses of energy.
- Energy saving light bulbs was recognized as measure of energy efficiency most often used in households. The reason for such situation is financial expenditure application of this measure requires.
  - Introduce public to other energy efficiency measures and point to possibilities of each of them. In this way, the awareness on the importance of achieving energy efficient solutions will be strengthened and knowledge on financial instruments and incentives will be increased.
  - In the following period the respondents are willing to apply inverter products in their households, to use cross ventilation and use energy saving light bulbs.
  - Supply respondents with information on energy efficiency measures, effects of their implementation, ways of purchase and financial incentives. Creating new incentives would contribute to the change of end-user habits.
  - 57% of respondents the reasoned for not implementing some of energy efficiency measures stated the lack of financial resources followed by 51% respondent mentioned the lack of information.

- Get respondents familiar with the terms and long term benefits of energy efficient devices. More adequate informing would contribute to their better familiarity with the devices, their characteristics and possibilities of their purchase.

## **4.2 Priorities for Policy Making**

The research on consumer behavior and preferences regarding Energy Efficiency was conducted for the purpose of getting insight into the level of respondents' awareness of energy efficiency and their informing on the importance of rational energy consumption in the household. Although, this was a household survey, focus group discussions were carried out with key-target groups in the island on energy efficiency of different sectors including government.

- Government should monitor, enforce, evaluate, and periodically update, energy efficiency policies and measures in all sectors – this includes procurement of goods for sectors as well, specifically in education and health.
- Government has already implemented several campaigns on LED and energy saving lights. Thus, to achieve energy savings in lighting, it is important to;
  - Phase-out inefficient lighting products as soon as technically feasible and economically viable.
  - Require and promote improved lighting systems design and management by ensuring that building codes promote the use of natural light.
- It was identified that some islands already implement solar energy systems.
  - Government should establish regulatory and other policies to ensure that energy utilities support cost-effective, verifiable end-use energy efficiency improvements.
  - Oblige the appropriate energy sector entity (e.g. regulated utility, competitive retail supplier or third-party entity) to deliver cost-effective energy efficiency products and services to end-use consumers.
  - Require that energy customers be provided with cost-reflective pricing, supporting information and technology necessary for consumers to better understand and manage energy use.
  - Utilize energy tariffs as a funding mechanism for energy efficiency.

## **4.3 Barriers for Implementation of Energy Efficiency**

It was identified that government play a crucial role in setting the cross sectoral framework for energy efficiency. Governments can help to stimulate investment in energy efficiency and accelerate implementation through national energy efficiency strategies. Once in place, monitoring, enforcement and evaluation of such strategies are crucial to identifying gaps and achieving targets. In this sense;

- Facilitate private investment in energy efficiency by supporting energy efficiency capacity building, standardized measurement and verification protocols, private lending and energy efficiency technology research and development demonstration.
- Barriers such as split incentives between tenants and landlords, lack of awareness of efficient technologies, absence of qualified “green” technicians and high initial investment costs threaten market-driven energy savings measures. Governments can eliminate these barriers and achieve building sector energy savings by implementing a package of policies. In particular:
  - Develop minimum energy performance codes/standards and require all new buildings, as well as buildings undergoing renovation, to meet energy codes standards.
  - Support and encourage the construction of buildings with net-zero energy consumption.
  - Implement policies to improve the energy efficiency of existing buildings with emphasis on significant improvements to building envelopes and systems during renovations.

- Require building energy performance labels or certificates that provide information to owners, buyers and renters.
- Establish policies to improve the energy efficiency performance of critical building components in order to improve the overall energy performance of new and existing buildings.



## 5 Annexes

### Annex 1: Research Tools

#### Questionnaire for selected Households

##### Identification

1. Name of House (If Male' with ward/island) .....
2. Contact number of respondent: .....
3. Gender of the respondent;
  - a. Male
  - b. Female
4. Age of the respondent
  - a. 18 – 34 years
  - b. 35 – 64 years
  - c. 65 and above
5. Education level of respondent
  - a. O' level
  - b. A' level
  - c. Degree and above
  - d. Academic/Vocational Certificate
  - e. No Certificate
  - f. Other.....
6. Employment status of respondent
  - a. Employed
  - b. Unemployed
  - c. Retired
  - d. Other.....
7. Number and employment status of persons living in the household
 

|                                   | No of persons in the HH |
|-----------------------------------|-------------------------|
| a. Total                          |                         |
| b. Children below 18 years of age |                         |
| c. 18 – 34 years                  |                         |
| d. 35 – 64 years                  |                         |
| e. 65 years and above             |                         |
8. Monthly household income
  - a. <5,000
  - b. 5,001 – 15,000
  - c. 15,001 – 25,000
  - d. 25,001 - 35,000
  - e. 35,001 – 45,000
  - f. > 45,001

### Living Condition

9. Type of dwelling
  - a. House
  - b. Flat/Apartment
  - c. Other, please specify.....
10. Number of levels in the building 

|  |  |
|--|--|
|  |  |
|  |  |
11. How many rooms are used for living by the occupants of the household? (include sitting room, dining room, storage, kitchen and bedrooms) 

|  |  |
|--|--|
|  |  |
|  |  |
12. How many rooms do you use for sleeping? (include sitting room also if you use it for sleeping) 

|  |  |
|--|--|
|  |  |
|  |  |
13. What is the type of tenure of the housing unit occupied by the household?
  - a. Owner occupied (skip to Q15)
  - b. Rent free (skip to Q15)
  - c. Rented
  - d. Others, please specify .....
14. If rented, what is your monthly rent (in Rufiyaa):
  - a. Less than MVR 5000
  - b. Between MVR 5001 – MVR 7500
  - c. Between MVR 7501 – MVR 15000
  - d. Between MVR 15001 – MVR 25000
  - e. Above MVR 25001
15. What are the most common means of seeking information? (Rank the most common 3)
  - a. Radio
  - b. TV
  - c. Websites (Online news/ministry websites etc)
  - d. Posters
  - e. Facebook
  - f. Viber
  - g. Twitter
  - h. Others, please specify.....

### On Energy Usage and Efficiency

16. Number of electricity meters available in the household 

|  |  |
|--|--|
|  |  |
|  |  |
17. How much is your monthly electricity bill?
  - a. Less than MVR 500
  - b. Between MVR 501 to MVR 1000
  - c. Between MVR 1001 to MVR 1500
  - d. Between MVR 1501 to MVR 3000
  - e. Between MVR 3001 to MVR 5000
  - f. More than MVR 5001



18. Do you feel your electricity bill is high compared to the equipment's used in the household?
- Yes, Always
  - Yes, sometimes
  - No

19. Have you considered decreasing your electricity bill in your household?
- Yes
  - No
  - Sometimes

20. How much is your monthly Water bill?
- Less than MVR 500
  - Between MVR 501 to MVR 1000
  - Between MVR 1001 to MVR 1500
  - Between MVR 1501 to MVR 3000
  - Between MVR 3001 to MVR 5000
  - More than MVR 5001

21. What sources of water is used at your household? (*Probe on main uses of water - flush tank; drinking, cooking, bathing. Tick all that is relevant*)
- Mains water/Water supply
  - Pumped water/ground-well water
  - Harvested rain water
  - Bottled water

22. Do you know what 'energy efficiency' means? (Write in your own words what you think it is)
- Yes.....
  - Don't know (skip to Q24)

23. How did you hear about energy efficiency (multiple answers possible):
- TV
  - Radio
  - Internet (websites)
  - Social media
  - From a friend and/or relative
  - Advertisements
  - Published articles about energy efficiency (newspapers, magazines, Internet, etc.)
  - Other, specify.....

24. Are you aware of the following programmes?

|  | Yes | No | Somewhat | What did you learn from the programme? |
|--|-----|----|----------|--|
| a. Distribution of led lights by government under Fahi Ali programme/project | Y   | N  | S        |  |
| b. Awareness campaign under "LED saves"                                      | Y   | N  | S        |  |
| c. Awareness campaign to keep limit AC temperature - "It's Cool @25"         | Y   | N  | S        |  |
| d. TV drama on energy efficiency Ramadan 2015 "dhenegannama"                 | Y   | N  | S        |  |

25. Do you know what energy star- rating/label means?

- a) Yes
- b) No

26. Which of the following energy-generating products you own and most often used in your household:

| 26. Items                          | 26.1 Availability |      | 26.2 No. of Items |
|------------------------------------|-------------------|------|-------------------|
|                                    | Yes 1             | No 2 |                   |
| a. Standard air conditioner        | 1                 | 2    |                   |
| b. Inverter air conditioner        | 1                 | 2    |                   |
| c. Washing machines – front loader | 1                 | 2    |                   |
| d. Washing machines – top loader   | 1                 | 2    |                   |
| e. Washing machines – twin tub     | 1                 | 2    |                   |
| f. Refrigerators                   | 1                 | 2    |                   |
| g. Freezers                        | 1                 | 2    |                   |
| h. Electric Fans                   | 1                 | 2    |                   |
| i. Electric Ovens                  | 1                 | 2    |                   |
| j. Microwave ovens                 | 1                 | 2    |                   |
| k. Induction cooktops              | 1                 | 2    |                   |
| l. Electric stove                  | 1                 | 2    |                   |
| m. Television sets                 | 1                 | 2    |                   |
| n. In built shower water heaters   | 1                 | 2    |                   |
| o. Electric Irons                  | 1                 | 2    |                   |

27. What factors do you consider when purchasing an energy generating product (Please rank up to 4 options with 1 being the most important and 4 being the least)Energy consumption

- a. Cost
- b. Brand
- c. Country of production
- d. Safety
- e. Advice from store staff
- f. Energy label
- g. Advertisement
- h. Others.....

Comment if any to Q27 (If separate factors are looked into when purchasing a specific item)

.....

.....

28. Do you use LPG (gas) in your household?

- a. Yes
- b. No (Skip to Q 30)

29. Please indicate the size and quantity of LPG cylinders used by your household Size (kg) per month?

- a. Size (Kg) 

|  |  |
|--|--|
|  |  |
|--|--|
- b. How long can you use it (in days) 

|  |  |
|--|--|
|  |  |
|--|--|

|  |  |
|--|--|
|  |  |
|  |  |

30. Among the following energy efficiency measures please identify those you have heard of and implemented so far?

| Energy Efficiency Measures   | Heard of |   | Implemented |   |
|--|----------|---|-------------|---|
| 1. Electrical equipment's off when unoccupied/not used   | Y        | N | Y           | N |
| 2. Use of electrical equipment with inverter   | Y        | N | Y           | N |
| 3. Cross ventilation using windows and for air/natural lighting                                  | Y        | N | Y           | N |
| 4. Opening the curtain the daytime so sunlight could enter                                       | Y        | N | Y           | N |
| 5. Size of wash load at full-capacity of washing machine   | Y        | N | Y           | N |
| 6. Allow air movement between wall and freezer by leaving not less than 4 inch between them      | Y        | N | Y           | N |
| 7. Not keeping more than enough stuff in freezer   | Y        | N | Y           | N |
| 8. Keeping AC not less than 25 Degrees Celsius   | Y        | N | Y           | N |
| 9. Servicing the AC at least once a year by a technician   | Y        | N | Y           | N |
| 10. Cleaning AC filter regularly   | Y        | N | Y           | N |
| 11. Closing doors and windows while the AC is on   | Y        | N | Y           | N |
| 12. Using energy efficiency lights   | Y        | N | Y           | N |
| 13. Solar PV grid connected system   | Y        | N | Y           | N |
| 14. Solar hot water heater   | Y        | N | Y           | N |
| 15. Use of dual flush toilets  | Y        | N | Y           | N |
| 16. Use of insulation stickers on windows to restrict heat                                       | Y        | N | Y           | N |
| 17. Insulating walls and ceiling of house/apartment insulation (in a way heat does not transfer) | Y        | N | Y           | N |

31. Have you improved your house's energy efficiency/cost savings since then?

- a. Yes
- b. No

32. Would you be willing to implement the above mentioned energy efficiency measures in your household?

- a. Yes
- b. No

Comment

.....

.....

33. Please specify the reasons for not implementing some of the mentioned measures? (multiple answers)

- a. Lack of information
- b. Lack of financial resources
- c. Inaccessibility of adequate products
- d. Relevant products related energy efficiency are more expensive
- e. Lack of information about relevant contractors
- f. Inability to reach agreement with other tenants in common residential building
- g. Some other reason, specify.....

34. Would you be willing to pay for a service/system/device that would reduce your energy bill?

- a. Yes
- b. No

35. Do you believe that any energy efficiency measure you use at your home will translate into any effect on global warming?

- a. Yes
- b. No

36. Would you like to give your opinion/remark or a statement on energy efficiency?

.....

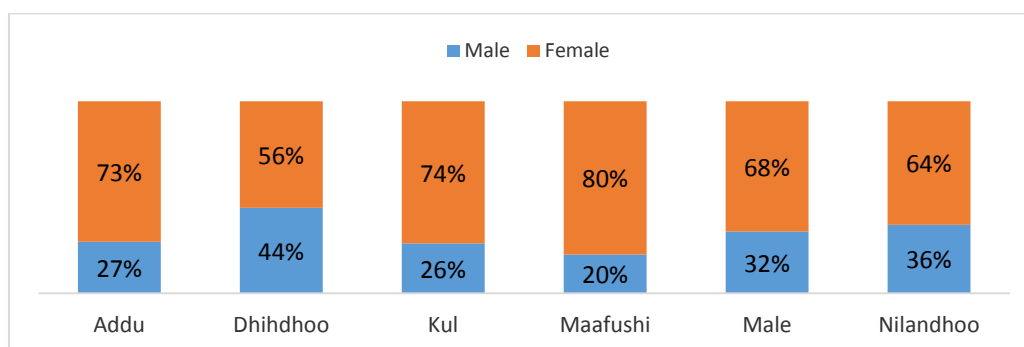
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**End of questionnaire**

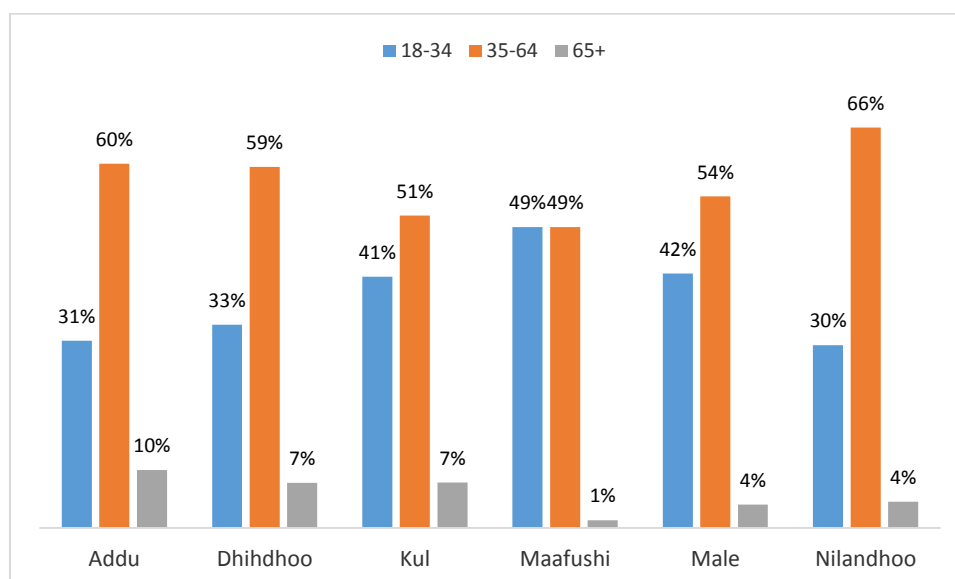
## Annex 2: Statistical Annex (graphs and tables with island comparisons, and descriptions)

Graph 33: Gender of respondent, by island



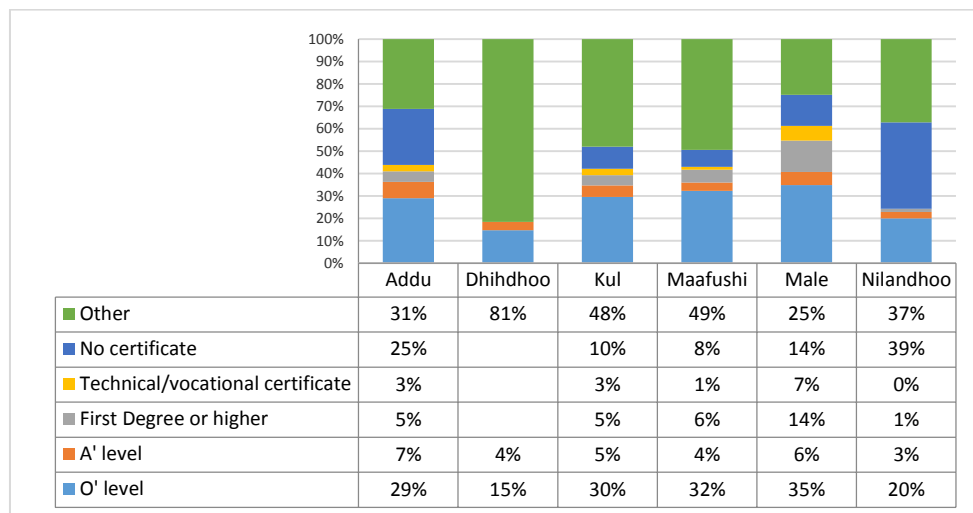
Respondents of the survey was largely skewed towards female; mostly male members are not found at their residence.

Graph 34: Age of respondent, by island



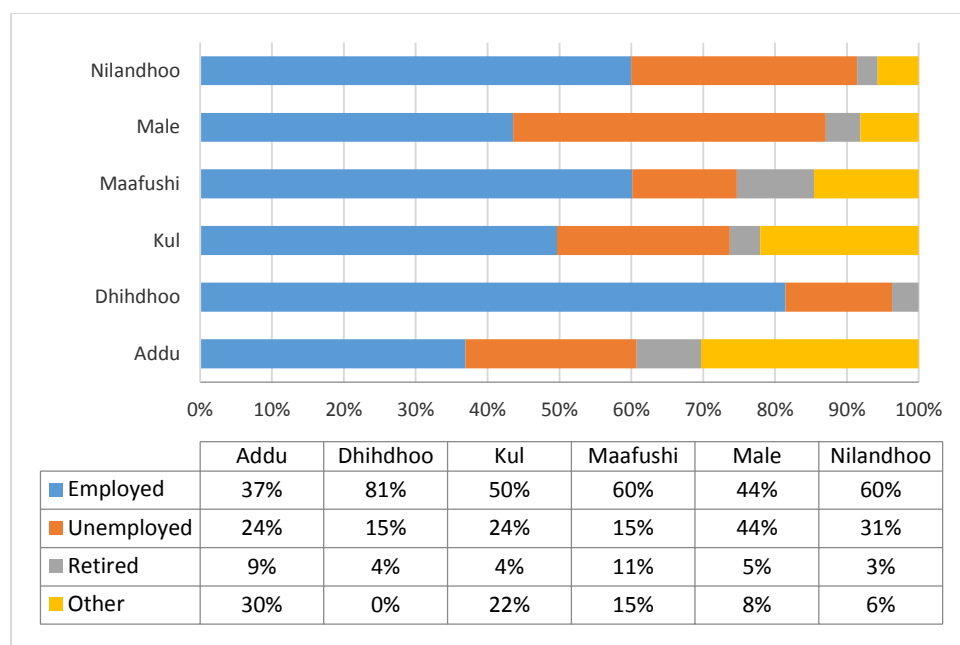
In all the localities, majority of the respondents were in the age group 35–64, except for Maafushi where equal percentages were in 18–34 and 35–64 (49%).

Graph 35: Education level of respondent, by island



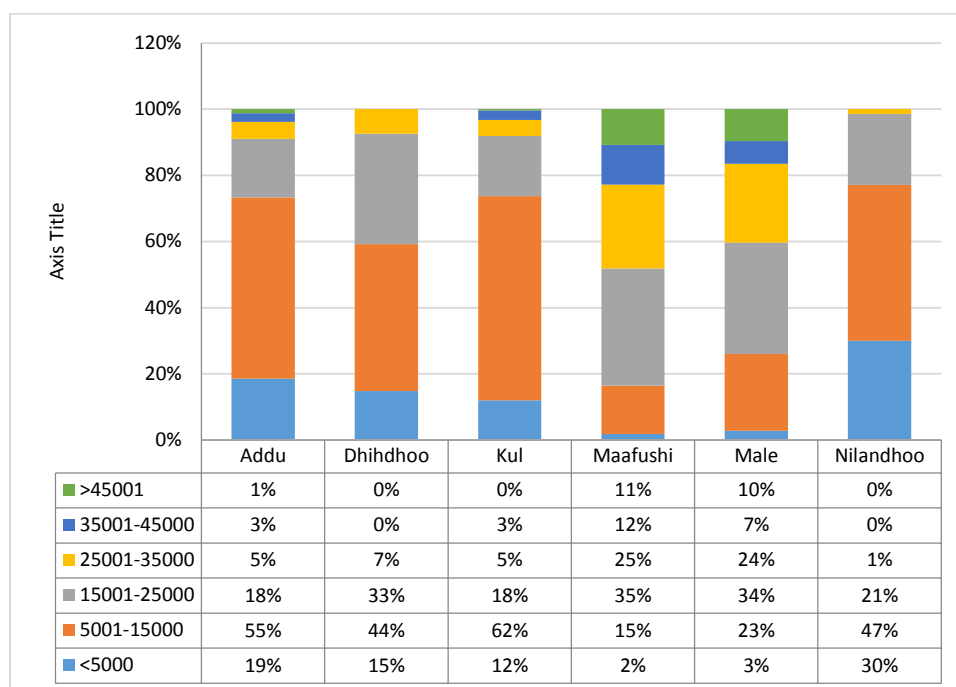
In all localities except Male', the highest percentage of respondents stated Other or No certificate as their level of education. However, O' level came very close in most localities.

Graph 36: Education level of respondent, by island



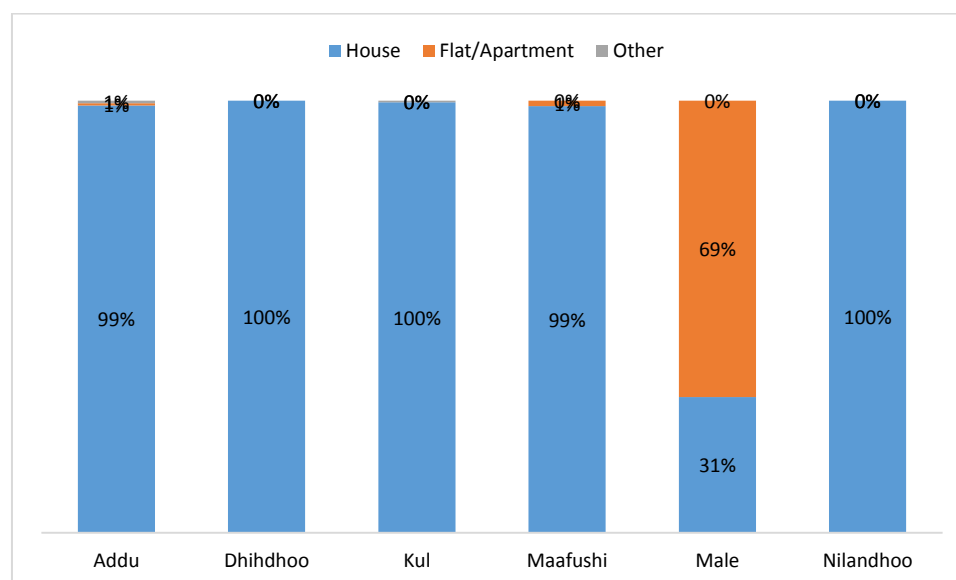
Except for Male', most respondents were employed. In Male' equal respondents were employed and unemployed (44%).

Graph 37: Monthly household income, by island



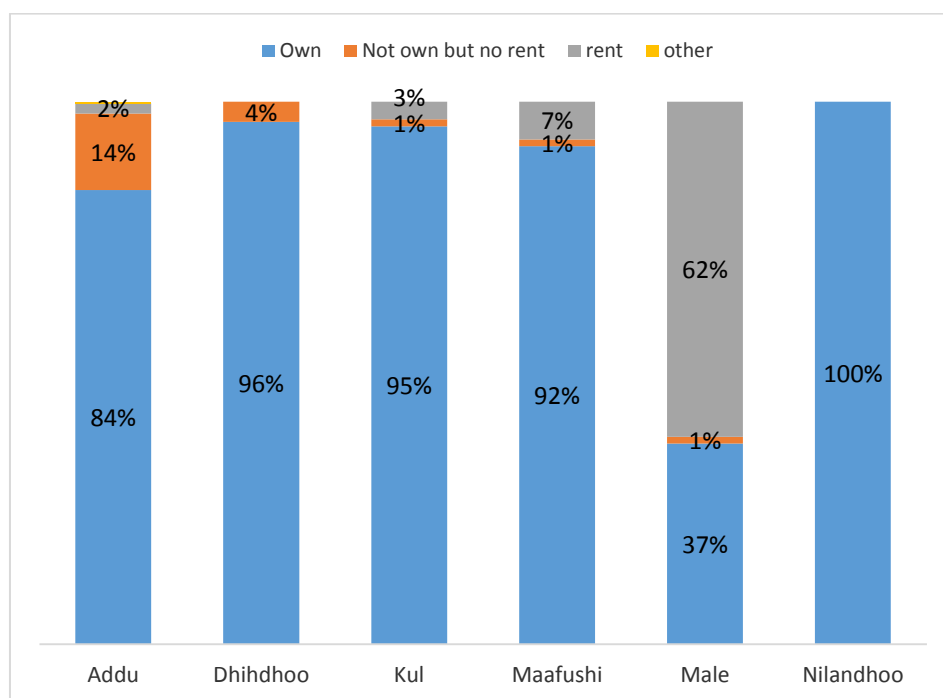
Except for Maafushi and Male', very few (<10%) reported to earn an income above 25,000 per month, Nilandhoo and Dhihdhoo recorded 0%.

Graph 38: Type of dwelling, by island



All localities except Male', Houses predominantly stated as type of dwelling. In Male' a little less than a third stated houses.

Graph 39: Type of tenure of the housing unit occupied by the household, by island



Male' residents 62% lived in rented premises, while 14% in Addu lived in premises which they do not own neither rent, while the rest of the localities lived in their own houses.

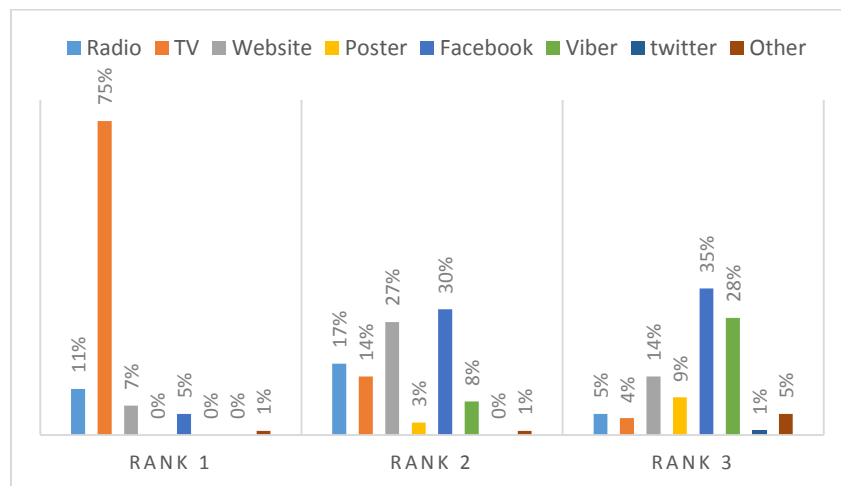
Table 4: If rented, monthly rent in MVR, by island

| Total Rent  | No rent | 5000 | 5001-7500 | 7501-15000 | 15001-25000 | 25001 + |
|-------------|---------|------|-----------|------------|-------------|---------|
| Addu        | 98%     | 2%   | 0%        | 0%         | 0%          | 0%      |
| Dhihdhoo    | 100%    | 0%   | 0%        | 0%         | 0%          | 0%      |
| Kul         | 97%     | 2%   | 1%        | 0%         | 0%          | 0%      |
| Maafushi    | 93%     | 1%   | 3%        | 3%         | 0%          | 1%      |
| Male        | 38%     | 3%   | 7%        | 29%        | 20%         | 2%      |
| Nilandhoo   | 100%    | 0%   | 0%        | 0%         | 0%          | 0%      |
| Grand Total | 85%     | 2%   | 2%        | 6%         | 4%          | 0%      |

Dhihdhoo and Nilandhoo residents live rent free, while 38% in Male' lived rent free and 51% of those renting in Male' paid a rent more than 7500 MVR per month.

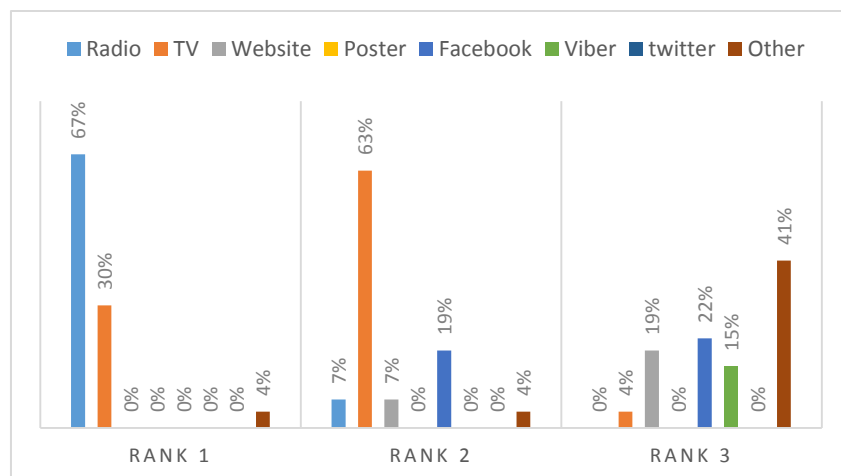


Graph 40: Most common means of seeking information, Addu



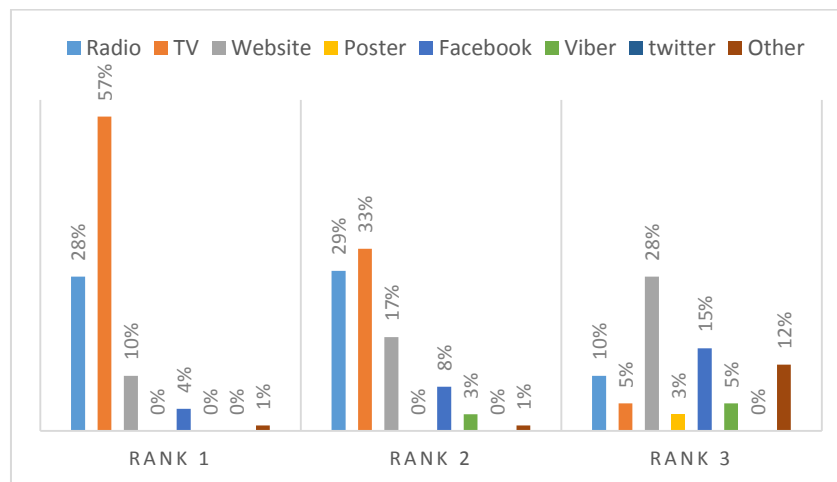
In Addu TV was the most common means of seeking information (75%), followed by twitter, websites and Viber.

Graph 41: Most common means of seeking information, Dhindhoo



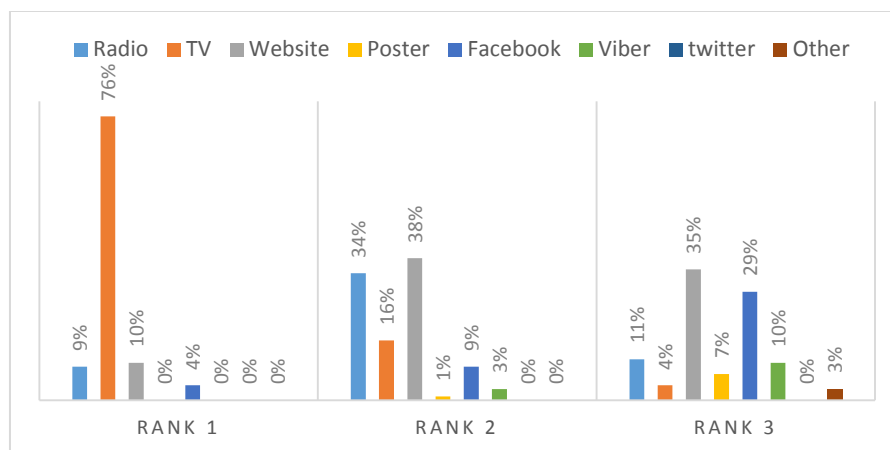
Radio is predominant in Dhindhoo as a means of seeking information (67%) while TV ranked highest in 2<sup>nd</sup> rank (63%).

Graph 42: Most common means of seeking information, Kulhudhuffushi



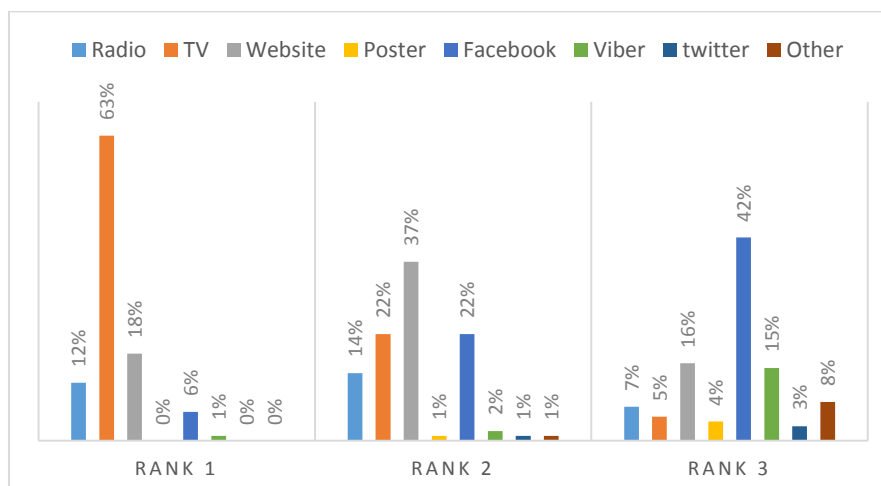
TV ranked highest in rank 1 (57%) and rank 2 (33%) while Radio ranked second in rank 1 (28%) and rank 2 (33%), in Kulhudhuffushi.

Graph 43: Most common means of seeking information, Maafushi



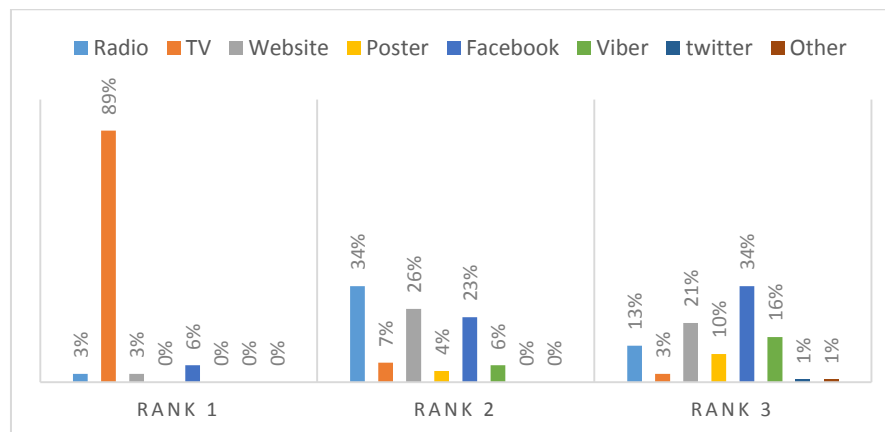
TV ranked highest in rank 1 (76%) while Website ranked highest in rank 2(38%) closely followed by Radio in rank 2 (34%) in Maafushi.

Graph 44: Most common means of seeking information, Male'



63% respondents from Male' ranked TV as the main source of information, and websites and Facebook as rank 2 (37%) and rank 3 (42%) respectively.

Graph 45: Most common means of seeking information, Nilandhoo



TV ranked 1<sup>st</sup> with 89% in Rank 1, and Radio and Facebook on rank 2 (34%) and rank 3 (34%) in Nilandhoo.

#### On Energy Usage and Efficiency

Table 5: Electricity meters available in the household, by island

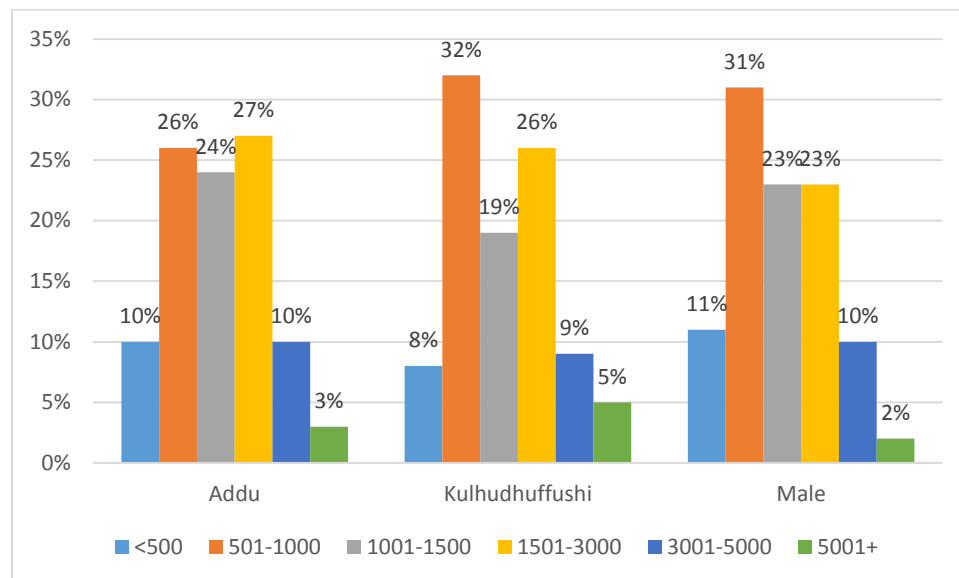
|                  | 1   | 2   | 3  | 4  | 5  | 6  |
|------------------|-----|-----|----|----|----|----|
| <b>Addu</b>      | 90% | 7%  | 2% | 1% | 0% | 0% |
| <b>Dhihdhoo</b>  | 93% | 7%  | 0% | 0% | 0% | 0% |
| <b>Kul</b>       | 85% | 12% | 2% | 0% | 0% | 0% |
| <b>Maafushi</b>  | 75% | 20% | 4% | 0% | 1% | 0% |
| <b>Male</b>      | 90% | 5%  | 2% | 2% | 1% | 1% |
| <b>Nilandhoo</b> | 64% | 31% | 4% | 0% | 0% | 0% |
|                  | 87% | 10% | 2% | 1% | 0% | 0% |

In most of the localities >90% had one electricity meter except for Kulhudhuffushi (85%), Maafushi (75%) and Nilandhoo 64%).

Table 6: Monthly expenses on electricity, by island

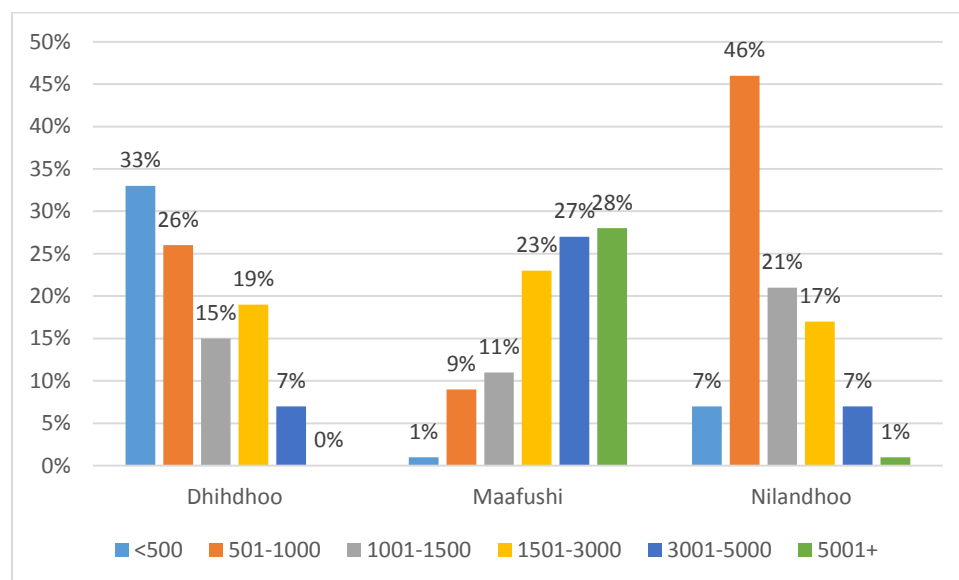
|                  | <500 | 501-1000 | 1001-1500 | 1501-3000 | 3001-5000 | 5001+ |
|------------------|------|----------|-----------|-----------|-----------|-------|
| <b>Addu</b>      | 10%  | 26%      | 24%       | 27%       | 10%       | 3%    |
| <b>Dhihdhoo</b>  | 33%  | 26%      | 15%       | 19%       | 7%        | 0%    |
| <b>Kul</b>       | 8%   | 32%      | 19%       | 26%       | 9%        | 5%    |
| <b>Maafushi</b>  | 1%   | 9%       | 11%       | 23%       | 27%       | 28%   |
| <b>Male</b>      | 11%  | 31%      | 23%       | 23%       | 10%       | 2%    |
| <b>Nilandhoo</b> | 7%   | 46%      | 21%       | 17%       | 7%        | 1%    |
|                  | 9%   | 27%      | 22%       | 25%       | 11%       | 5%    |

Graph 46: Expenses on monthly electricity bill, urban centres (Addu, Kulhudhuffushi and Male')



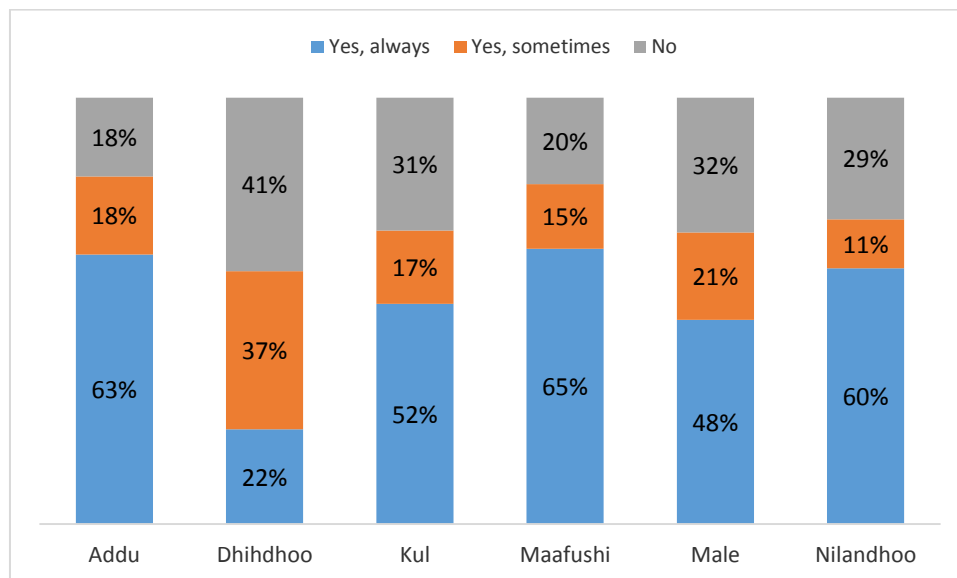
For the urban centers, in Addu 77% paid MVR501 to MVR3000 for their electricity consumption, for Kulhudhuffushi it was 78% and for Male' it was 77% of the respondents. While those who paid more than MVR3000 stood at 12% for Male' it was 13% for Addu and 14% for Kulhudhuffushi.

Graph 47: Expenses on monthly electricity bill, rural islands (Dhihdhoo, Maafushi and Nilandhoo)



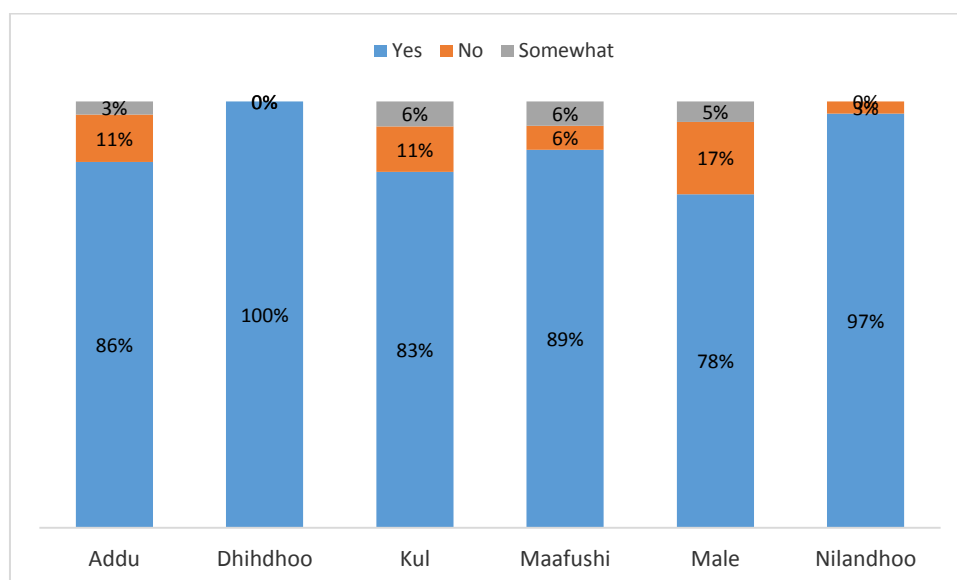
For the non-urban centers included in the research, 33% in Dhihdhoo spent less than 500MVR whereas this was 1% in Maafushi and 7% in Nilandhoo. In Maafushi 28% spent more than 5000MVR on electricity while this percentage was 1% in Nilandhoo and Dhihdhoo had none.

Graph 48: Perception on electricity bill being high compared to equipment's used in households, by island



65% in Maafushi, 63% in Addu, 60% in Nilandhoo and 52% in Kulhudhuffushi perceived that the electricity bill is high always compared to the equipment's they use.

Graph 49: Percentage of respondents who considered reducing the electricity bill, by island



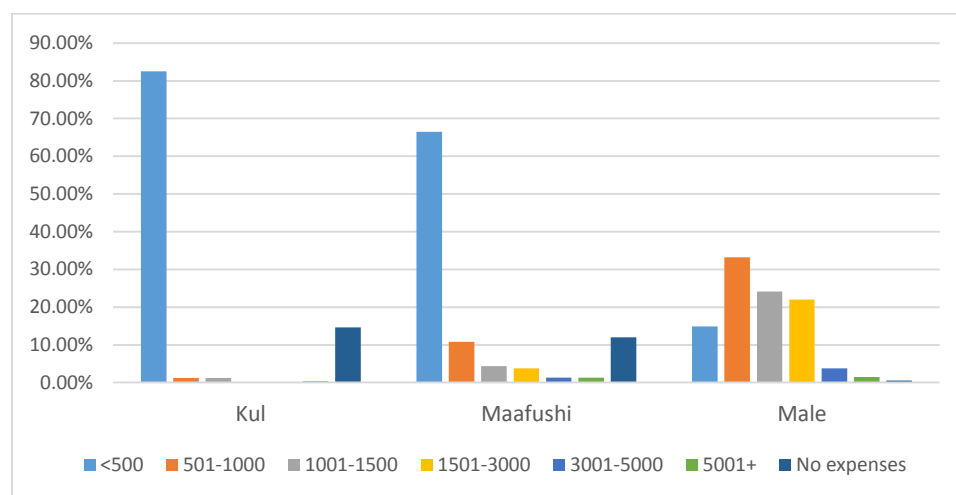
While more than 78%-100% considered decreasing their electricity bill, 17% in Male' claimed they didn't consider it, for which there were 11% in Addu and Kulhudhuffushi.

Table 7: Monthly expenses on water, by island

|                     | <500  | 501-1000 | 1001-1500 | 1501-3000 | 3001-5000 | 5001+ | No expenses |
|---------------------|-------|----------|-----------|-----------|-----------|-------|-------------|
| <b>Addu</b>         | 0.8%  | 0.3%     | 0.8%      | 0.2%      | 0.1%      | 0.0%  | 97.8%       |
| <b>Dhihdhoo</b>     | 0.0%  | 0.0%     | 0.0%      | 0.0%      | 0.0%      | 0.0%  | 100.0%      |
| <b>Kulhdhufushi</b> | 82.5% | 1.2%     | 1.2%      | 0.0%      | 0.0%      | 0.4%  | 14.6%       |
| <b>Maafushi</b>     | 66.5% | 10.8%    | 4.4%      | 3.8%      | 1.3%      | 1.3%  | 12.0%       |
| <b>Male'</b>        | 14.9% | 33.2%    | 24.1%     | 22.0%     | 3.8%      | 1.5%  | 0.5%        |
| <b>Nilandhoo</b>    | 0.0%  | 0.0%     | 0.0%      | 0.0%      | 0.0%      | 0.0%  | 100.0%      |
|                     | 20.7% | 8.5%     | 6.2%      | 5.2%      | 1.0%      | 0.5%  | 57.9%       |

Nilandhoo and Dhihdhoo did not have piped water, and hence no expenses. Addu also reported 98% with no expenses made.

Graph 50: Monthly Water bill, MVR, by island



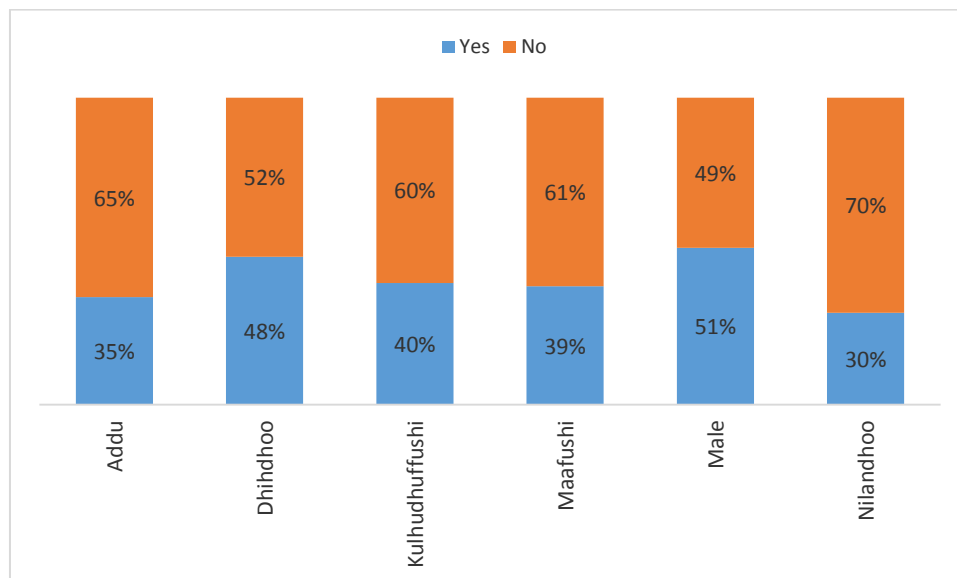
While more than 80% in Kulhudhufushi spent less than 500MVR on piped water, more than 40% in Maafushi spent more than 501MVR and 85% in Male' spent more than 501MVR on piped water.

Table 8: Sources of water is used at your household, by island

|                     | Piped water | Well water | Rain water | Bottled water |
|---------------------|-------------|------------|------------|---------------|
| <b>Addu</b>         | 1%          | 85%        | 94%        | 31%           |
| <b>Dhihdhoo</b>     | 41%         | 100%       | 100%       | 15%           |
| <b>Kulhdhufushi</b> | 50%         | 92%        | 87%        | 22%           |
| <b>Maafushi</b>     | 68%         | 87%        | 82%        | 34%           |
| <b>Male</b>         | 99%         | 51%        | 2%         | 83%           |
| <b>Nilandhoo</b>    | 0%          | 100%       | 99%        | 34%           |
| <b>Grand Total</b>  | 36%         | 80%        | 73%        | 41%           |

While 99% in Male' used piped water for their daily water uses, 68% in Maafushi and 50% in Kulhudhufushi used it.

Graph 51: Respondents who claimed knew what 'energy efficiency' means, by island



Almost half of the respondents in Male' claimed to know what energy efficiency means, while 30% in Nilandhoo, 35% in Addu, 39% in Maafushi, 40% in Kulhudhuffushi and 48% in Dhindhoo claimed the same.

Table 9: Sources from which the respondents heard about energy efficiency, by island

|                    | TV  | Radio | Internet | Social media | family/friend | Advertisement | Article |
|--------------------|-----|-------|----------|--------------|---------------|---------------|---------|
| <b>Addu</b>        | 35% | 24%   | 16%      | 5%           | 3%            | 2%            | 1%      |
| <b>Dhindhoo</b>    | 48% | 48%   | 41%      | 19%          | 7%            | 7%            | 4%      |
| <b>Kul</b>         | 39% | 25%   | 12%      | 3%           | 1%            | 0%            | 0%      |
| <b>Maafushi</b>    | 39% | 22%   | 15%      | 4%           | 1%            | 0%            | 0%      |
| <b>Male</b>        | 51% | 30%   | 19%      | 6%           | 2%            | 1%            | 0%      |
| <b>Nilandhoo</b>   | 30% | 23%   | 16%      | 3%           | 0%            | 0%            | 0%      |
| <b>Grand Total</b> | 39% | 26%   | 16%      | 5%           | 2%            | 1%            | 1%      |

While the highest percentage of people heard about energy efficiency from TV in all the locations, social media was used by people in Dhindhoo more than the rest of the localities.

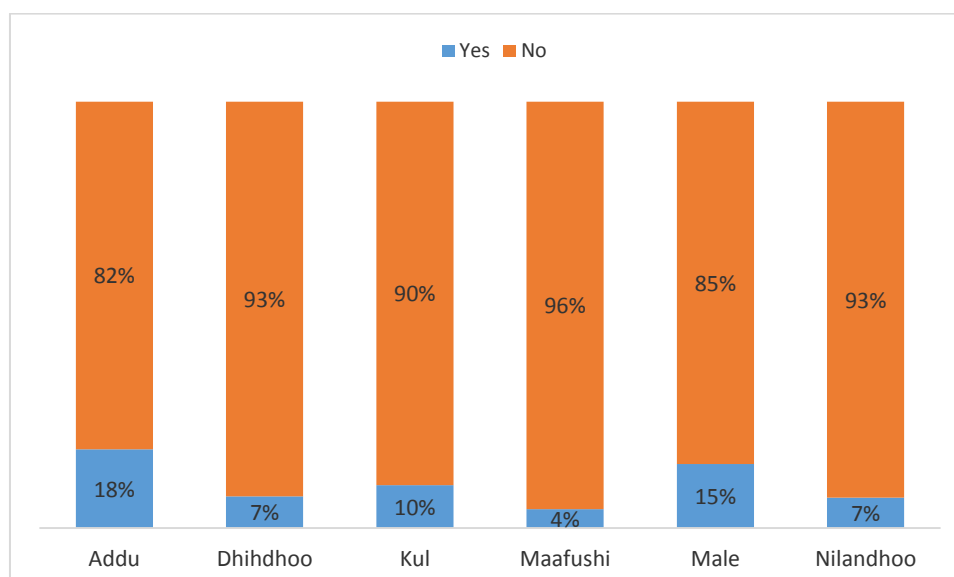
Table 10: Respondents aware of government run programs, by island

|                      | Numbers |     |        | Percentages |      |        |
|----------------------|---------|-----|--------|-------------|------|--------|
|                      | Yes     | No  | Little | Yes         | No   | Little |
| <b>Fahi Ali</b>      |         |     |        |             |      |        |
|                      | Yes     | No  | Little | Yes         | No   | Little |
| <b>Addu</b>          | 311     | 564 | 40     | 34%         | 62%  | 4%     |
| <b>Dhihdhoo</b>      | 21      | 6   |        | 78%         | 22%  | 0%     |
| <b>Kul</b>           | 168     | 110 | 29     | 55%         | 36%  | 9%     |
| <b>Maafushi</b>      | 78      | 76  | 4      | 49%         | 48%  | 3%     |
| <b>Male</b>          | 184     | 184 | 25     | 47%         | 47%  | 6%     |
| <b>Nilandhoo</b>     | 38      | 32  |        | 54%         | 46%  | 0%     |
| <b>LED Saves</b>     |         |     |        |             |      |        |
|                      | Yes     | No  | Little | Yes         | No   | Little |
| <b>Addu</b>          | 42      | 864 | 9      | 5%          | 94%  | 1%     |
| <b>Dhihdhoo</b>      | 1       | 26  |        | 4%          | 96%  | 0%     |
| <b>Kul</b>           | 11      | 292 | 4      | 4%          | 95%  | 1%     |
| <b>Maafushi</b>      | 5       | 151 | 2      | 3%          | 96%  | 1%     |
| <b>Male</b>          | 18      | 372 | 3      | 5%          | 94%  | 1%     |
| <b>Nilandhoo</b>     | 1       | 69  |        | 1%          | 99%  | 0%     |
| <b>It's cool @25</b> |         |     |        |             |      |        |
|                      | Yes     | No  | Little | Yes         | No   | Little |
| <b>Addu</b>          | 29      | 882 | 4      | 3%          | 96%  | 0%     |
| <b>Dhihdhoo</b>      | 1       | 26  |        | 4%          | 96%  | 0%     |
| <b>Kul</b>           | 13      | 288 | 6      | 4%          | 94%  | 2%     |
| <b>Maafushi</b>      | 9       | 147 | 2      | 6%          | 93%  | 1%     |
| <b>Male</b>          | 58      | 330 | 5      | 15%         | 84%  | 1%     |
| <b>Nilandhoo</b>     | 3       | 67  |        | 4%          | 96%  | 0%     |
| <b>TV Drama</b>      |         |     |        |             |      |        |
|                      | Yes     | No  | Little | Yes         | No   | Little |
| <b>Addu</b>          | 65      | 843 | 7      | 7%          | 92%  | 1%     |
| <b>Dhihdhoo</b>      | 0       | 27  | 0      | 0%          | 100% | 0%     |
| <b>Kul</b>           | 75      | 219 | 13     | 24%         | 71%  | 4%     |
| <b>Maafushi</b>      | 22      | 130 | 6      | 14%         | 82%  | 4%     |
| <b>Male</b>          | 62      | 317 | 14     | 16%         | 80%  | 4%     |
| <b>Nilandhoo</b>     | 9       | 60  | 1      | 13%         | 86%  | 1%     |

People in Addu (34%) were less aware of Fahi Ali programme, whereas those in Dhihdhoo (78%) were aware. Almost all localities, around 94%-99% were not aware of LED saves and It's cool @25, except for Male' for the later where 15% were aware. As for the drama, 24% of Kulhudhuffushi was aware while in the rest of the localities, 80%-100% were unaware.



Graph 52: Percentage of respondents who know what energy label is, by island



18% and 15% in Addu and Male' respectively claimed they knew what energy label means. However, for the rest of the localities 90% - 96% claimed they did not know about it.

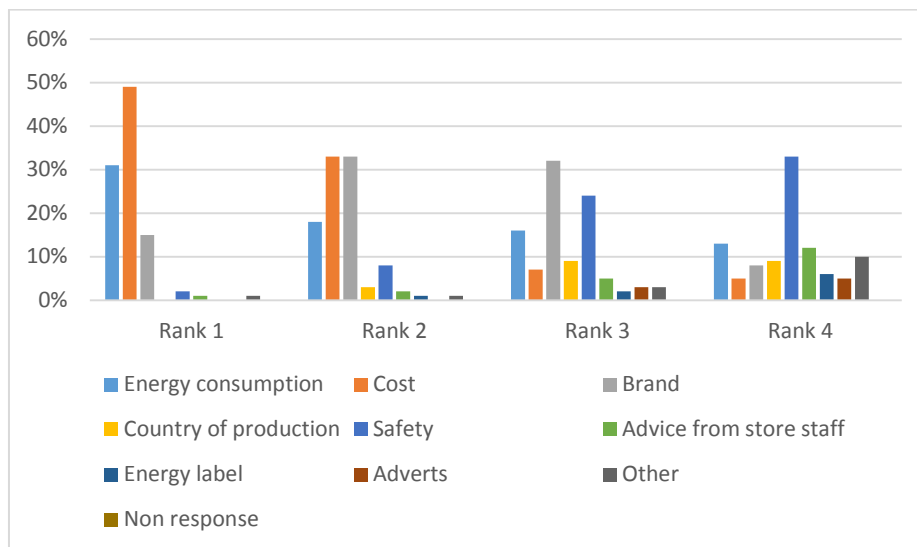
Table 11: Energy-consuming products owned and most often used in the households, by island

|    |                                 | Addu | Dhindhoo | Kul | Maafushi | Male | Nilandhoo | Grand Total |
|----|---------------------------------|------|----------|-----|----------|------|-----------|-------------|
| 1  | Standard air conditioner        | 21%  | 0%       | 21% | 28%      | 18%  | 16%       | 20%         |
| 2  | Inverter air conditioner        | 42%  | 52%      | 30% | 82%      | 63%  | 43%       | 48%         |
| 3  | Washing machines – front loader | 8%   | 7%       | 10% | 7%       | 22%  | 11%       | 11%         |
| 4  | Washing machines – top loader   | 40%  | 33%      | 33% | 50%      | 50%  | 29%       | 41%         |
| 5  | Washing machines – twin tub     | 59%  | 67%      | 69% | 55%      | 31%  | 60%       | 54%         |
| 6  | Refrigerators                   | 97%  | 78%      | 96% | 100%     | 97%  | 90%       | 96%         |
| 7  | Freezers                        | 5%   | 33%      | 9%  | 15%      | 4%   | 17%       | 7%          |
| 8  | Electric Fans                   | 99%  | 100%     | 99% | 100%     | 99%  | 100%      | 99%         |
| 9  | Electric Ovens                  | 58%  | 33%      | 71% | 66%      | 72%  | 67%       | 64%         |
| 10 | Microwave ovens                 | 22%  | 22%      | 14% | 46%      | 34%  | 13%       | 25%         |
| 11 | Induction cooktops              | 26%  | 0%       | 9%  | 3%       | 5%   | 4%        | 16%         |
| 12 | Electric stove                  | 9%   | 7%       | 9%  | 18%      | 10%  | 10%       | 10%         |
| 13 | Television sets                 | 93%  | 81%      | 95% | 98%      | 95%  | 93%       | 94%         |
| 14 | In built shower water heaters   | 15%  | 4%       | 12% | 37%      | 25%  | 4%        | 18%         |
| 15 | Electric Irons                  | 97%  | 89%      | 97% | 99%      | 99%  | 100%      | 98%         |

\*Usage per day except for washing machines; for washing machines it is average per week

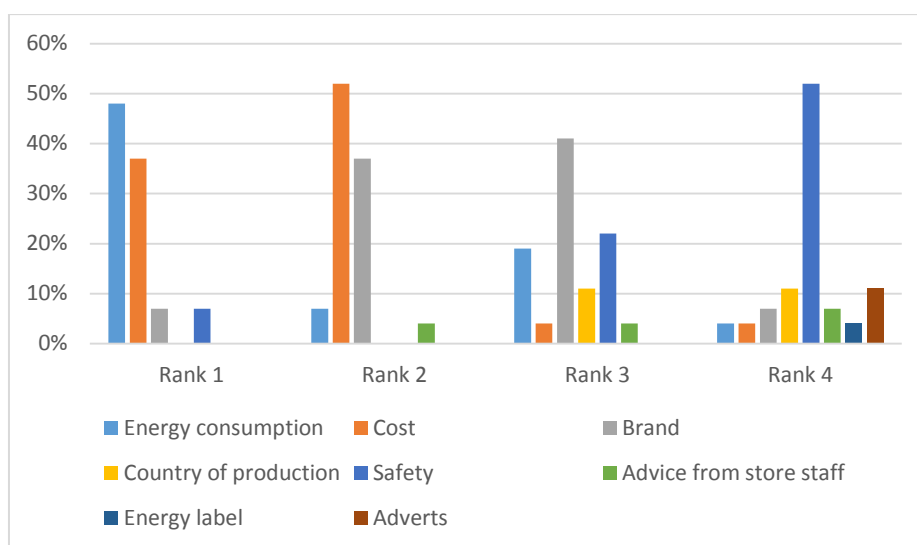
Air conditioners, majority used inverter air conditioner. As for washing machines, twin tubs were more in use except for Male' where Top loaders were more in use.

Graph 53: Factors consider when purchasing an energy consuming product, Addu



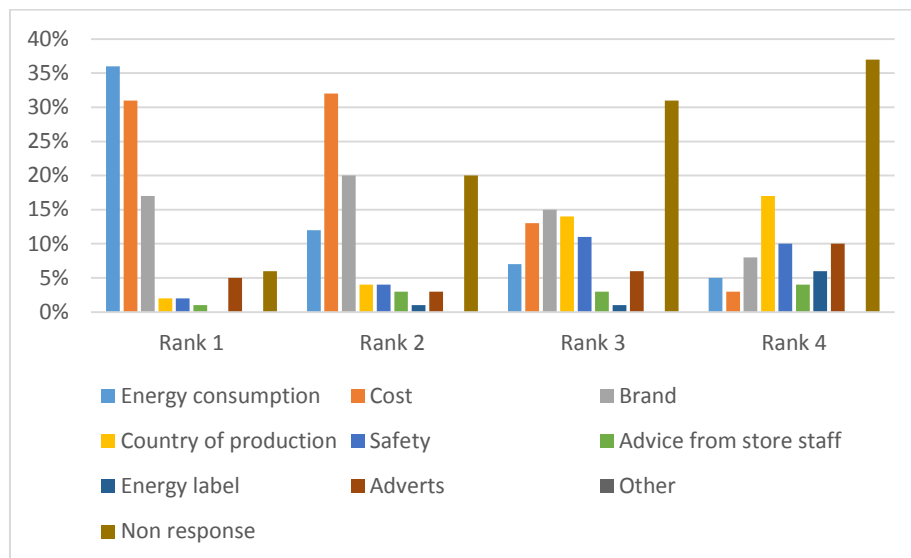
Cost ranked highest in Rank 1 followed by energy consumption and brand for Addu.

Graph 54: Factors consider when purchasing an energy consuming product, Dhidhdhoo



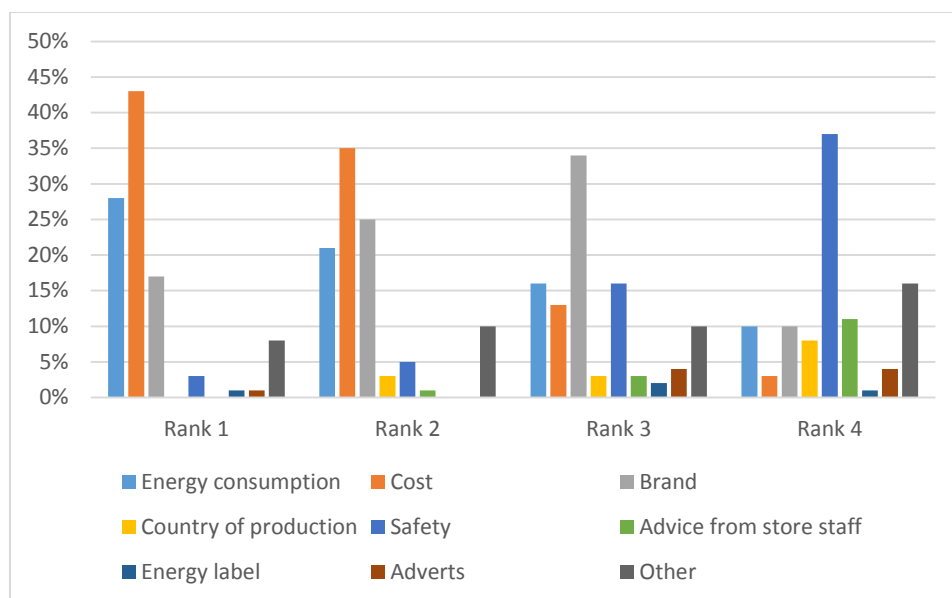
Energy consumption ranked highest in Rank 1 followed by cost in Dhidhdhoo. Cost and Brand ranked highest in Rank 2.

Graph 55: Factors consider when purchasing an energy consuming product, Kulhudhuffushi



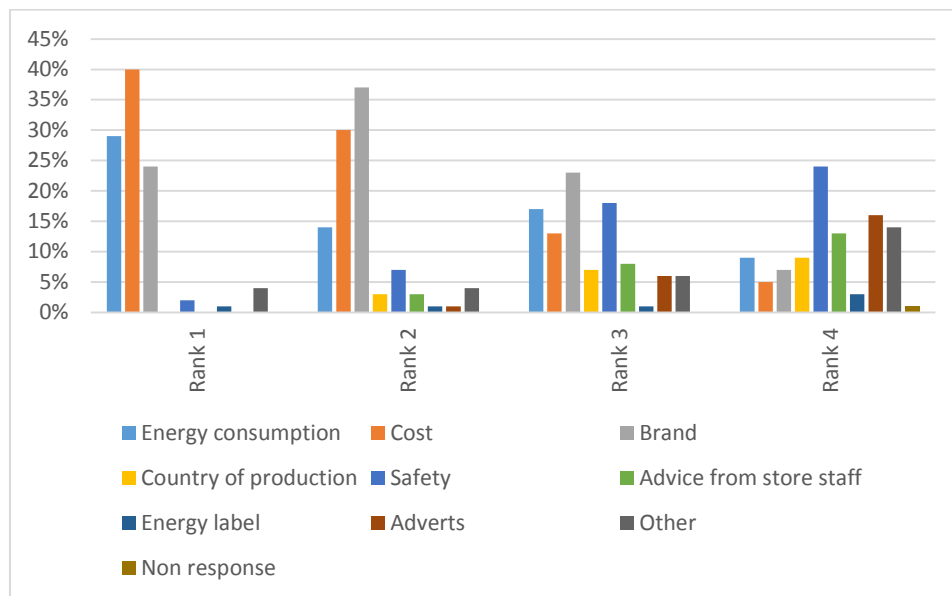
Energy Consumption ranked highest followed by cost and brand in Rank 1 in Kulhudhuffushi. A significant non-response is recorded in the island for this question.

Graph 56: Factors consider when purchasing an energy consuming product, Maafushi



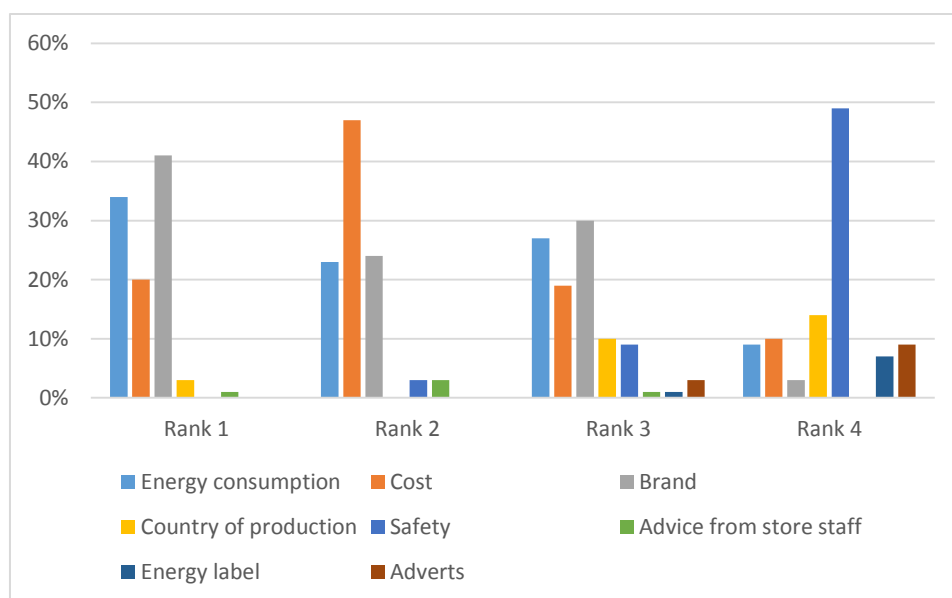
In Maafushi cost ranked highest followed with energy consumption in Rank 1.

Graph 57: Factors consider when purchasing an energy consuming product, Male'



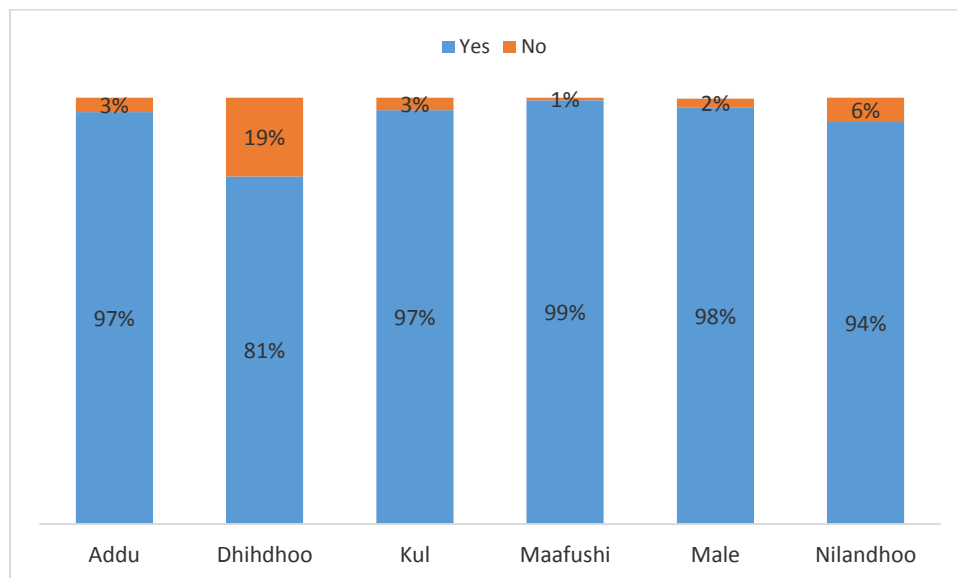
Cost followed by energy consumption and brand ranked highest in Rank 1, while brand followed cost and energy efficiency in rank 2 in Male'.

Graph 58: Factors consider when purchasing an energy consuming product, Nilandhoo



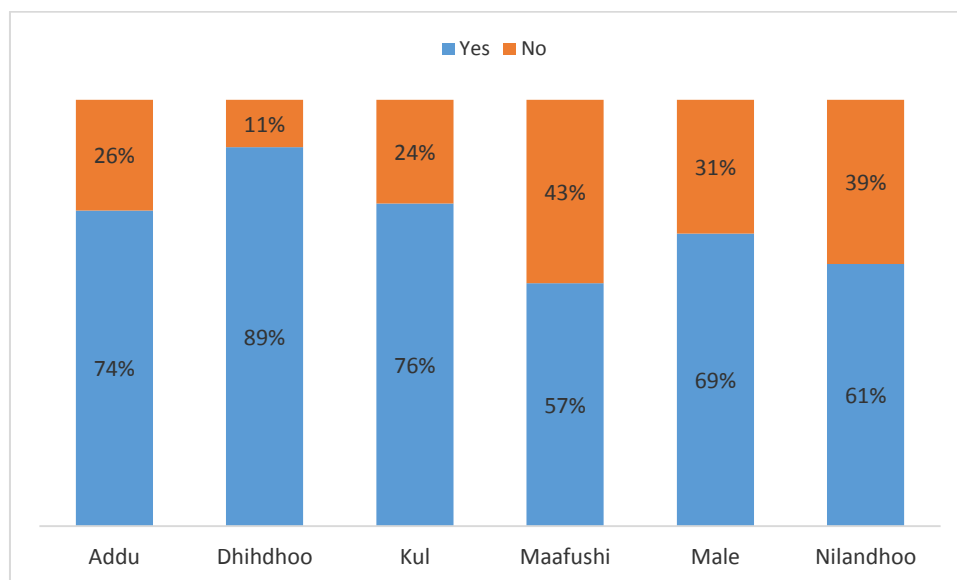
In Nilandhoo brand followed by energy consumption and cost ranked highest in Rank 1.

Graph 59: Percentage of Households who use cooking gas



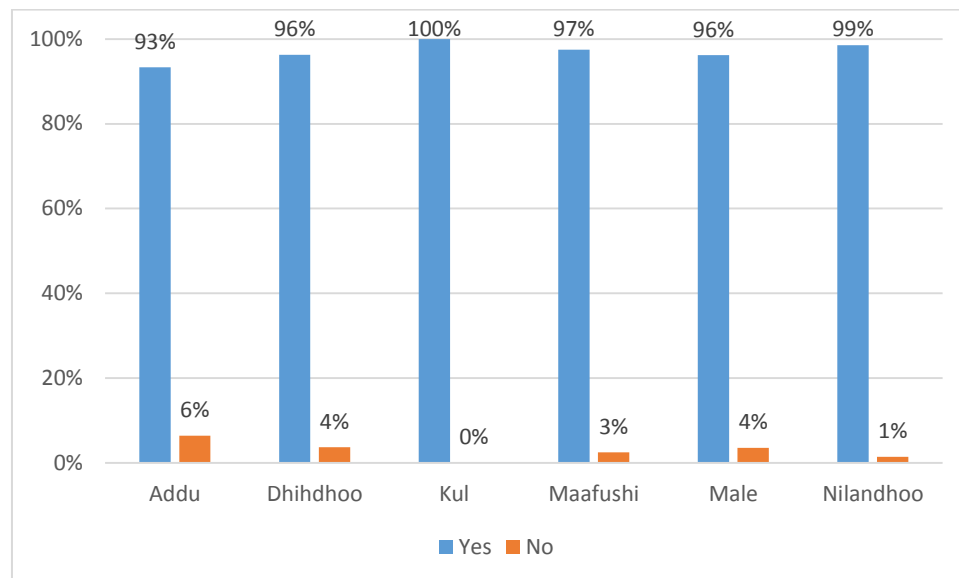
Except for Dhihdhoo, all localities had 94% to 99% who used LPG gas. In Dhihdhoo 19% did not use LPG gas.

Graph 60: Percentage of households who minimized use and expenses due to use of energy efficient methods, by island



All localities affirmed that they minimized use and expenses by using energy efficient methods, 89% in Dhihdhoo compared to 57% in Maafushi.

Graph 61: Percentage of households willing to implement energy efficient methods, by island

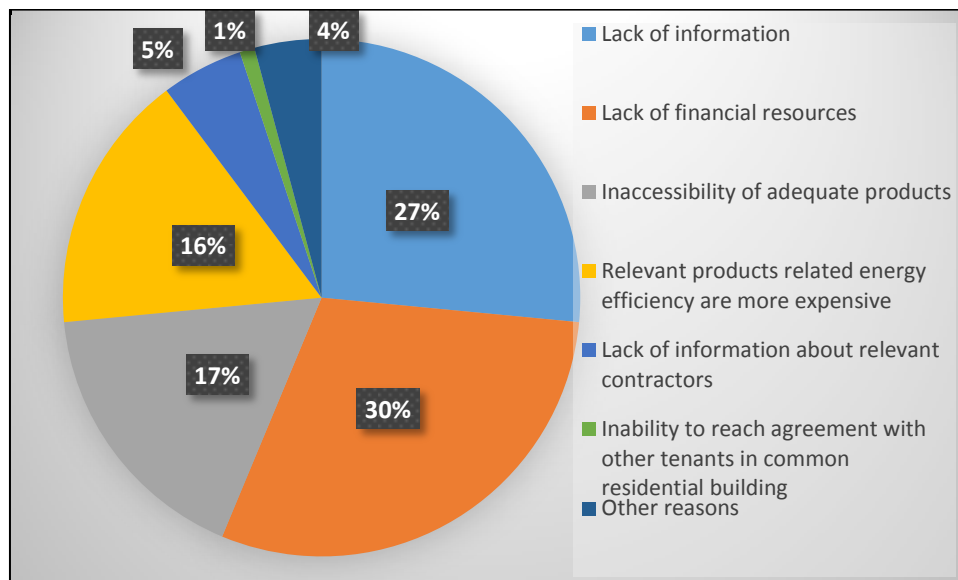


All the localities were willing to implement energy efficient methods, in Kulhudhuffushi 100% whereas in Addu 93%.

Table 12: Reasons for not implementing some of the mentioned measures of energy efficiency, by island

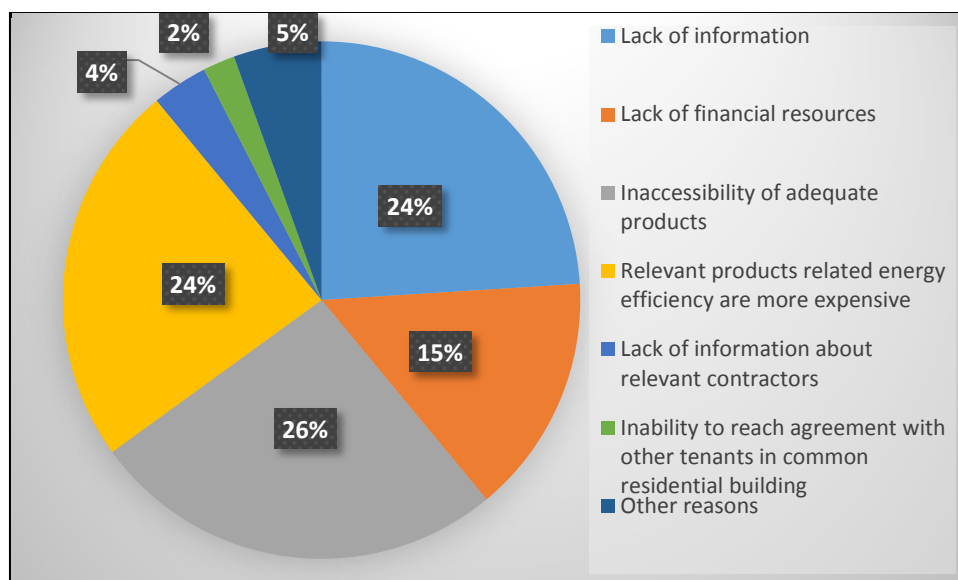
|                      | Lack of information | Lack of financial resources | Inaccessibility of adequate products | Relevant products related energy efficiency are more expensive | Lack information of relevant contractors | Inability to reach agreement with other tenants in common residential building | Other reasons |
|----------------------|---------------------|-----------------------------|--------------------------------------|--|--|--|---------------|
| <b>Addu</b>          | 57%                 | 64%                         | 37%                                  | 35%  | 11%                                      | 2%   | 9%            |
| <b>Dhihdhoo</b>      | 48%                 | 30%                         | 52%                                  | 48%  | 7%                                       | 4%   | 11%           |
| <b>Kulhudhufushi</b> | 47%                 | 51%                         | 8%                                   | 8%   | 3%                                       | 5%   | 24%           |
| <b>Maafushi</b>      | 35%                 | 65%                         | 28%                                  | 20%  | 3%                                       | 7%   | 18%           |
| <b>Male</b>          | 46%                 | 41%                         | 17%                                  | 20%  | 6%                                       | 11%  | 26%           |
| <b>Nilandhoo</b>     | 63%                 | 80%                         | 64%                                  | 59%  | 16%                                      | 3%   | 0%            |
| <b>Grand Total</b>   | 51%                 | 57%                         | 28%                                  | 27%  | 8%                                       | 5%   | 15%           |

Graph 62: Reasons for not implementing some of the mentioned measures of energy efficiency, Addu



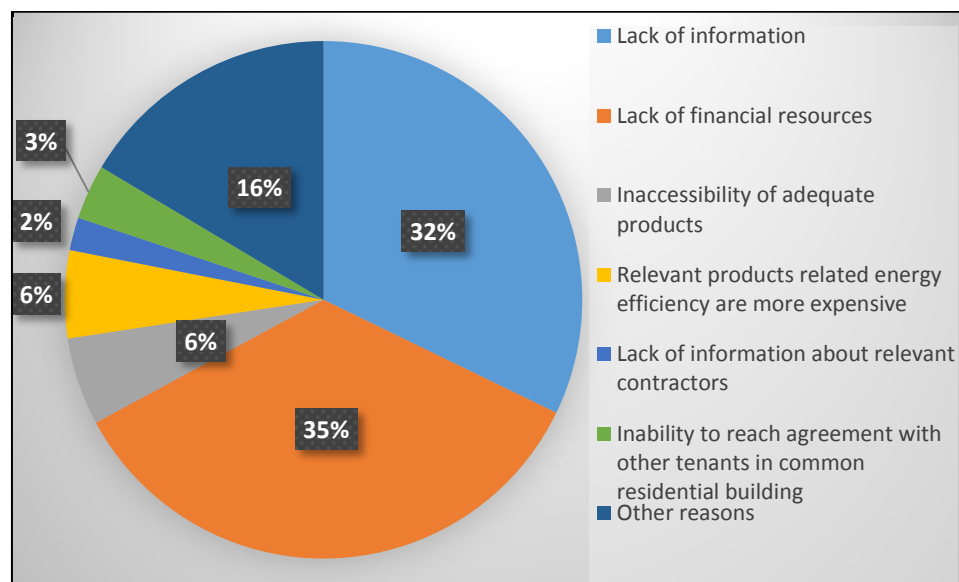
In Addu the main reasons for not implementing energy efficiency methods were lack of financial resources and lack of information.

Graph 63: Reasons for not implementing some of the mentioned measures of energy efficiency, Dhithhoo



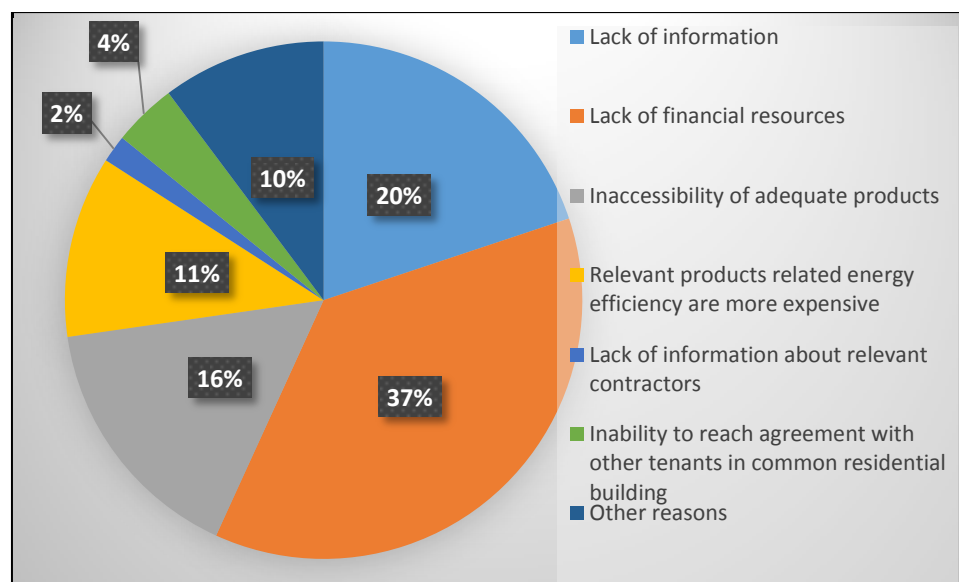
In Dhithhoo the main reasons for not implementing energy efficiency methods were inaccessibility of adequate products, lack of information and relevant products related energy efficiency being more expensive.

Graph 64: Reasons for not implementing some of the mentioned measures of energy efficiency, Kulhudhuffushi



In Kulhudhuffushi the main reasons for not implementing energy efficiency methods is lack of financial resources and lack of information.

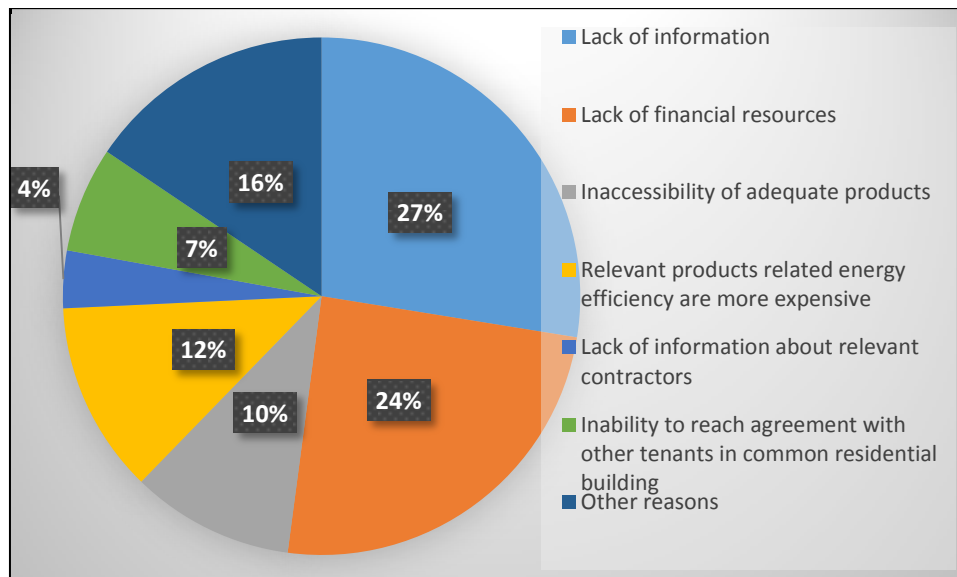
Graph 65: Reasons for not implementing some of the mentioned measures of energy efficiency, Maafushi



As for Maafushi, the main reasons for not implementing energy efficiency methods is lack of financial resources and lack of information.

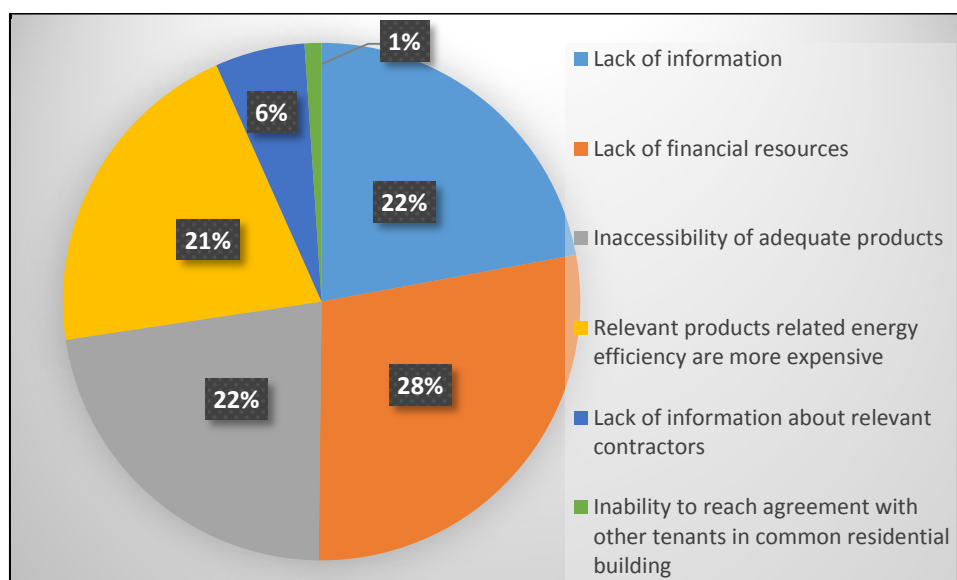


Graph 66: Reasons for not implementing some of the mentioned measures of energy efficiency, Male'



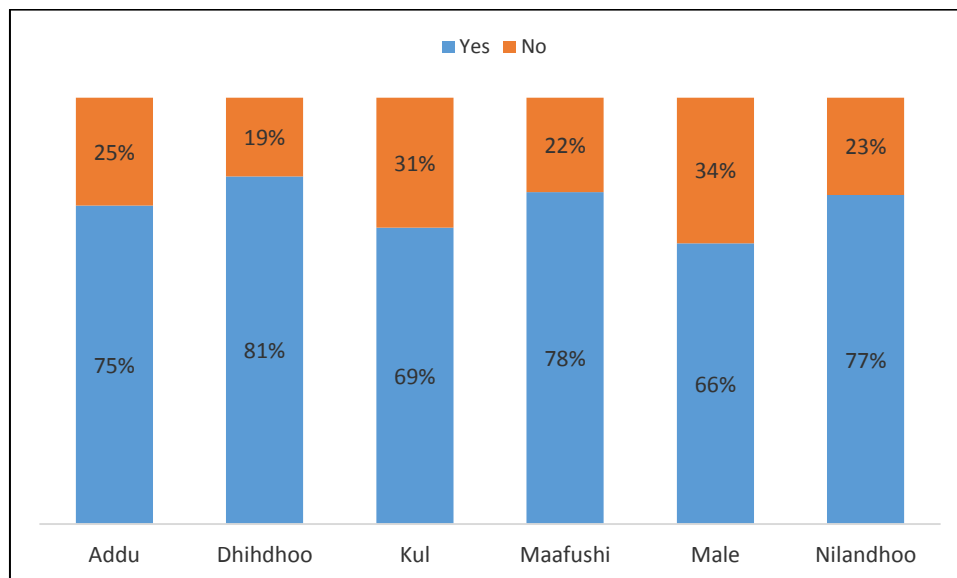
In Male', the main reasons for not implementing energy efficiency methods is lack of information and lack of financial resources.

Graph 67: Reasons for not implementing some of the mentioned measures of energy efficiency, Nilandhoo



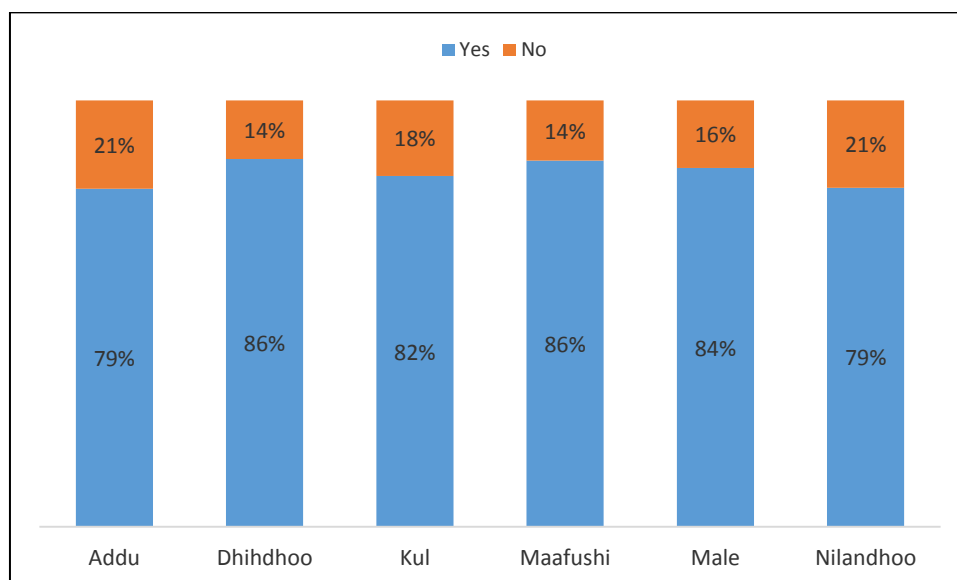
In Nilandhoo the main reasons for not implementing energy efficiency methods is lack of financial resources and lack of information and inaccessibility of adequate products.

Graph 68: Willingness to pay for a service/system/device that would reduce energy bill, by island



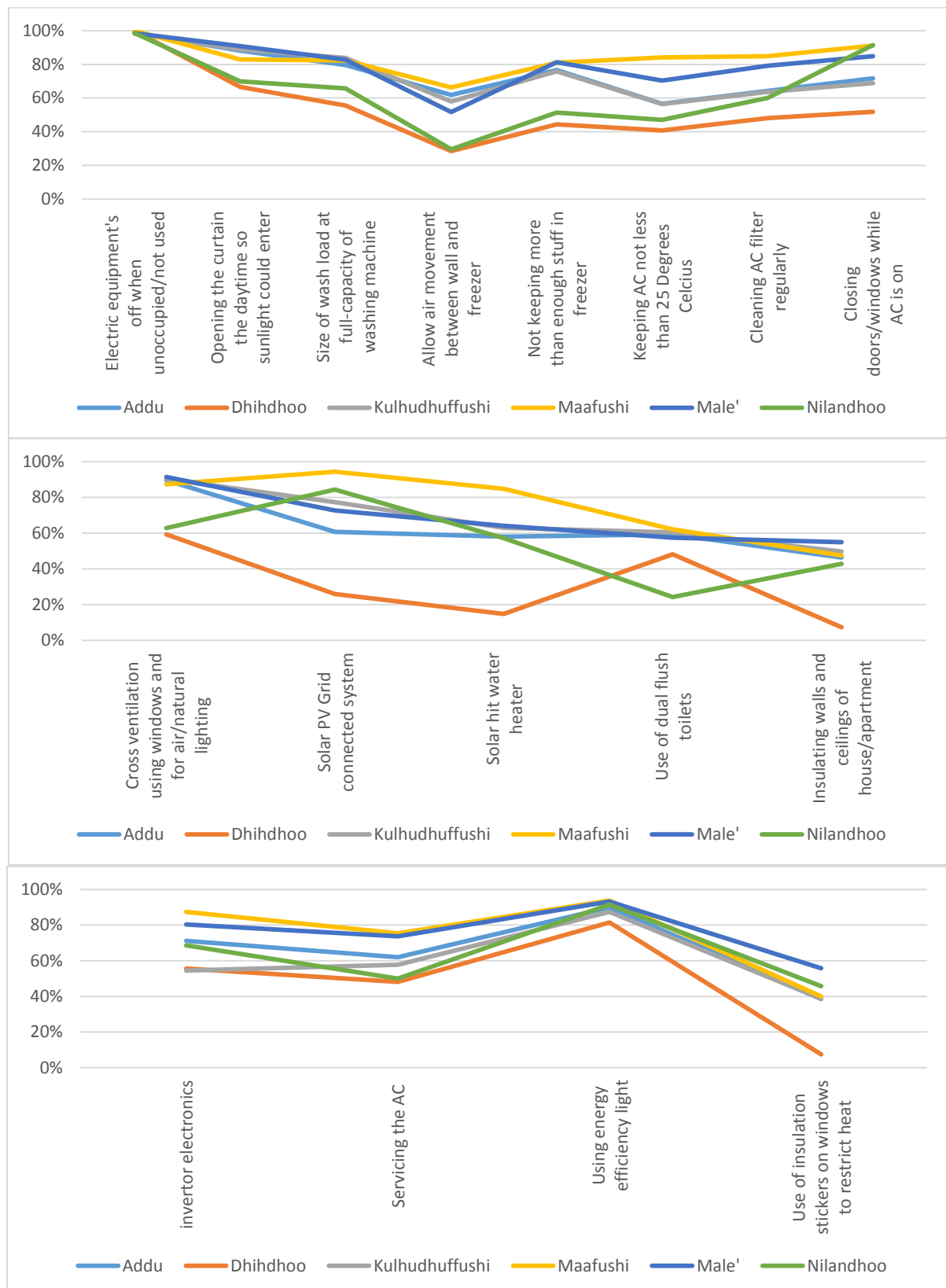
66% to 81% of the respondents in all localities were willing to pay for the use of energy efficient system or device or service if their bills would be reduced. However, in Male' and in Kulhudhuffushi almost 1 in 3 respondents were not willing.

Graph 69: Perception that any energy efficiency measure used at your home has any effect on global warming, by island



79% to 86% perceived that any individual's effort in applying energy efficiency measures does have an effect on global warming.

Box 1: Energy Efficiency measures respondents have HEARD about by island



Box 2: Energy Efficiency measures respondents IMPLEMENTED by island

