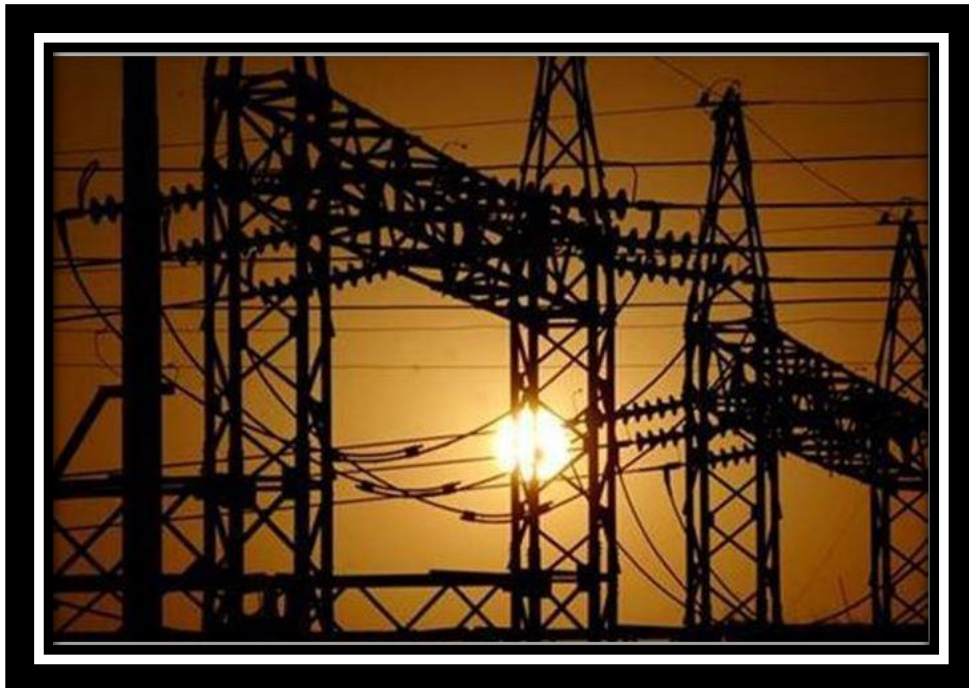


SURVEY ON AFFORDABILITY OF ELECTRICITY AND SAFETY OF HOUSEHOLD ELECTRICAL APPLIANCES

FINAL REPORT

DECEMBER 2020



Submitted by:

EML Consultants (Pvt) Ltd.

Submitted to:

Public Utilities Commission of Sri Lanka

Contents

List of Figures	iii
List of Tables	v
Abbreviations.....	vii
Executive Summary.....	viii
1 Background	1
2 Objectives of the Assignment	4
2.1 Major Objectives	4
2.2 Electricity Affordability	4
2.2.1 Detailed Objectives	4
2.3 Safety of Household Electrical Equipment.....	5
2.3.1 Detailed Objectives	5
3 Methodology:.....	6
3.1 Literature Review	6
3.2 Structured Questionnaire Survey	6
3.2.1 Sampling Procedure	7
3.2.2 Questionnaire Formulation.....	11
3.2.3 Enumerator Training	11
3.2.4 Conduct of Survey	11
3.3 Qualitative Data Collection	14
3.4 Data Analysis and Reporting	14
4 Survey Results	15
4.1 Household Survey	15
4.1.1 Details of Interviews Completed.....	15
4.1.2 Education and Civil Status of HH Heads.....	17
4.1.3 Occupation, Income and Expenditure of Household Heads	18
4.1.4 Type of Wiring, Use, Basic Needs and Affordability of Electricity	24
4.1.5 Willingness to Pay Electricity Bill, Alternatives to Electricity and Future Plans on Use of Electricity38	
4.1.6 Coping with Tariff Increases.....	44
4.1.7 Constraints Faced in Electricity Supply, Quality of Services and of Electrical Products48	
4.1.8 Electric Shocks, Safety in Electricity Use and Awareness of Policies on Safety of Products 52	
4.1.9 Impacts of Lightning and Measures for Improving Quality of Electrical Products	57
4.2 Survey of Institutions	59

4.2.1	Details of Sampling, Respondent Details and Electricity Users	59
4.2.2	Expenditure of Institutions	62
4.2.3	Electricity Connection, Electricity Use, Affordability and Cost	66
4.2.4	Use of Electrical Equipment and Basic Needs of Electricity.....	70
4.2.5	Willingness to Pay Electricity Bill and Alternatives to Electricity	74
4.2.6	Future Plans for Use of Electricity and Meeting any Increased Costs of Electricity	76
4.2.7	Equality and Fairness of Current Tariffs, Quality of Services and Constraints Faced in Obtaining Services.....	79
4.2.8	Appliances Causing Shocks and Policies and Measures for Safety and to Ensure Sub- Standards Products Do Not Reach Customers.....	83
4.2.9	Incidence and Impacts of Lightning	88
5	Key Findings	89
5.1	Key Findings of Household Survey	89
5.2	Key Findings of Institutions Survey	92
6	Conclusions and Recommendations	95
6.1	Conclusions (Household Survey).....	95
6.2	Conclusions (Institution Survey)	97
6.3	Recommendations (Household and Institutional Surveys)	99

List of Figures

Figure 1: Household Heads by Consumer Category and Gender.....	16
Figure 2: Education Levels of HH Heads by Gender.....	17
Figure 3: Primary Occupations of HH Heads by Electricity Consumption Categories	19
Figure 4: Secondary Occupations of HH Heads by Electricity Consumption Categories	20
Figure 5: Income of HH Head from Primary and Secondary Occupations.....	21
Figure 6: Sources of Household Income (All Households)	22
Figure 7: Expenditure items as a Percentage of Total HH Expenditure (All Households)	24
Figure 8: Type of Wiring in Premises	25
Figure 9: Average Monthly Use of Electricity / HH (Units)	26
Figure 10: Average Monthly Electricity Bill / HH (Rs.).....	26
Figure 11: Affordability of Electricity	27
Figure 12: Reasons for Non-Affordability of Electricity	28
Figure 13: If Not-Affordable, What are your Basic Needs?.....	29
Figure 14: Is Electricity Consumption Less Than Basic Needs?	36
Figure 15: Electricity Needed for Basic Needs (Units)	37
Figure 16: Amount of Bill Needed for Basic Needs (Rs).....	37
Figure 17: Willingness to Pay Current Electricity Bill	38
Figure 18: If Not Willing, Maximum Amount Willing to Pay.....	39
Figure 19: Use of Electricity by Households by Affordability.....	40
Figure 20: If Using Less Electricity Alternatives Adopted by Households.....	40
Figure 21: Future Plans for Electricity Use Adopted by Households	42
Figure 22: How to Meet the Extra Cost of Increased Electricity	42
Figure 23: Actions to Reduce Electricity Use in Future (No of HH).....	43
Figure 24: Actions to Reduce Electricity Use in Future (% of HH).....	44
Figure 25: Actions to Cope with any Future Electricity Tariff Increases (% of HH).....	45
Figure 26: Equitability and Fairness of Current Electricity Tariffs (% of HH)	46
Figure 27: Suggestions on Tariff Rates to CEB	47
Figure 28: Constraints Faced in Obtaining Electricity Supply Services	49
Figure 29: Quality of Services of CEB	50
Figure 30: Impact of Poor or Very Poor Quality of Services of CEB.....	51
Figure 31: Impacts of Electric Shocks on Households.....	53
Figure 32: Metal Parts Causing Shocks	53
Figure 33: Safety in Electricity Use.....	55
Figure 34: Frequency of Testing of Trip Switches	56
Figure 35: Awareness of New Policies Relating to Electrical Fittings – All Households.....	57
Figure 36: use of Lightning Arrestor and Impacts of Lightning – All Households	58
Figure 37: Sampling Details of Institutions Surveyed	59
Figure 38: Resident and Non Resident Employees of Institutions.....	61
Figure 39: Visitors to Institutions.....	61
Figure 40: Annual Expenditure (Industry Sector).....	62
Figure 41: Annual Expenditure (General Purpose Institutions)	63
Figure 42: Annual Expenditure (Hotels).....	64
Figure 43: Annual Expenditure (Religious Places).....	65
Figure 44: Annual Expenditure (All Institutions).....	66

Figure 45: Type of Connection (Wiring)	67
Figure 46: Monthly Average Electricity Use by Institution	68
Figure 47: Monthly Average Electricity Bill by Institution	68
Figure 48: Affordability of Electricity by Institution.....	69
Figure 49: Reasons for Non-Affordability of Electricity Bill.....	70
Figure 50: First Ten Highest Average Number of Equipment Owned (All Institutions).....	71
Figure 51: Is Electricity Consumed Less Than Basic Needs?	72
Figure 52: Electricity Requirements for Basic Needs (Units)	73
Figure 53: Amount of Bill Needed for Basic Needs (Rs.).....	74
Figure 54: Willingness to Pay Current Bill.....	75
Figure 55: Alternatives to Electricity Adopted by Institutions Unable to Pay Bill (All Institutions)	76
Figure 56: Future Plans on Electricity Use (All Institutions).....	77
Figure 57: How to Meet Cost of Increased Usage of Electricity (All Institutions).....	77
Figure 58: Responding to Any Tariff Increases (All Institutions).....	78
Figure 59: Equitability of Tariffs and Suggestions for Reducing Inequality (All Institutions).....	79
Figure 60: Constraints in Obtaining Electricity Services	81
Figure 61: Quality of Services Provided by CEB	82
Figure 62: Impact of Poor Quality of Services Provided by CEB (All Institutions).....	83
Figure 63: Impacts of Shocks (All Institutions).....	84
Figure 64: Safety in Use of Electricity (All Institutions).....	85
Figure 65: Awareness and Adoption of New Policies on Electrical Outlets (All Institutions)	86
Figure 66: Measures to Ensure Sub-Standard Electrical Products do not Reach Customer.....	87
Figure 67: Impacts of Lightning.....	88

List of Tables

Table 1: Current Tariff Categories of Household and Religious Electricity Consumers	1
Table 2: Household Population by Tariff Blocks	2
Table 3: Selected Sample by Region	7
Table 4: Sample Selection – Domestic Household Electricity Consumers	8
Table 5: Sample Selection - Electricity Consumers – Religious Places and Industries.....	9
Table 6: Sample Selection – Electricity Consumers – General Purpose and Hotels	9
Table 7: Household Interviews Completed.....	12
Table 8: Institutions Interviews Completed.....	12
Table 9: Household Surveys Completed by Area and Consumer Category	12
Table 10: Number of Interviews Conducted by Consumption Category of Households	15
Table 11: Respondent Details - Households	15
Table 12: Household Heads by Consumer Category and Gender.....	16
Table 13: Education of HH Heads	17
Table 14: Civil Status of HH Heads.....	18
Table 15: Primary Occupation of HH Heads.....	18
Table 16: Secondary Occupation of HH Heads	19
Table 17: Income of HH Heads.....	20
Table 18: Monthly Household Income.....	21
Table 19: Type of Connection (Wiring)	24
Table 20: Use of Electricity.....	25
Table 21: Affordability of Electricity	26
Table 22: Reasons for Non-Affordability of Electricity.....	28
Table 23: What Are Your Basic Needs if Electricity is Not-Affordable	29
Table 24: Basic Needs and Use of Electrical Equipment in Households < 60 Units of Consumption ...	30
Table 25: Basic Needs and Use of Electrical Equipment in Households 61-120 Units of Consumption	31
Table 26: Basic Needs and Use of Electrical Equipment in Households 121-180 Units of Consumption	32
Table 27: Basic Needs and Use of Electrical Equipment in Households >180 Units of Consumption ..	33
Table 28: Basic Needs and Use of Electrical Equipment in Households – All Households	34
Table 29: Is Electricity Consumption Less Than Basic Needs? – All Households	35
Table 30: Electricity Needed for Basic Needs (Rs and Number of units)	36
Table 31: Willingness to Pay Current Electricity Bill	38
Table 32: Alternatives to Using Electricity	39
Table 33: Future Plans for Electricity Use	41
Table 34: Actions Proposed to Reduce Electricity Use Further	43
Table 35: Actions Proposed to Cope with an Increase in Tariff	44
Table 36: Are Current Electricity Tariffs Equitable.....	45
Table 37: Suggestions on Tariff Rates of the CEB	47
Table 38: Constraints Faced in Electricity Supply Services	48
Table 39: Quality of Services of CEB	49
Table 40: Impact of Poor or Very Poor Quality of Services of CEB	50
Table 41: Self-Assessment of Quality of Electrical Products Used	51
Table 42: Appliances That Have Caused Shocks within the last five years (2015-2020)	52

Table 43: Household Members Affected by Shock (All HH)	54
Table 44: Safety Related to Electricity Use (All HH).....	54
Table 45: Frequency of Testing of Trip Switches	55
Table 46: Awareness of New Policies Related to Electrical Fittings – All Households.....	56
Table 47: Impacts of Lightning – All Households	57
Table 48: Measures Needed to Ensure Quality of Electrical Fittings.....	58
Table 49: Sampling for Survey – All Institutions	59
Table 50: Details of Respondents – All Institutions	60
Table 51: Electricity Users within the Institution.....	60
Table 52: Expenditure of Institution (Industry)	62
Table 53: Expenditure of Institution (General Purpose).....	63
Table 54: Expenditure of Institution (Hotels)	64
Table 55: Expenditure of Institution (Religious Places)	64
Table 56: Expenditure of Institution (All Institutions)	65
Table 57: Type of Wiring of Institution	66
Table 58: Electricity Use and Cost.....	67
Table 59: Affordability of Electricity Bill.....	69
Table 60: Reasons for Non-Affordability of Electricity Bill.....	69
Table 61: Use of Electrical Equipment (All Institutions)	70
Table 62: Is Electricity Consumed Less Than Basic Needs?	72
Table 63: Electricity Consumption for Basic Needs	72
Table 64: Willingness to Pay the Current Bill.....	74
Table 65: Alternatives to Electricity Use (All Institutions)	75
Table 66: Future Plans of Institutions on Electricity Use (All Institutions)	76
Table 67: Coping with Increases in Electricity tariff (All Institutions)	78
Table 68: Equitability and Fairness of Current Electricity Tariffs.....	79
Table 69: Constraints Faced in Obtaining Electricity Services (All Institutions).....	80
Table 70: Quality of Services Provided by CEB (All Institutions).....	81
Table 71: Impact of Poor Quality of Services Provided by CEB (All Institutions).....	82
Table 72: Appliances Causing Shocks, Treatment, Cause and Action Taken to Avoid Future Accidents (All Institutions).....	83
Table 73: Safety in Use of Electricity (All Institutions)	84
Table 74: Awareness on the New Policy on the Type of Electrical Outlets That are Allowed (All Institutions).....	85
Table 75: Measures to Ensure Sub-Standard Products Do Not Reach Customer (All Institutions)	86
Table 76: Impacts of Lightning (All Institutions)	88

Abbreviations

CCTV	Closed Circuit Television
CD	Compact Disc
CEB	Ceylon Electricity Board
CFL	Compact Florescent Light
COVID - 19	Corona Virus - D 2019
GCE(AL)	General Certificate of Education (Advanced Level)
GCE(OL)	General Certificate of Education (Ordinary Level)
GOSL	Government of Sri Lanka
Govt.	Government
GP	General Purpose
H	Hotels
HH	Household
IP	Industrial Producer
kWh	Kilowatt Hour
LECO	Lanka Electricity Company
LED	Light Emitting Diode
LT	Less Than
MT	More Than
PC	Personal Computer
PHEV	Plugin Hybrid Electric Vehicle
PUCSL	Public Utilities Commission of Sri Lanka
RP	Religious Places
SLRs	Sri Lanka Rupees
TOU	Time of Use
TV	Television

Executive Summary

The Public Utilities Commission of Sri Lanka (PUCSL) has proposed to conduct a study on the use and affordability as well as safety in the use of electricity by household consumers and institutions such as industries, general purpose institutions, religious places and hotels. A sample of household consumers by category of consumption and the four types of institutions was selected with representative samples across the whole country. A separate questionnaire survey was conducted for the households and institutions. The surveys were due to begin towards early march in 2020. However due to the COVID 19 outbreak it was delayed and was finally completed in December 2020 or a total period of about 18 months.

The main objective was to obtain reliable data on affordability of electricity to various sectors of the population, in order to determine end user tariffs in future and to review and establish appropriate policy measures supportive of such tariffs.

The second objective was to collect data on use of electrical equipment by consumers and the level of awareness on the safe use of such equipment in order to reduce or prevent electrical accidents to an acceptable level and to implement policies which will motivate consumers to adopt safe practices when using electricity.

The detailed objectives were as follows:

- a. Collection of data on the requirements of different categories of electricity consumers on the following aspects;
 - i. Willingness to pay for electricity and the amount that they can afford to pay.
 - ii. The proportion of income spent on electricity as compared to their expenses on other utilities such as telephone, water, transport, internet services etc.
 - iii. Constraints faced in obtaining electricity connections, augmentation and other electricity related services.
 - iv. The level of quality of electricity services and the corresponding impacts on the households.
 - v. The acceptability of the current quality of the services provided by the suppliers.
- b. Estimation of electricity affordability including the following;
 - i. Estimates of basic electricity needs
 - ii. Number of households who are currently consuming below the level of basic electricity needs
 - iii. Use of electricity according to the location and characteristics of the household
 - iv. Areas where quality of service is unacceptable
 - v. Overall level of affordability of electricity according to each consumption category each tariff category.
- c. Collection of data on the public opinion and incidence and severity of electrical accidents, among different categories of electricity consumers, particularly on the following;

- i. Opinion of the households on requirement of regulatory intervention to remove sub-standard products from the market.
- ii. Types of appliances causing electrical shocks
- iii. Parts of the equipment which has caused the electrical shocks
- iv. Death, injuries due to electrical shocks caused by faulty equipment and data on hospitalization and consequences
- v. Actions taken to avoid future electrical accidents from household appliances.

The Public Utilities Commission of Sri Lanka (PUCSL) is the regulator that determines electricity tariffs for customers. Among the five distribution licensees, the Ceylon Electricity Board (CEB) owns four licensees and is the largest distributor. Lanka Electricity Company Private Limited distributes electricity, especially in the western coastal areas. According to the new electricity tariff tables of CEB which came into effect from November 2015, household customers whose consumption is less than 60 kWh are charged at a reduced price. Commercial customers fall under the category “General Purpose.” A mandatory Time of Use (TOU) tariff has been introduced since 2011 for industries, hotels, and general purpose customers who are supplied at medium voltage or high voltage. An optional TOU tariff was introduced in 2015 for larger household customers.

The review of “Assessment of impact of electricity subsidies in Sri Lanka 2016” suggests that there are many loopholes in the present criteria used for selecting consumers for receiving the subsidy considering the affordability. The major shortcoming is that it allows unwanted people to enjoy the subsidy. Thus, it is seen that modifications are needed to make the tariff affordable by consumers and for the electricity subsidy eligibility criteria to ensure that only needy people who cannot afford higher tariff rates to receive the subsidy.

A total of 1860 HH was selected but it was possible to complete only 1692 HHs. A total 409 institutions were interviewed out of 790 institutions that were selected. This was due to the COVID situation, where it was not possible to conduct the interviews. However a representative sample covering the entire island was selected and was adequate to provide statistically valid results.

The main conclusions of the household survey

Over 95% of the HH heads had only a primary occupation, the major occupation being private sector employment, followed by government or semi-government employment. The majority of the employers were from the higher consuming groups. Wages provided more than half the income of HH.

The highest expenditure was on food, with lower consumption groups spending the highest proportion (45%). The proportion spent on electricity was low for the lower consuming groups and high for higher consuming groups. The proportion spent on electricity increased from 1.6% for the lowest consuming group to 8.7% for the highest consuming group. In terms of the bill paid for electricity.

In comparison, expenditure on communication ranged from 3.8%-4.9%, water from 0.8% to 1.5%, transport from 5.2% to 6.9% and gas from 2.1% to 2.4% with the higher consuming groups spending a higher proportion. The variation between the groups was not very large for these expenditures except for electricity where the variation was very large between the different consumption groups.

Almost 80% of the HH indicated that they could afford to pay the electricity bill. The highest affordability was reported by the lowest consuming group (90%) and it declined gradually with increased consumption of electricity to (53%) which was reported by the highest consuming group.

Nearly half of the households reported that electricity consumption was less than their basic needs and this proportion was more or less the same for all consumer groups (40%- 46%). Thus a considerable proportion of the HH in all groups are consuming less than their basic needs as they cannot afford it.

Only 20% of the HH are not willing to pay the current bill. A greater proportion of consumers at a higher level of consumption are not willing to pay bill compared to the consumers at the lower level of consumption.

About two thirds of the HH are using less electricity than their actual requirements as they cannot afford it and about 80% plan to keep consumption for the future at the current level. About 13% want to increase consumption and 4% plan to reduce it. Thus most consumers are willing to pay the bill as they are consuming less than what they actually need and they can then afford to pay the bill.

A majority of HH (70%) feel that the tariffs are equitable, particularly the low consumption groups. One of the opinions of the HH is that the CEB should give medium users a subsidy and increase the rates for high level users in order to make tariffs more equitable.

High cost of connection was the major complaint of all HH (60%). The other complaints reported by less than a third of the HH and mostly high end consumers were, long time taken to obtain a connection and for repair of breakdowns, meters not working properly and meter readers coming late.

Overall, the quality of CEB services was good with 78% of the HH reporting it to be very good or good and 19% reporting it to be satisfactory. Less than 3% reported that the quality was poor or very poor. The major complaints by this group were, regular breakdown of services, voltage fluctuations causing dim lights, damage to equipment, and long delays in restoring power.

About 77% of the equipment owned by HH is working well, 19% working satisfactorily and 4% not working well. Main items not working well were ovens, dish washers, clothes dryers, hair dryers, shavers and air conditioners.

The numbers getting shocks was small with only 3.7% of total number of HH reporting (62). Nearly 40% of those receiving shocks did not take any treatment, about a third received outdoor treatment, 8% were hospitalized and 16% died (10 persons). Electric shocks received were mostly from handling of bulbs, followed by irons, cookers, refrigerators, plugs and bases, electric kettles, blenders and ceiling fans. The most reported part causing the shocks was the handle, followed by knobs, metal body and power cable

Other safety factors such as fixing of earth for the wiring and installing trip switches were reported by 80%-90% of the HH. Thus safety precautions taken by HH appear to be adequate. However, only about half of the HH tested the trip switches once a month or once in six months

About 75% of the HH were aware of the new policies on promoting square type of plug outlets. A majority (84%) of the HH still use the round type of outlet, both types of outlets or use adapters.

Only about 22% of the HH have installed lightning arrestors and 10% do not know whether such arrestors have been installed or not. A total of 53 members of HH reported being struck by lightning. The impacts have been mainly minor with some damages to equipment and structures. Deaths were reported by 3 HH.

Regarding measures needed to ensure quality, most HH were of the view that sub-standard products should be removed from the market. A fair proportion the HH indicated that customers should be given awareness about quality, warranty should be made mandatory, standards should be imposed for all electrical products and the seller of electrical goods should be made liable for all accidents.

The main conclusions of the Institution Survey

The breakup of expenditures of institutions shows that the major expenditure was for material inputs and wages. Overall expenditure on electricity was 3.6%. However, Water and Telecom bills were less than 1% for all institutions. Expenditure on transport was 3%. Thus overall electricity cost can be considered to be not too excessive.

The highest electricity consumption was reported by the hotel sector, followed by industry sector, general purpose sector and religious places. A majority (76%) of the institutions stated that electricity was affordable.

The highest affordability was reported by religious places, followed by general purpose, industry and least affordability by hotels. The main reasons for non-affordability were; low income; high tariffs; income fluctuations and having to forego essentials.

The most reported equipment used institutions were mobile phones, fans, machinery, equipment, computers and laptops, TV, refrigerator, internet, CCTV, radio, CD players and other entertainment equipment and air conditioners.

Overall, 35% of the institutions reported consuming less than their basic needs of electricity. The highest average requirement for basic needs was for hotels, followed by industry, general purpose and religious places.

A majority of the institutions are willing to pay the current electricity bill. Over half of the institutions reported that they were using less electricity than actually needed.

Regarding future plans, 80% will continue with the current level of consumption, 5% plan to increase use and 15% plan to reduce use. In case they want to increase use of electricity, the following steps will be taken to counter the costs; increase own incomes, request CEB to reduce tariffs, manage equipment usage and install solar power.

In case the CEB imposes higher tariffs, the following would be adopted by the institutions; adopt energy saving devices, cut down usage, switch off some equipment and install solar power.

About two thirds of the institutions felt that the tariffs were fair and equitable. Suggestions to improve fairness and equality of tariffs suggested by those who felt that tariffs were not equitable include; giving small and medium institutions a subsidy; give all institutions a further subsidy; reducing the inefficiencies and losses of the CEB; building more low cost power plants and increasing the tariffs for the higher income earning institutions .

In case the CEB imposes higher tariffs, the following would be adopted by the institutions; adopt energy saving devices, cut down usage, switch off some equipment and install solar power. About two thirds of the institutions felt that the tariffs were fair and equitable.

Some major constraints that institutions faced in obtaining services were the high cost of connection as well as that of increasing capacity and the long period taken to complete repairs after an interruption to the services or breakdown. Other constraints faced were the high charges levied for meter testing and for miscellaneous services. Customers also had difficulties in obtaining net metering services.

A large proportion of the institutions were very satisfied with the services provided by the CEB, with only less than 3% reporting either poor or very poor services. The impacts of poor services as indicated by this group were delays in restoring power, regular or frequent breakdowns and high cost of interruptions to consumers due to spoilage of food etc.

It appears that the institutions had not suffered much due to shocks. Only a few instances of shocks with no deaths were reported. None of the persons receiving shocks were given any treatment except one person who received treatment at a local clinic

Safety precautions such as installing earths for premises and trip switches were undertaken by the majority (80%-90%) of the institutions. However, less than half the institutions tested the trip switches monthly.

A high majority of institutions were aware of the new policies on conversion to square pin outlets. However, only 25% use square pin outlets while about 60% of the institutions use both types of outlets or use adapters.

The majority of the institutions feel that regulatory interventions are needed to ensure sub-standard products do not reach the markets. Mandatory warranty, awareness campaigns, establishment of quality standards and sellers liability for accidents caused by faulty electrical appliances should be implemented by the authorities.

Lightning damage was reported by less than 1% of the institutions. Less than 15% of the institutions have installed lightning arrestors. It is necessary to evaluate whether promoting lightning arrestors is cost effective with the reported low level of incidence of lightning strikes.

Recommendations

- On the issue of affordability, the lowest consuming group had reported the highest proportion of affordability. Thus the lower income groups could easily bear an increase in tariffs by a small percentage. In the case of the higher consumer groups such an increase may increase the proportion of HH not able to afford the bill. Therefore it is recommended to review the tariffs and determine the feasibility of reducing the subsidies for the low consumption groups and to reduce the tariffs to the middle and high consumption groups. Other measures such as reducing the inefficiencies of the CEB, building of low cost power plants and finding other low cost energy sources are recommended to reduce the losses of the CEB
- A tariff reduction could also be linked to the use of energy efficient equipment and other ways of reducing the consumption. For example, a points system could be developed to estimate the number of LED bulbs, energy efficient equipment used or other measures taken and based on achieving a certain number of points, a percentage reduction in tariff could be given to the consumer. This will also provide an incentive for the customer to reduce the use of electricity. This reduction could also be extended to the institutions, particularly, the industries and hotel sectors and to some extent to the general purpose sector.
- A tariff reduction could be considered for the hotel sector, which is a high user of electricity. This could be temporary in order to reduce the impact of COVID on the hotel sector. Similarly, small and medium sized industries and general purpose organizations could also be included for similar subsidies.
- The CEB should review the charges levied for various purposes such as connections, increasing of capacity, meter testing and replacement, moving of electricity pole and for obtaining net metering services.
- One of the major complaints of the HHs was that of the delay in restoring power after a breakdown of services. Other complaints include delays in obtaining connection, non-working or defective meters and delays in meter reading. It is recommended that the CEB find ways and means to resolve this issue satisfactorily. One solution is to provide temporary connections, when repairs take too long. Another way is to divide the interruption over short periods throughout the repair period, if this is feasible. The CEB could use small independent or mobile power plants to provide temporary power during breakdowns, particularly in susceptible areas.
- To reduce the incidence of shocks, the PUCSL or the CEB should conduct awareness programmes to educate the customers on handling of electrical equipment or wiring, testing and use of trip switches and installing earths for the premises.
- Awareness programmes should also be conducted to educate the public on the use of square pin outlets to improve safety in the use of electricity. Customers should be made aware that square outlets are safer due to the improved fitting of square pin plugs and outlets.
- Promoting the use of lightning arrestors may be initially restricted to high risk areas. The possibility of subsidizing the cost of lightning arrestors could be studied in order to promote this.

- Improving the quality of electrical equipment could be undertaken through legal means such as mandatory warranties and implementing quality standards. Ensuring liability of the seller for accidents resulting from the poor quality of electrical product may be difficult proposition locally, although it is common practice in other countries. It will be good if this is introduced to this country. However, for the present it is recommended that this issue be studied carefully before being implemented.

1 Background

The National Energy Policy and Strategies of Sri Lanka (Policy) states that energy requirements to fulfil the basic needs of the people and to enhance their living standards and opportunities for gainful economic activity will be adequately and continually satisfied at the lowest possible cost to the economy. In this regard one priority will be to improve access by rural areas to commercial energy forms such as electricity and petroleum-based fuels. In addition, a transparent mechanism will be established to provide subsidies to the deserving groups in the country particularly in the urban, rural and estate areas to ensure that such groups have access to their basic energy needs at affordable prices and adopt safe practices in using electrical appliances. This includes providing low cost standardized and affordable price based service and electricity connections to consumers on lifeline tariffs both in urban and rural areas. In this regard, the Public Utilities Commission of Sri Lanka (PUCSL) will define the tariff schedule for final end use customers based on the guidelines provided by GOSL, and the commission will determine which customer categories would be charged under one-part or two-part tariffs, and flat tariffs or other tariffs every year. An appropriate pricing policy for the energy sector will be adopted considering important factors such as cost reflectivity, need for targeted subsidies, and competitiveness of locally produced goods and services in the regional and world markets', and the establishment of target subsidies in this regard.

In terms of affordability, to ensure that the low income deserving groups have access to basic energy needs at affordable prices through a transparent subsidy mechanism, the Policy states that, households consuming less than 30kWh per month should be permanently subsidized at 50% of their consumption. Further, as per the Budget Speech 2011, the tariffs applicable for consumers consuming less than 120kWh per month were kept constant, at the recent revision of electricity tariffs (for the period January to June 2011). However, as noted none of such estimations of basic energy needs are based on any empirical study and therefore are based on various assumptions. Table 1 shows the current tariff levels for households and consumers in religious places.

Table 1: Current Tariff Categories of Household and Religious Electricity Consumers

Category	Consumers using <60 kWh / Month	Rate (SLRs /kWh)	Fixed Charge (SLRs/month)
Household	0–30	2.5	30
	31–60	4.85	60
	Consumers using >60 kWh		
	0–60	7.85	
	61–90	10	90
	91–120	27.75	480
	121–180	32	480
	>180	45	540
Religious	0–30	1.9	30
	31–90	2.8	60
	91–120	6.75	180
	121–180	7.5	180
	>180	9.4	240

The current tariffs are based on consumer blocks with the lowest rate starting from consumers under 30 units per month increasing by consumer blocks to the highest unit rate for the > 180 unit per month consumer. The lower user categories are subsidised by the higher user categories. However, the largest categories of consumers are those consuming less than 60 units per month. The proportions of household consumers falling into the various tariff categories are shown in Table 2

Table 2: Household Population by Tariff Blocks

Tariff Block	No of HH	% of HH	Monthly Bill (Rs.)
< 30 Units	932,945	17.1	102
31- 60 Units	1,727,404	31.7	565
61 - 90 Units	1,493,385	27.4	1308
91- 120 Units	668,679	12.3	2150
121 - 180 Units	446,175	8.2	4261
> 180 Units	187,235	3.4	> 4261
200 units			5116
Total	5,455,823	100.0	

The bulk of the consumers > 75% consume less than 90 units per month. About 50% consume less than 60 units and 17% consume less than 30 units. Only 11.6% of the consumers consume more than 120 units per month. Thus for 75% of the consumers the monthly bill is less than 1300 per month and for 50% of the consumers the bill is less than Rs 600 per month. Thus it appears that for most consumers the electricity is affordable. However, with the advent of development more and more households will tend to use new appliances that may make electricity less affordable, particularly for the lower income groups who may want to use new appliances but cannot afford to pay the additional electricity cost.

The commission carried out a study on Electricity affordability in 2011 to facilitate these policy objectives. However the data on electricity affordability needs to be revisited in the context of changed demographic and socio economic conditions that have taken place over recent years. The reliability of data on electricity affordability plays a vital role in an end user tariff design and is essential for successful realization of policy objectives associated with the tariff design. Therefore a comprehensive survey on electricity affordability has been proposed by PUCSL to obtain reliable data needed for the analysis and review of the affordability and effectiveness of the existing electricity tariff structure in order to establish an effective tariff regime that will fulfil socio economic and other objectives of the government energy policy. The PUCSL also acts as the safety regulator for the electricity industry in Sri Lanka. One of the goals of the Commission is to reduce the annual electrocution rate to below 20. To achieve this, the PUCSL has been carrying out several activities including standardisation of electrical plugs and sockets, public awareness, preparing mechanisms for licensing of electricians and implementing safety regulations.

In a fast developing country like Sri Lanka, the use of electrical appliances in houses has increased substantially over the recent past. Living standards have increased over the years and most households are looking for greater convenience and time saving. Currently, almost all households now use one or more of the following household appliances such as TVs, refrigerators, PCs, electric irons, pedestal fans, grinders, mixers, etc. to uplift the living standards and to make life at home more

convenient. Hence, the risk of electrical accidents in homes is much higher than in past era. Hence it is required to assess the extent of public awareness regarding safety and safe handling of household electrical appliances. This data can assist in formulating policies and strategies for implementing any regulatory system or mechanism to reduce or prevent electrical accidents and to regulate the use of electrical appliances.

2 Objectives of the Assignment

2.1 Major Objectives

1. To obtain reliable data on affordability of electricity to various sectors of the population, in order to determine end user tariffs in future and to review and establish appropriate policy measures supportive of such tariffs.
2. To collect data on use of electrical equipment by consumers and the level of awareness on the safe use of such equipment in order to reduce or prevent electrical accidents to an acceptable level and to implement policies which will motivate consumers to adopt safe practices when using electricity.

2.2 Electricity Affordability

The reliability of data on electricity affordability plays a vital role in an end user tariff design and is essential for successful realization of policy objectives associated with the tariff design. Therefore a comprehensive survey on electricity affordability is required to analyse and review the existing electricity tariff structure.

2.2.1 Detailed Objectives

Detailed data is required to be obtained on the following aspects through the surveys.

- a. Collection of data on the requirements of different categories of electricity consumers on the following aspects;
 - I. Willingness to pay for electricity and the amount that they can afford to pay.
 - II. The proportion of income spent on electricity as compared to their expenses on other utilities such as telephone, water, transport, internet services etc.
 - III. Constraints faced in obtaining electricity connections, augmentation and other electricity related services.
 - IV. The level of quality of electricity services and the corresponding impacts on the households.
 - V. The acceptability of the current quality of the services provided by the suppliers.
- d. Estimation of electricity affordability including the following;
 - vi. Estimates of basic electricity needs
 - vii. Number of households who are currently consuming below the level of basic electricity needs
 - viii. Use of electricity according to the location and characteristics of the household
 - ix. Areas where quality of service is unacceptable
 - x. Overall level of affordability of electricity according to each consumption category each tariff category.

2.3 Safety of Household Electrical Equipment

Use of electrical equipment may cause electrical shocks to users due to various reasons. For example, lack of adequate protection from live electrical parts due to manufacturing faults, poor quality of equipment resulting in shorting, fires and burn injuries. Ignorance or lack of awareness among consumers on the proper and safe use of electrical equipment in their households is another reason for electrical accidents. According to a PUCSL report Of 2018, the number of electrocutions, from electrical accidents increased from 131 in 2008 to 180 by 2012, but dropped sharply in 2013 to 76 and from thereon increased gradually to 89 in 2018. It is not certain why there was a sharp decline in electrocutions in 2013 but it is possible that the decline could be due to some policy measures taken or due to implementation of safety measures by the government. However, it could be also due to errors in collection of data or due to changes in the way data is collected or other reasons. Currently more and more households are using a variety of household electrical appliances and the likelihood of the number of electrical accidents increasing is high. The PUCSL has been carrying out several activities such as standardizing plugs and sockets, public awareness, preparing mechanism for licensing of electricians, implementing safety regulations as well as other measures to reduce electrical accidents. The Government objective is to reduce electrical accidents to below 20 per annum or to any other accepted international norms. The objective of this part of the survey is to collect data on public concerns on electricity safety, identify the type of electrical equipment that have safety concerns or issues and the number and severity of electrical accidents faced by household and other consumers. This data can be used to determine whether it is necessary to start implementing regulatory systems to control the use of unsafe electrical appliances.

2.3.1 Detailed Objectives

Detailed data is required to be obtained on the following aspects through the surveys.

- e. Collection of data on the public opinion and incidence and severity of electrical accidents, among different categories of electricity consumers, particularly on the following;
 - vi. Opinion of the households on requirement of regulatory intervention to remove sub-standard products from the market.
 - vii. Types of appliances causing electrical shocks
 - viii. Parts of the equipment which has caused the electrical shocks
 - ix. Death, injuries due to electrical shocks caused by faulty equipment and data on hospitalization and consequences
 - x. Actions taken to avoid future electrical accidents from household appliances.

3 Methodology:

Several tools were used for obtaining data for this study. This included literature review, structured questionnaire survey, focal group discussions (FGD) and key informant interviews (KII) including stakeholder analysis.

3.1 Literature Review

All relevant documents and literature on the subject were studied in order to obtain an overview and insight on the topic. For this purpose, available documents, previous studies on the topic and other related data were obtained from CEB and PUCSL web sites and other internet sites. A search was also made to obtain any studies, reports or data published in Journals, publications of research institutes, universities and related government agencies. A previous study on affordability completed by the PUCSL in 2011 was reviewed along with another study completed in 2008 for the Hambantota district. Other relevant studies on the topic were also reviewed prior to the start of the survey.

The Public Utilities Commission of Sri Lanka (PUCSL) is the regulator that determines electricity tariffs for customers. Among the five distribution licensees, the Ceylon Electricity Board (CEB) owns four licensees and is the largest distributor. Lanka Electricity Company Private Limited distributes electricity, especially in the western coastal areas. According to the new electricity tariff tables of CEB which came into effect from November 2015, household customers whose consumption is less than 60 kWh are charged at a reduced price. Commercial customers fall under the category “General Purpose.” A mandatory Time of Use (TOU) tariff has been introduced since 2011 for industries, hotels, and general purpose customers who are supplied at medium voltage or high voltage. An optional TOU tariff was introduced in 2015 for larger household customers.

This implies that the tariff rates are targeted at those who can afford the tariff based on their monthly HH income and monthly electricity consumption (no. of units consumed).

Affordability studies conducted across the globe and Sri Lanka have shown that low-income households spend a substantial share of their income on utility services such as electricity, heating and water. As indicated by “Sri Lanka Tariff appraisal study – balancing sustainability 2018” the difficulty of socially vulnerable consumers who are unable to afford further tariff increases is often used as an argument against tariff reform/increases. However, detailed information on the utility expenditures of different consumer groups and the affordability implications of tariff adjustments is scarce.

Available literature on electricity and tariff suggests that affordability of electricity can be measured using the ratio of electricity charges as a percentage of monthly household income or household expenditure. Alternatively, affordability may also be expressed as the share of electricity costs with respect to total expenditure on utilities such as water, telephone, electricity, gas, kerosene etc. The latter definition of electricity expenditure as a proportion of household expenditure may be a better estimator for estimating affordability.

3.2 Structured Questionnaire Survey

A structure questionnaire survey was conducted with a selected sample of electricity consumers, from among households, industries, hotels and other categories. Both affordability as well as safety aspects was included in the questionnaire. Electricity consumers have been categorized by tariff levels and as such the sample was stratified by category of consumer and tariff levels. The CEB operations have

been divided into 4 Regions, while LECO consumers are categorized as the 5th. Region. The areas covered under Region 1 include Colombo City, North Central, and Northern and North Western regions. Region 2 comprises of Western North, Central and Eastern regions. Region 3 includes Western South 2, Uva and Sabaragamuwa. Region 4 comprises of Western South 1 and Southern regions. Region 5 comprises of electricity customers of the LECO within the areas of Negombo, Kelaniya, Kotte, Nugegoda, Moratuwa, Kalutara and Galle.

3.2.1 Sampling Procedure

The total population was stratified initially by region and subsequently by areas within the region. Within each area, the population was further stratified by tariff category. For example, the population was stratified into four categories in each region for the household consumers, those consuming under 60 units, those consuming below 120 units, those consuming below 180 units and those consuming above 180 units. In the case of the other categories such as industry, general purpose and hotels, the population was stratified by small, medium and large categories. The total sample selected was proportionate to the total population within each category. On this basis a total 2626 samples were selected which includes 1860 households, 269 religious places and industries and 497 general purpose and hotel customers. The sample percentage works out to 0.03% of the population and has an error percentage of 2% within a confidence interval of 95%. This means that the results of the survey will be accurate to within + or – 2 % of the actual result with a confidence of 95% or 95% of the values will fall with this interval. The sampling details are provided in Tables 3-6 below.

Table 3: Selected Sample by Region

Sampling	Number of Electricity Accounts / Consumers	Selected Sample				
		Sample HH	Religious / Industry	Gen. Purpose / Hotels	Total	Sample %
Region 1	2,084,939	484	101	154	739	0.035
Region 2	2,436,780	590	76	144	810	0.033
Region 3	1,226,924	354	44	79	477	0.039
Region 4	1,068,757	289	33	70	392	0.037
Region 5	585,770	143	15	50	208	0.036
Total	7,403,170	1860	269	497	2626	0.035

Table 4: Sample Selection – Domestic Household Electricity Consumers

Domestic Household Consumers	Selected Sample (No.)					All Regions Total
Tariff Units	Region 1	Region 2	Region 3	Region 4	Region 5	
LT060	93	255	146	125	28	647
LT090	98	167	79	82	29	455
LT120	96	86	56	41	28	307
LT180	118	61	45	28	34	286
MT180	79	21	28	13	24	165
Total sample	484	590	354	289	143	1860
Total No of Households	1,832,603	2,178,041	1,204,932	1,051,668	577,875	6,845,119
Sample %	0.026	0.027	0.029	0.027	0.025	0.027
Region 1	Popl -HH (LT & MT)	Selected Sample (No.)				
		LTO60	LTO 120	LT180	MT180	Total
Colombo City	168,684	9	18	10	11	47
North Western	851,087	43	90	54	36	224
North Central	458,223	23	48	30	19	121
Northern	354,609	18	38	24	13	92
Total Region 1	1,832,603	93	194	118	79	484
Region 2	Popl -HH (LT & MT)	Selected Sample (No.)				
		LTO60	LTO 120	LT180	MT180	Total
Western North	629,218	73	67	16	6	162
Central	1,012,280	118	118	30	10	276
Eastern	536,543	63	67	16	6	152
Total Region 2	2,178,041	254	252	62	22	590
Region 3	Popl -HH (LT & MT)	Selected Sample (No.)				
		LTO60	LTO 120	LT180	MT180	Total
Western South 2	385,674	47	43	14	9	113
Uva	369,109	45	42	14	9	110
Sabaragamuwa	450,149	54	50	17	10	131
Total Region 3	1,204,932	146	135	45	28	354
Region 4	Popl -HH (LT & MT)	Selected Sample (No.)				
		LTO60	LTO 90-120	LT180	MT180	Total
Western South 1	283,118	33	33	7	3	76
Southern	768,550	92	90	21	10	213
Total Region 4	1,051,668	125	123	28	13	289
Region 5 (LECO)	Popl -HH (LT & MT)	Selected Sample (No.)				
		LTO60	LTO 120	LT180	MT180	Total
LECO Total	577,875	28	57	35	23	143
Grand Total of Samples	6,845,119	744	663	288	165	1860

Table 5: Sample Selection - Electricity Consumers – Religious Places and Industries

Region 1	Popl (RP+IP)	Selected Sample (No.)				
		RP	IP1	IP2	IP3	Total
Colombo City	1,273	2	1	2	1	6
North Western	24,172	7	38	8	2	55
North Central	9,324	3	14	3	1	21
Northern	9,366	7	10	1	1	19
Total Region 1	44,135	19	63	14	5	101
Region 2	Popl (RP+IP)	Selected Sample (No.)				
		RP	IP1	IP2	IP3	Total
Western North	8,231	4	10	10	7	31
Central	10,586	10	7	8	1	26
Eastern	8,767	5	11	2	1	19
Total Region 2	27,584	19	28	20	9	76
Region 3	Popl (RP+IP)	Selected Sample (No.)				
		RP	IP1	IP2	IP3	Total
Western South 2	5,514	2	7	7	3	19
Uva	5,393	4	6	2	1	13
Sabaragamuwa	4,336	4	3	4	1	12
Total Region 3	15,243	10	16	13	5	44
Region 4	Popl (RP+IP)	Selected Sample (No.)				
		RP	IP1	IP2	IP3	Total
Western South 1	2,719	2	3	4	1	10
Southern	9,012	6	10	6	1	23
Total Region 4	11,731	8	13	10	2	33
Region 5	Popl (RP+IP)	Selected Sample (No.)				
		RP	IP1	IP2	IP3	Total
LECO	2,537	4	4	4	3	15
Grand Total	98,693	60	124	61	24	269
Sample Size %	0.273					

Table 6: Sample Selection – Electricity Consumers – General Purpose and Hotels

Region 1	Popul. (GP+H)	Selected Sample (No.)						Total
		GP1	GP2	GP3	H1	H2	H3	
Colombo City	35468	16	27	4	1	2	3	53
North Western	94340	45	4	1	1	1	0	52
North Central	44351	21	2	1	2	1	0	27
Northern	34042	16	3	1	1	1	0	22
Total Region 1	208201	98	36	7	5	5	3	154
Region 2	Popul. (GP+H)	Selected Sample (No.)						Total
		GP1	GP2	GP3	H1	H2	H3	
Western North	77206	36	7	1	1	1	0	46
Central	105231	50	7	1	6	4	0	68

Eastern	48718	23	2	1	1	2	1	30
Total Region 2	231155	109	16	3	8	7	1	144
Region 3	Popul. (GP+H)	Selected Sample (No.)						
		GP1	GP2	GP3	H1	H2	H3	Total
Western South 2	1598	24	6	1	1	1	0	33
Uva	2597	16	2	1	1	1	0	21
Sabaragamuwa	2554	20	2	1	1	1	0	25
Total Region 3	6749	60	10	3	3	3	0	79
Region 4	Popul. (GP+H)	Selected Sample (No.)						
		GP1	GP2	GP3	H1	H2	H3	Total
Western South	1290	14	5	1	1	1	0	22
Southern	4068	34	4	1	2	6	1	48
Total Region 4	5358	48	9	2	3	7	1	70
Region 5	Popul. (GP+H)	Selected Sample (No.)						
		GP1	GP2	GP3	H1	H2	H3	Total
LECO	2537	35	9	2	2	1	1	50
Grand Total	451463	350	80	17	21	23	6	497
Sample Size %	0.11							

By stratifying the sample, a greater accuracy of results can be obtained with a fewer samples. The stratification adopted here was by regions and tariff blocks for household consumers and by regions and by small, medium and large consumers in the case of industries, general purpose and hotels and by religious places. The stratification adopted will enable one to analyse the results according to the stratifications adopted, which will give a good insight on the affordability issues being studied in this survey. For this procedure we adopted a systematic random sampling technique for selecting the sample. Under the systematic sampling procedure, for each category or strata used we divide the total population by the proposed sample size. The resulting number is the interval used for selecting samples from the list. For example, if the population is 50,000 and we need to select 200 samples, the interval we need to use is $50,000/200$ or 250 or we chose every 250th. Household in the list of names of households up to the end of the list. The advantage of this method is that the sample will have representatives from all of the areas within the selected region and thus be representative of the total population characteristics.

As a result of the pandemic situation the systematic random sampling procedure could not adopted in all areas. In areas where there were restrictions of entry due to the pandemic, a random walk procedure was adopted in selecting the sample. Although selected household lists from a stratified random sampling procedure were available, it was not possible to interview all selected households. The rest of the households were selected by random walk procedures but adhering to the numbers required under each stratum. Under the random walk procedure, the enumerator visits a certain area and follows a set of rules such as going straight on the road, turning left and then picking the 3rd house, etc. There will be several such instructions given and the enumerator will use these instructions one at a time and then repeats it after reaching the end of the list of instructions. The only issue with this procedure is that we may not be able to stratify the population according to our requirements. Thus

the random walk procedure was utilized in adjacent areas to those areas closed due to pandemic, ensuring that all the needed sample numbers under each stratified category was obtained.

3.2.2 Questionnaire Formulation

The questionnaire/ instrument used for the survey covered several areas such as basic demographic, socioeconomic information (income/ expenditure, willingness to pay for electricity, affordability, safety and security, opinions on affordability and safety, issues and concerns and also the suggestion for improvement etc. In addition much focus was placed on Housing condition of consumers, energy usage, quality of power, electricity consumption, electrical appliances/instruments used etc. Tablets or smart phones were used to collect data from the consumer survey. An electronic format of the questionnaire was developed to facilitate data collection using instruments. The questionnaire formulated to collect data from households and institutions was pilot tested prior to finalization. The results of the pilot test were analysed to determine if changes or modifications to the questionnaire were needed. A few minor changes were required and these changes were made to draft questionnaire prior to conducting the main survey. Comments and suggestions of the client were also incorporated in the final questionnaire. The finalized questionnaire was used for the quantitative survey.

3.2.3 Enumerator Training

Appropriately qualified enumerators were hired by the consultant for conducting the survey. Due to the pandemic and the need to reduce travel between areas, a larger number of enumerators (60) than originally envisaged (25) were hired for the survey. Both Sinhala and Tamil speaking experienced and competent enumerators were hired to conduct the survey. Some of the enumerators hired were from among those who had worked for the consultant on similar surveys. The enumerators were provided with a thorough training on survey methodology and in the conduct of the survey using the final questionnaire formulated for the survey. The questionnaire was discussed in detail with the enumerators in order to familiarize them with the questionnaire and a role play session was included in the training in order to enhance the quality of training. The client also participated in the training programme. The training included a session on using the tablet to collect data for the survey. Sampling procedure was also explained to the enumerators in order to reduce any errors in the conduct of the survey. The Team Leader along with fellow consultants and IT specialist conducted this training in order to ensure a high quality standard in data collection. Some of the enumerators also participated in the pilot survey so as to gain field experience in the conduct of the survey.

3.2.4 Conduct of Survey

The enumerators were divided into groups and each group was assigned to a certain area. Interviews were conducted simultaneously in all areas so as to complete the surveys according to the allotted time frame. All health protocols required by the authorities for the prevailing COVID -19 pandemic environment were followed by the enumerators during the survey. Supervisors were appointed to oversee the work of enumerators in each area. The supervisors inspected the work of enumerators and reviewed the filled questionnaires to check for errors of entry, numerical errors, errors of unit types and any other type of errors. If required, any doubts about the responses were cleared through phone calls to the respondents. Once data was entered in the tablet, the data was automatically transferred to the consultant web site. Further analysis was undertaken after the cleaning of the data. Although the total number of samples needed was 2600 the actual numbers completed was less due to the COVID 19 situation. The actual number of interviews conducted as against the number selected is provided in tables below

Table 7: Household Interviews Completed

Consumer Category	Selected	Completed	Balance	% Completed
< 60 Units	747	637	110	85.3
61-120 Units	661	693	-32	104.8
121-180 Units	288	240	48	83.3
> 180 Units	165	109	56	66.1
Total	1861	1679	182	90.2

Table 8: Institutions Interviews Completed

Institution Category	Selected	Completed	Balance	% Completed
Religious Places	60	31	30	50.0
Industries	209	67	142	32.1
General Purpose	447	278	169	62.2
Hotels	50	33	17	66.0
Total	766	409	357	53.3

Due to the Covid 19 pandemic, it was not possible to take samples according to the sampled list. All sampled households could not be visited for various reasons such as lock downs, addresses being incorrect, refusal to take survey, etc. In addition to the sample households selected from the sampled list, additional samples were taken using a random walk procedure for taking the sample. This procedure allowed the enumerators to complete 90% of the household interviews for the survey. In the case of institutions, it was more difficult to complete the surveys as many of the institutions, particularly the industries, refused to participate in the survey due to the COVID – 19 situation. A little over 50% of the samples selected for institutions were completed. Details of completed surveys by area and categories of consumers have been presented in Table 9.

Table 9: Household Surveys Completed by Area and Consumer Category

	Consumer Categories									
CATEGORIES	LTO60		LTO 60-120		LT 180		MT180		Total	
AREA	Selected	Completed	Selected	Completed	Selected	Completed	Selected	Completed	Selected	Completed
Households										
Colombo - City										
Colombo	18	2	9	14	10	6	11	5	48	27
North Western										
Kurunegala	60	56	29	33	36	17	24	12	149	118
Puttalama	30	30	14	17	18	14	12	13	74	74
Sub Total	90	86	43	50	54	31	36	25	223	192
North Central										
Anuradhapura	30	32	14	17	18	19	12	6	74	74

Hinugurakgoda - Minneriya	18	24	9	14	12	9	7	4	46	51
Sub Total	48	56	23	31	30	28	19	10	120	125
Northern										
Jaffna	8	8	5	5	5	6	3	2	21	21
Kilinochchi City	8	8	4	5	5	5	3	3	20	21
Mannar City	8	8	4	4	5	6	3	3	20	21
Mullaitivu City	8	11	3	3	5	6	2	2	18	22
Vavuniya-Madhu	6	7	3	3	4	4	2		15	14
Sub Total Sub Total	38	42	19	20	24	27	13	10	94	99
Western - North										
Kelaniya	36	9	33	10	8	7	2	6	79	32
Gampaha	37	41	34	56	8	17	4	3	83	117
Sub Total	73	50	67	66	16	24	6	9	162	149
Central										
Kandy City	40	25	40	35	10	6	3	2	93	68
Matale	40	43	40	40	10	10	3	3	93	96
N- Eliya	38	11	38	9	10	4	4	2	90	26
Sub Total	118	79	118	84	30	20	10	7	276	190
Eastern										
Trincomalee City	21	13	22	27	5	3	2	2	50	45
Batticaloa-Eravur	21	21	22	44	5	6	2	3	50	74
Ampara	21	24	23	29	6	2	2	1	52	56
Sub Total	63	58	67	100	16	11	6	6	152	175
Western South 2										
Avissawela	24	38	22	43	8	14	6	8	60	103
Kalutara	23	17	21	20	6	9	3	3	53	49
Sub Total	47	55	43	63	14	23	9	11	113	152
Uva										
Monaragala	25	32	22	58	7	8	5	5	59	103
Badulla City	20	22	20	23	7	4	4	4	51	53
Sub Total	45	54	42	81	14	12	9	9	110	156
Sabaragamuwa										
Kegalle	27	28	25	30	8	10	5	2	65	70
Ratnapura	27	31	25	18	9	2	5	1	66	52
Sub Total	54	59	50	48	17	12	10	3	131	122

Western South 1										
Boralesgamuwa	33	10	33	37	7	20	3	9	76	76
Sub Total	33	10	33	37	7	20	3	9	76	76
Southern										
Galle-Bataduwa	30	41	30	42	7	15	3	2	70	100
Matara-Dikwella	30	37	30	38	7	9	3	3	70	87
Hambantota	32	8	30	19	7	2	4		73	29
Sub Total	92	86	90	99	21	26	10	5	213	216
Total CEB / LECO	719	637	604	693	253	240	142	109	1718	1679

3.3 Qualitative Data Collection

Qualitative data was collected using tools such as Key Informant Interviews (KII) and literature reviews. Focal Group Discussions were not possible due to the COVID – 19 situation. A few officials of the CEB and LECO were interviewed. It was proposed to also interview officials of a few large, medium and minor institutions within the industry, hotel and other commercial and general purpose areas. However this was not feasible due to the current COVID situation. The information gathered from these KIIs and literature survey was triangulated with the data gathered from the questionnaire survey.

3.4 Data Analysis and Reporting

Data analysis was undertaken after all the data had been sent to the data base. Prior to the analysis, data obtained was checked for errors and cleaned to eliminate outliers or inconsistencies. Subsequently the data was entered into a data base and analysed using the SPSS programme. Dummy tables were prepared and shared with the client prior to the analysis. Cross tabulations were undertaken where appropriate. Tables and charts were prepared for reporting purposes. Qualitative data collected for the study was incorporated in the appropriate sections in order to triangulate the data collected through the quantitative survey.

4 Survey Results

4.1 Household Survey

The households interviewed were stratified by the level of consumption of electricity of households. The population was stratified into four groups, those consuming below 60 units of electricity per month, those consuming 61-120 units per month, those consuming 121-180 units per month and those consuming above 120 units of electricity. A unit is defined as 1 kilowatt hour of electricity. Table 10 below provides details of sampling according to the stratified groups. The sample percentage was proportional to the population within each group.

4.1.1 Details of Interviews Completed

Table 10: Number of Interviews Conducted by Consumption Category of Households

Household Category	Consumption	No of Interviews	Percentage of Total
< 60 Units		642	37.9
61-120 Units		698	41.3
121-180 Units		239	14.1
>180 Units		113	6.7
Total		1692	100

The two largest groups sampled were those consuming below 60 units and those consuming between 61 and 120 units. The largest number of consumers was from these two categories.

Table 11: Respondent Details - Households

Respondent Details of Households		
Persons Answering Questionnaire	No	%
HH Head	1487	87.9
Spouse of HH Head	105	6.2
Son	36	2.1
Daughter	56	3.3
Son in Law	6	0.4
Other members of HH	2	0.1
Total	1692	100.0

About 88% of the respondents were household heads, 6% were the spouses of the household heads. Other members who answered the survey questions included sons, daughters, sons in law and others making up to 6% of the total number of households interviewed.

Table 12: Household Heads by Consumer Category and Gender

Household Consumption Category	HH Heads	Male	Female	Total
< 60 Units	No	500	142	642
	%	77.9	22.1	100.0
61-120 Units	No	590	108	698
	%	84.5	15.5	100.0
121-180 Units	No	203	36	239
	%	84.9	15.1	100.0
>180 Units	No	99	14	113
	%	87.6	12.4	100.0
Total Units	No	1392	300	1692
	%	82.3	17.7	100.0

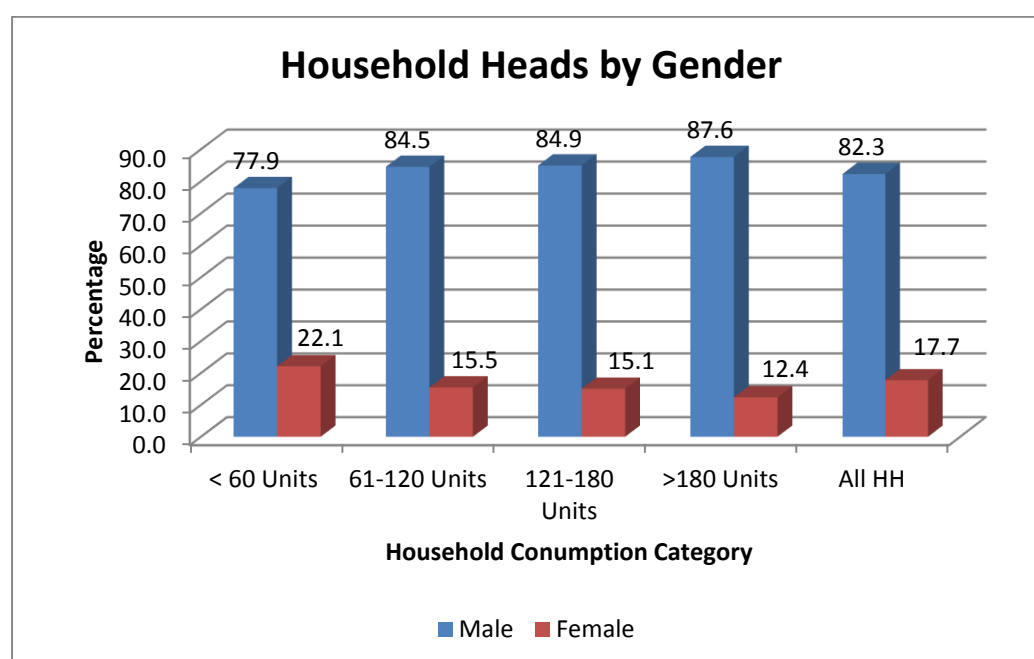


Figure 1: Household Heads by Consumer Category and Gender

As can be observed in Table 12, about 82 % of the household heads were males and this ranged from 78% to 88% among the four groups. When all households were taken into account 82% of the HH heads were male and 17.7% females. The majority of the respondents (about 80% appear to be males). The highest proportion of male household heads (85%-88%) was in the consumer categories above 60 units. The highest proportion of female household heads was in the consumer category of income group consuming low levels of electricity.

4.1.2 Education and Civil Status of HH Heads

Table 13: Education of HH Heads

Educational Status	HH Head (Male)		Household Head (Female)		Total	
	No	%	No	%	No	%
No Education	39	2.8	24	8.0	63	3.7
Up to Primary	176	12.6	54	18.0	230	13.6
Up to GCE (OL)	589	42.3	123	41.0	712	42.1
Passed GCE (OL)	231	16.6	34	11.3	265	15.7
Up to GCE (AL)	134	9.6	27	9.0	161	9.5
Passed GCE (AL)	104	7.5	18	6.0	122	7.2
Degree	39	2.8	11	3.7	50	3.0
Master's Degree or Above	16	1.1	1	0.3	17	1.0
Vocational Training	3	0.2	0	0.0	3	0.2
Not Relevant	60	4.3	8	2.7	68	4.0
Other	1	0.1	0	0.0	1	0.1
Total	1392	100.0	300	100.0	1692	100.0

The female household heads appear to be less educated than their male counterparts with 26% with either no education or having only primary education compared to the males with only about 15% in this group. About 60% of the males have studied up to or passed the GCE (OL) among males compared to 52% among females. Among those with qualifications higher than GCE (OL), both the males and females have a similar proportion of about 20% with these qualifications. Thus overall the female household heads appear to be less educated.

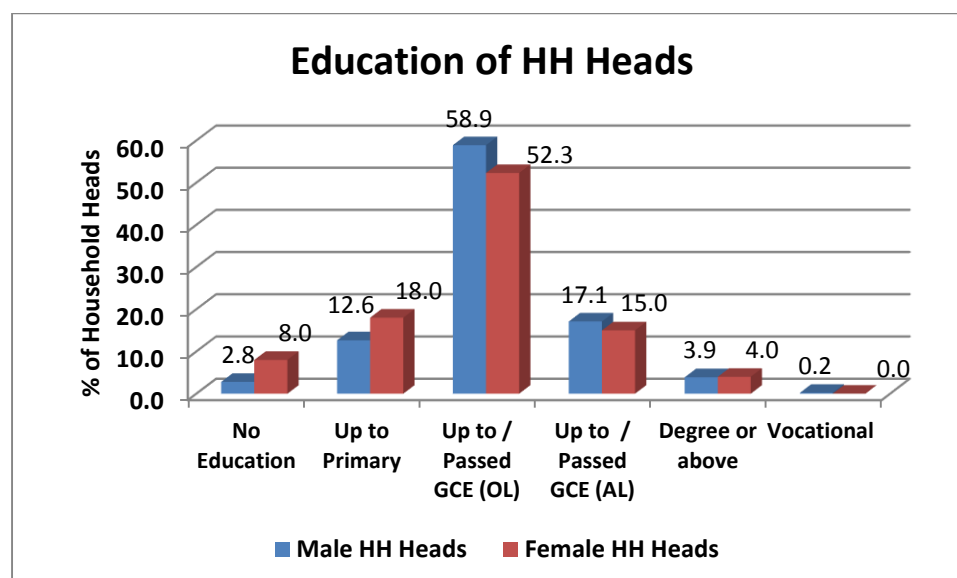


Figure 2: Education Levels of HH Heads by Gender

Table 14: Civil Status of HH Heads

Civil Status of HH Heads	Male		Female	
	No	%	No	%
Married	1316	94.5	224	74.7
Single	54	3.9	11	3.7
Widow / Widower	15	1.1	61	20.3
Divorced	3	0.2	2	0.7
Separated	3	0.2	2	0.7
Living Together	1	0.1	0	0
Total	1392	100	300	100.1
Total (%)	1392	82.3	300	17.7

About 95% of the male and 75% of the female household heads was married. Over 20% of the female HH heads were widows compared to 1.1% widowers among males. Less than 4% of the HH heads were single.

4.1.3 Occupation, Income and Expenditure of Household Heads

Table 15: Primary Occupation of HH Heads

Consumption Category	< 60 Units		61-120 Units		121-180 Units		>180 Units		Total	
	No	%	No	%	No	%	No	%	No	%
Govt. / Semi Govt.	67	10.4	116	16.7	63	26.3	15	13.3	261	15.4
Employer	37	5.8	46	6.6	17	7.1	27	23.9	127	7.5
Self Employed	39	6.1	38	5.4	14	5.9	9	8	100	5.9
Private Sector	133	20.7	222	31.8	67	28	28	24.8	450	26.6
Crop Farmer	111	17.3	70	10	11	4.6	6	5.3	198	11.7
Unpaid Fam Worker	7	1.1	2	0.3	1	0.4	0	0	10	0.6
Livestock Farmer	11	1.7	4	0.6	3	1.3	1	0.9	19	1.1
Unable to work/ too old	79	12.3	51	7.3	15	6.3	7	6.2	152	9
Other	79	12.3	72	10.4	25	10.4	13	11.5	189	11.1
No Response	79	12.3	77	11	23	9.6	7	6.2	186	11
Total	642	100	698	100	239	100	113	100	1692	100

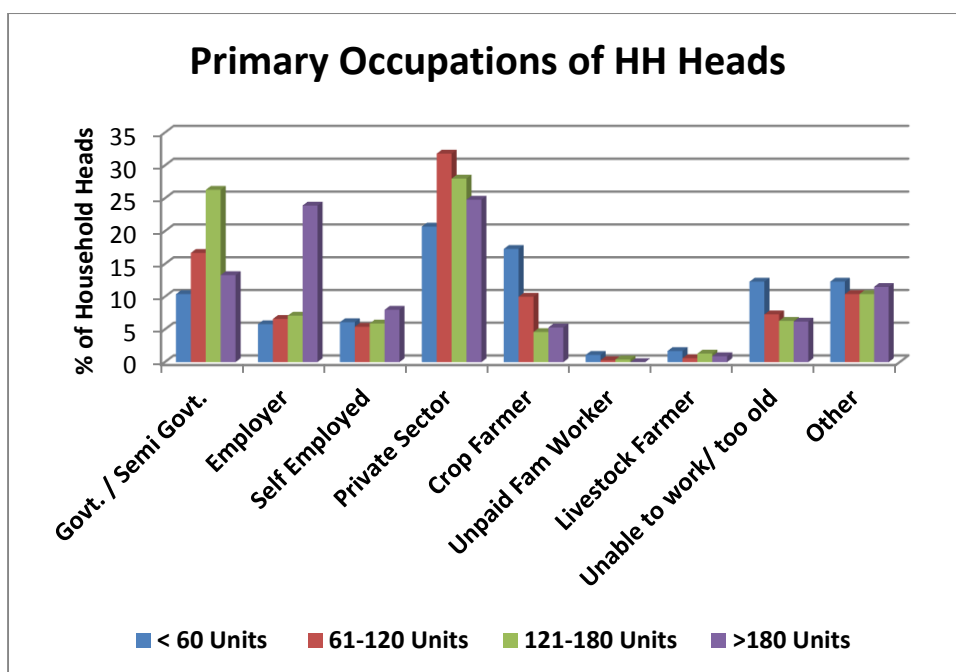


Figure 3: Primary Occupations of HH Heads by Electricity Consumption Categories

The major occupation of all groups was private sector employment, ranging from 21% for the below 60 unit consumer category to 32% for the 61-120 unit consumer category. The next highest occupation was government or semi-government employment which ranged from 10% for the under 60 unit consumers to 26% for the 121-180 unit consumers. The third major primary occupation reported was crop farming which ranged from 5% among the 121-180 unit consumers to 17% among less than 60 unit consumers. The employer category of employment ranged from 6%-7% among the groups 0-180 unit consumers. It was highest at 24% for above 180 unit consumer category, showing that the highest level of consumers had a high proportion of employers, who ran their own businesses. Overall about 6% were self-employed and 11% were holding other types of employment. About 10% of the HH heads indicated that they were too old or unable to work due to old age. About 11% of the HH heads did not respond to this question.

Table 16: Secondary Occupation of HH Heads

Consumption Category	< 60 Units		61-120 Units		121-180 Units		>180 Units		Total Units	
Occupation of HH Head	No	%	No	%	No	%	No	%	No	%
Govt. / Semi Govt.	0	0	0	0	0	0	1	16.7	1	1.3
Employer	2	5.9	2	9.1	3	23.1	3	50	10	13.3
Self Employed	1	2.9	1	4.5	1	7.7	0	0	3	4
Private Sector	4	11.8	3	13.6	0	0	0	0	7	9.3
Crop Farmer	13	38.2	6	27.3	4	30.8	0	0	23	30.7
Unpaid Fam Worker	0	0	0	0	0	0	0	0	0	0
Livestock Farmer	1	2.9	1	4.5	3	23.1	1	16.7	6	8
Unable to work/ too old	0	0	0	0	0	0	0	0	0	0
Other	13	38.5	9	40.9	2	15.8	1	16.7	25	33.3
Total	34	100	22	100	13	100	6	100	75	100
Total (%)	45.3		29.3		17.3		8.0		100.0	

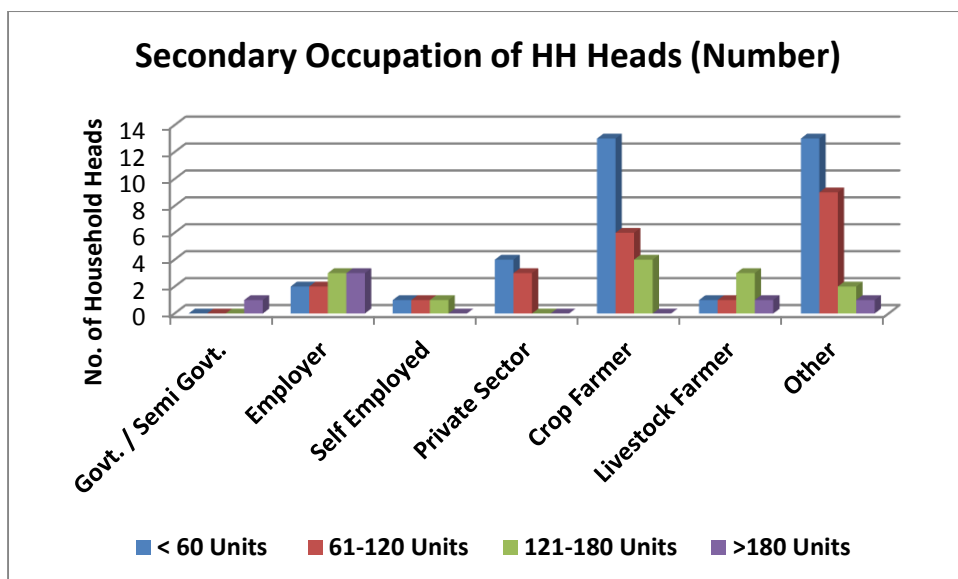


Figure 4: Secondary Occupations of HH Heads by Electricity Consumption Categories

Less than 5% or 75 of the households reported secondary employment. The majority of those reporting secondary employment (25 persons) were from the other category (33%), followed by farmers 31% (23 persons), employer 13% (10 persons) and private sector employment 9% (7 persons). The highest proportion, 45% (34 persons) having secondary employment was in the under 60 unit consumer category, followed by the 60-120 unit consumer category, 29% (22 persons) and 120-180 unit consumer category, 17% (13 persons). Thus it appears that the more HH heads of the lowest consumer group or the poorest group appear to have more than one occupation.

Table 17: Income of HH Heads

Household Consumption Category		Primary Occupation (Income/Month) Rs		Secondary Occupation (Income /Month) Rs.	
		Ave HH Head Income	Income Range Rs	Ave HH Head Income	Income Range Rs
< 60 Units	No	551	1,000-1,000,000	34	1,100 - 60,000
	Rs	38,030		18,811	
61-120 Units	No	629	1,000-750,000	22	3,000 - 80,000
	Rs	40,330		28,909	
121-180 Units	No	219	5,000-650,000	13	2,000 - 200,000
	Rs	50,232		38,615	
>180 Units	No	100	3,000-500,000	6	2,000 - 165,000
	Rs	65,700		66,166	
Total Units	No	1,499	1,000-1,000,000	75	1,100 - 200,000
	Rs	42,624		28,994	

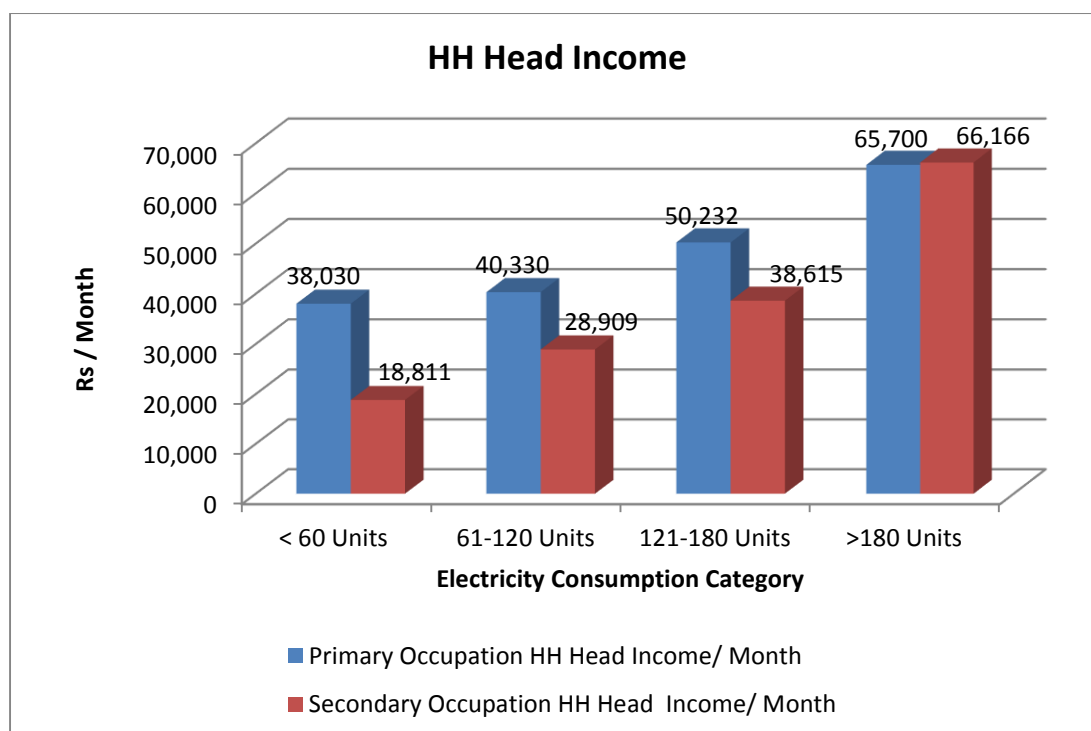


Figure 5: Income of HH Head from Primary and Secondary Occupations

Income from the primary occupation of household heads ranged from Rs 38,000 to Rs 65,000 per month. The lowest income was observed for the less than 60 unit consumption group, gradually increasing for the higher consumption groups with the highest being observed for the highest consumption group. This suggests that the higher income earners use more units of electricity per month than the lower income groups. This is agreement with the notion that as income increases, households tend to use a greater number of electrical equipment and thus consume more electricity. Income from secondary occupation was reported only by 5% of the HH heads. Here too, the incomes increased as the number of units used increased.

Table 18: Monthly Household Income

Consumption Category	< 60 Units		61-120 Units		121-180 Units		>180 Units		Total Units	
Category	Total Amount (Rs)	%	Total Amount (Rs)	%	Total Amount (Rs)	%	Total Amount (Rs)	%	Total Amount (Rs)	%
Farming – Paddy	2,048,800	16.7	2,004,133	10.9	678,500	7.7	437,000	8.2	5,168,433	11.6
Farming – Other	1,118,500	9.1	943,686	5.1	272,900	3.1	216,000	4.1	2,551,086	5.7
Livestock	224,400	1.8	128,055	0.7	91,000	1.0	59,500	1.1	502,955	1.1
Small Business (Agric.)	82,700	0.7	413,396	2.2	145,000	1.7	60,000	1.1	701,096	1.6
Small Business (Non Agric.)	404,600	3.3	704,755	3.8	375,000	4.3	239,000	4.5	1,723,355	3.9
Employment (Wages / Salaries – Regular)	4,137,050	33.7	7,524,146	40.9	4,218,000	48.1	1,969,750	37.1	17,848,946	39.9
Rental / Boarders	178,500	1.5	531,023	2.9	274,500	3.1	372,000	7.0	1,356,023	3.0
Skilled Work (Mason, Carpenter)	499,500	4.1	356,555	1.9	287,000	3.3	177,000	3.3	1,320,055	3.0

Electrician, Welder Tailoring, Etc.)										
Unskilled Labour	198,500	1.6	285,355	1.6	6,500	0.1	22,000	0.4	512,355	1.1
Plantation Work	173,300	1.4	260,755	1.4	47,000	0.5	60,600	1.1	541,655	1.2
Income from interest	322,350	2.6	695,256	3.8	53,200	0.6	34,500	0.7	1,105,306	2.5
Income from assets (Hiring/rental)	282,000	2.3	434,233	2.4	207,000	2.4	311,500	5.9	1,234,733	2.8
Pension	777,427	6.3	1,555,166	8.5	701,000	8.0	232,000	4.4	3,265,593	7.3
Remittances (Local)	193,000	1.6	543,733	3.0	145,000	1.7	205,000	3.9	1,086,733	2.4
Remittances (Foreign)	199,000	1.6	447,833	2.4	365,000	4.2	275,000	5.2	1,286,833	2.9
Samurdhi	277,460	2.3	192,766	1.0	107,750	1.2	19,200	0.4	597,176	1.3
Social security payments (disability, relief)	70,150	0.6	15,806	0.1	21,250	0.2	0	0.0	107,206	0.2
Scholarship	13,450	0.1	200,750	1.1	107,800	1.2	50,000	0.9	372,000	0.8
Solar Net Metering	553,054	4.5	356,145	1.9	417,614	4.8	224,000	4.2	1,550,813	3.5
Loan	522,580	4.3	783,500	4.3	256,000	2.9	341,000	6.4	1,903,080	4.3
Other (Specify)	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	12,276,321	100.0	18,377,047	100.0	8,777,014	100.0	5,305,050	100.0	44,735,432	100.0
Ave Monthly Income / HH	22,280		29,216		40,078		53,051		29,844	

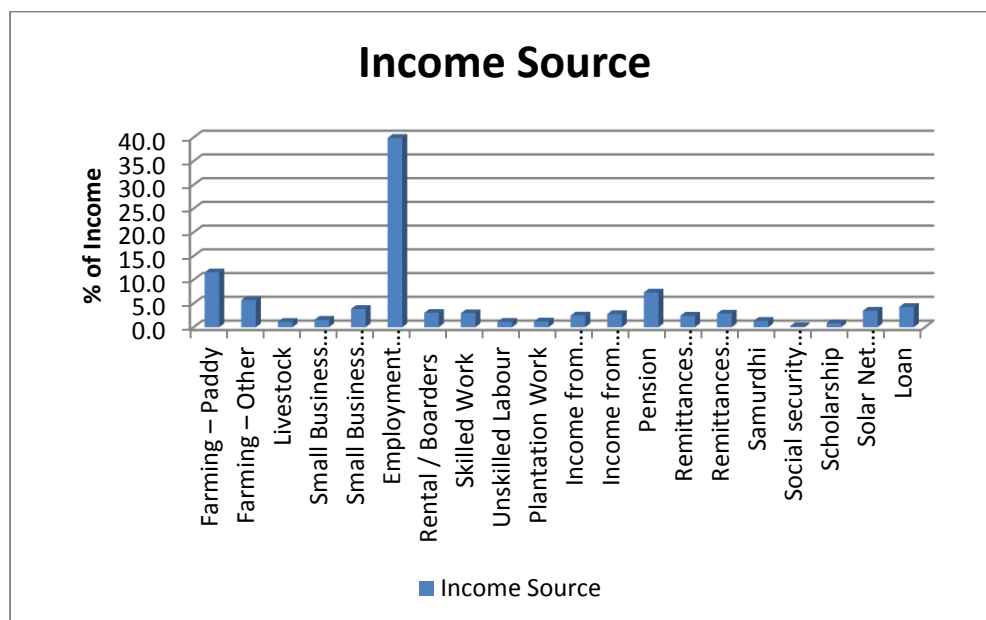


Figure 6: Sources of Household Income (All Households)

The highest proportion of income was obtained from wages or employment ranging from 34% to 48% of the total household income among the four consumption groups. The next highest income was

obtained from farming (Paddy and other), ranging from about 10% to 26% of the total household income. The next highest incomes were obtained from local and foreign remittances ranging from 3%-9% among the four groups and pensions providing from 4% -9% of the incomes. This was followed by income from net metering ranging from 2%-5%. Income from assets ranged from 2%-6% and that from interest ranged from 1%-4%. Loans provided from 3% - 6% additional revenues to the households.

Table 17: Average Monthly Household Expenditure by Consumption Category

Consumption Category	< 60 Units		61-120 Units		121-180 Units		>180 Units		Total Units	
Category	Total Amount (Rs)	%	Total Amount (Rs)	%	Total Amount (Rs)	%	Total Amount (Rs)	%	Total Amount (Rs)	%
Food	7,309,900	45.1	10,318,200	41.9	4,333,000	38.0	2,190,800	28.2	24,151,900	40.2
Housing	880,100	5.4	1,584,890	6.4	692,100	6.1	623,500	8.0	3,780,590	6.3
Clothing	1,181,400	7.3	1,693,413	6.9	672,300	5.9	476,000	6.1	4,023,113	6.7
Health	1,399,735	8.6	2,058,650	8.4	886,100	7.8	603,350	7.8	4,947,835	8.2
Communication / TV	551,500	3.4	820,690	3.3	399,890	3.5	277,050	3.6	2,049,130	3.4
Cable TV	84,003	0.5	122,354	0.5	74,210	0.7	102,750	1.3	383,317	0.6
Gas	387,925	2.4	563,143	2.3	242,980	2.1	163,445	2.1	1,357,493	2.3
Electricity	264,791	1.6	867,575	3.5	629,528	5.5	679,485	8.7	2,441,379	4.1
Water	123,543	0.8	369,462	1.5	161,164	1.4	113,650	1.5	767,819	1.3
Education	1,292,750	8.0	1,974,134	8.0	901,200	7.9	569,080	7.3	4,737,164	7.9
Transport	839,070	5.2	1,383,468	5.6	787,409	6.9	520,080	6.7	3,530,027	5.9
Entertainment	515,215	3.2	751,470	3.1	329,550	2.9	325,600	4.2	1,921,835	3.2
Alcohol / Smoking	204,150	1.3	300,935	1.2	134,500	1.2	120,500	1.5	760,085	1.3
Loan Repayment	1,170,886	7.2	1,818,335	7.4	1,158,600	10.2	1,010,000	13.0	5,157,821	8.6
Other	7,056	0.0	660	0.0	0	0.0	0	0.0	7,716	0.0
Total Expenditure	16,212,024	100	24,627,379	100.0	11,402,531	100	7,775,290	100	60,017,224	100
Total Income	12,276,321	100	18,377,047	100	8,777,014	100	5,305,050	100	44,735,432	100
Ave. Monthly Exp /HH	25,252		35,283		47,709		68,808		35,471	
Ave. Monthly Income / HH	22,280		29,216		40,078		53,051		29,844	
Exp as % of Income / HH	132.1		134.0		129.9		146.6		134.2	

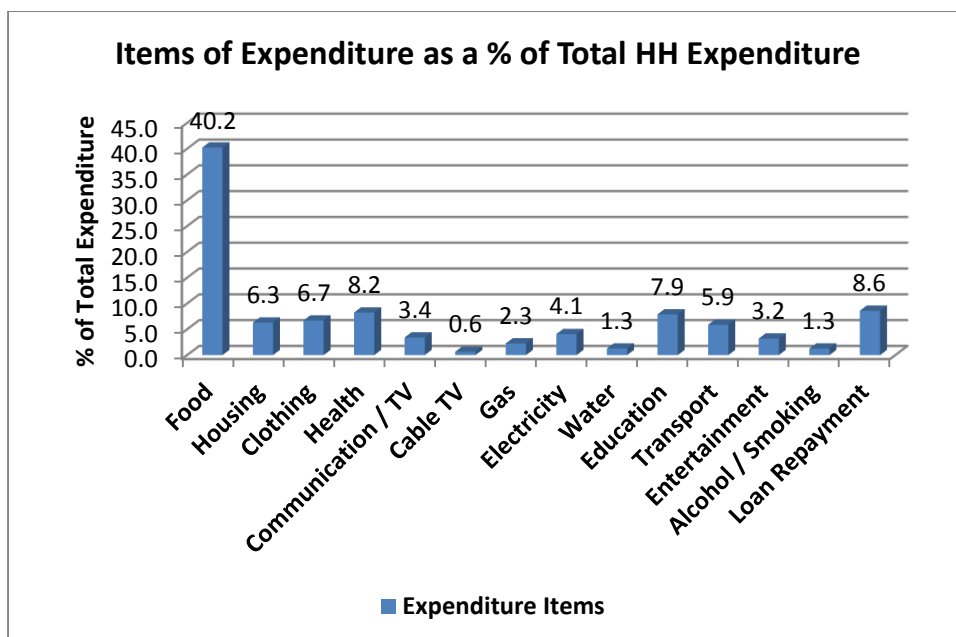


Figure 7: Expenditure items as a Percentage of Total HH Expenditure (All Households)

Major expenditure was for food in all four categories, the proportion spent on food ranged from 28% to 45% to, with the highest proportion for the lowest consuming group and lowest for the highest consuming group. The proportion spent on electricity varied from 1.6% for the lowest consuming group (<60 units/month) to 3.5% for the 61-120 units consumer, to 5.5% for the 121-180 unit consumer and 8.7% for the highest consuming group (>180 units/month). Thus a very low proportion of expenditure was spent on electricity for the lower consuming groups. Other major expenditures were for health, education, loan repayment, clothing, housing and transport.

4.1.4 Type of Wiring, Use, Basic Needs and Affordability of Electricity

Table 19: Type of Connection (Wiring)

Consumption Category	Type of Wiring	Single Phase	Three Phase	Not reported	Total	Solar
< 60 Units	No.	517	115	10	642	6
	%	80.5	17.9	1.6	100.0	0.9
61-120 Units	No.	562	122	14	698	7
	%	80.5	17.5	2.0	100.0	1.0
121-180 Units	No.	202	37	0	239	3
	%	84.5	15.5	0.0	100.0	1.3
>180 Units	No.	93	20	0	113	1
	%	82.3	17.7	0.0	100.0	0.9
Total Units	No.	1374	294	24	1692	17
	%	81.2	17.4	1.4	100.0	1.0

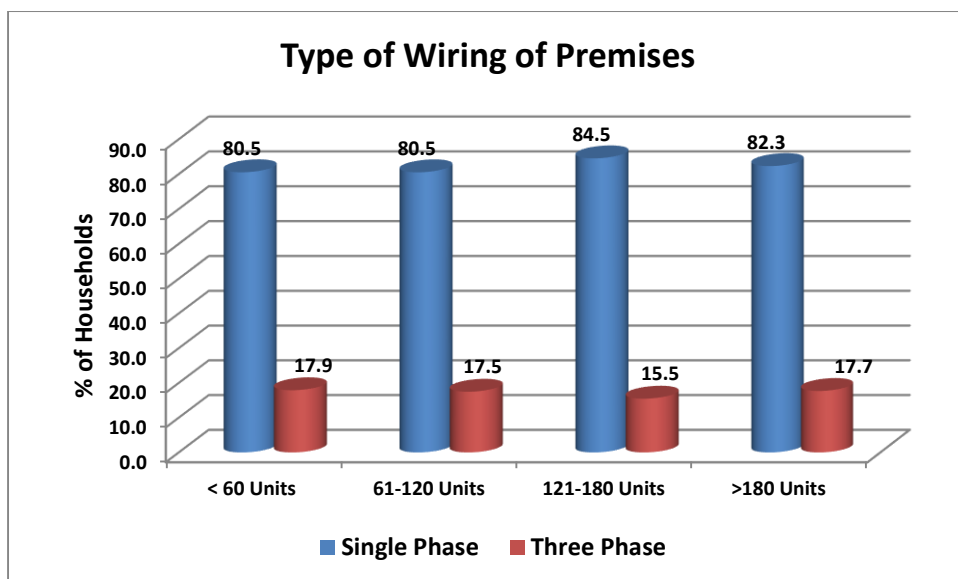


Figure 8: Type of Wiring in Premises

Single phased wiring was reported by over 80% of the households , ranging from 81% for those groups consuming below 120 units and 85% for the group consuming between 120-180 units and 82% for the group consuming greater than 180 units. Thus a majority of the households appear to have installed single phased wiring in their houses.

Table 20: Use of Electricity

Electricity Use by Consumption Category	Number of Households	Total Number of Units Used / Month	Average Number of Units Used /Month/HH	Total Electricity Bill / Month (Rs)	Average Electricity Bill / month / HH (Rs)
< 60 Units	642	29,441	47	250,586	396
61-120 Units	698	65,755	97	805,730	1,178
121-180 Units	239	35,623	149	645,488	2,701
>180 Units	113	26,438	233	692,757	6,130
Total Units	1692	157,257	95	2,397,561	1,435

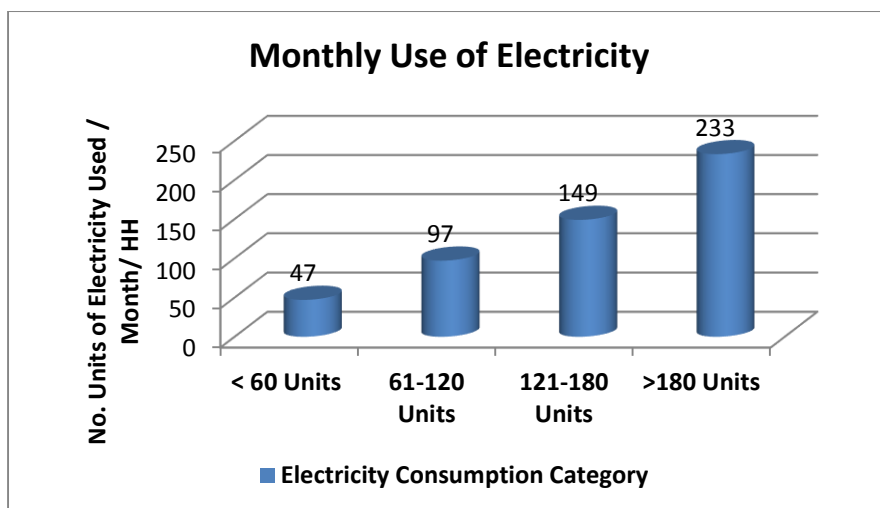


Figure 9: Average Monthly Use of Electricity / HH (Units)

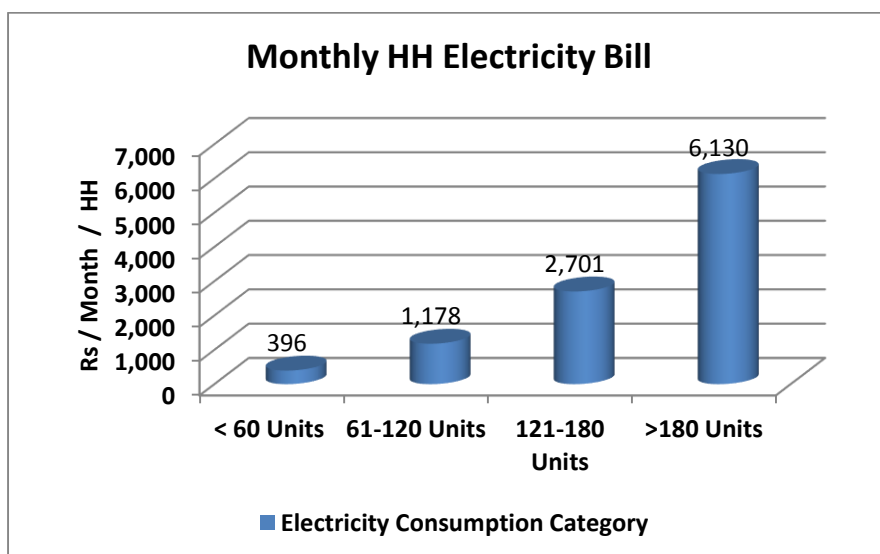


Figure 10: Average Monthly Electricity Bill / HH (Rs.)

As expected the average number of units used per month increased according to the groupings by the number of units used. Thus the average number of units consumed per month increased from 47 units for < 60 unit consumers, to 97 units for 61-120 unit consumers, to 149 units for 121-180 unit consumers and to 233 units for > 180 unit consumers. Likewise the average monthly bill increased from Rs 396, to Rs 1178, to Rs 2701 and to Rs 6130 for the same groups. Overall average consumption for all households was 95 units and the bill Rs 1435 per month.

Table 21: Affordability of Electricity

Electricity Affordability Consumption Category by	Can you afford to pay the electricity bill?				
	Units	Yes	No	Not reported	Total
< 60 Units	Number	573	59	10	642

	%	89.3	9.2	1.6	100.0
61-120 Units	Number	528	155	15	698
	%	75.6	22.2	2.1	100.0
121-180 Units	Number	174	65	0	239
	%	72.8	27.2	0.0	100.0
>180 Units	Number	60	53	0	113
	%	53.1	46.9	0.0	100.0
Total Units	Number	1335	332	25	1692
	%	78.9	19.6	1.5	100.0

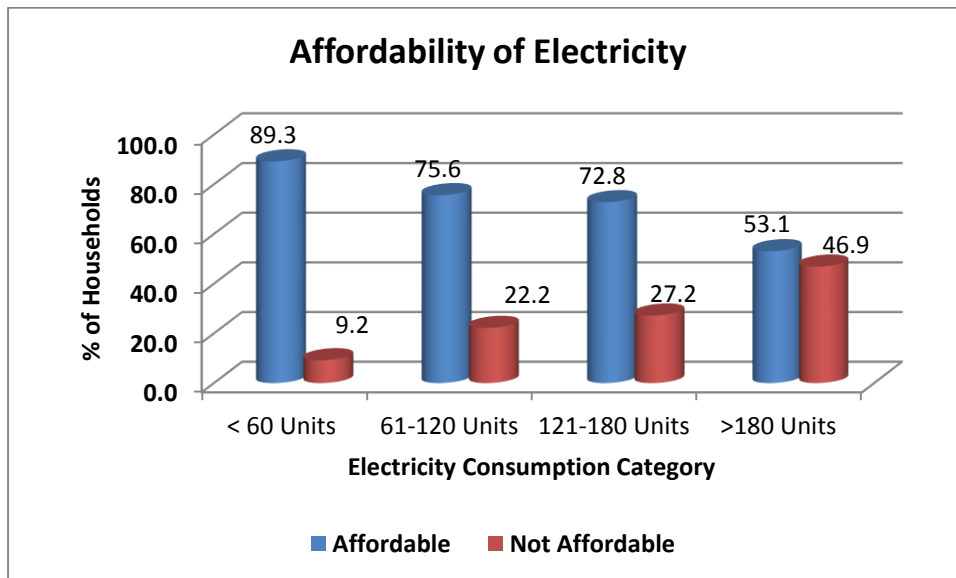


Figure 11: Affordability of Electricity

Overall about 79% of the households indicated that they could afford to pay the bill. About 89% indicated that they could afford the bill in the < 60 unit consumer group. This declined to 76% for the 61-120 unit consumer group, to 73% for the 12-180 unit consumer group and to 53% for the > 180 unit consumer group. Thus the electric is more affordable to the lower unit consumers than the higher unit consumers. This may be also due to the fact that the lower unit consumers are subsidized, with the higher unit consumers paying for the subsidy of the lower unit consumers. Thus this may indicate that even with the removal of such subsidies, the lower consumer groups may not be affected much.

Table 22: Reasons for Non-Affordability of Electricity

Consumption Category	Why not Affordable?				
	Units	Income low - need to spend for basic needs	Have to forego essentials to pay bill	Income fluctuates	Total
< 60 Units	Number	35	12	12	59
	%	59.3	20.3	20.3	100.0
61-120 Units	Number	73	62	20	155
	%	47.1	40.0	12.9	100.0
121-180 Units	Number	21	38	6	65
	%	32.3	58.5	9.2	100.0
>180 Units	Number	17	29	7	53
	%	32.1	54.7	13.2	100.0
Total Units	Number	146	141	45	332
	%	44.0	42.5	13.6	100.0

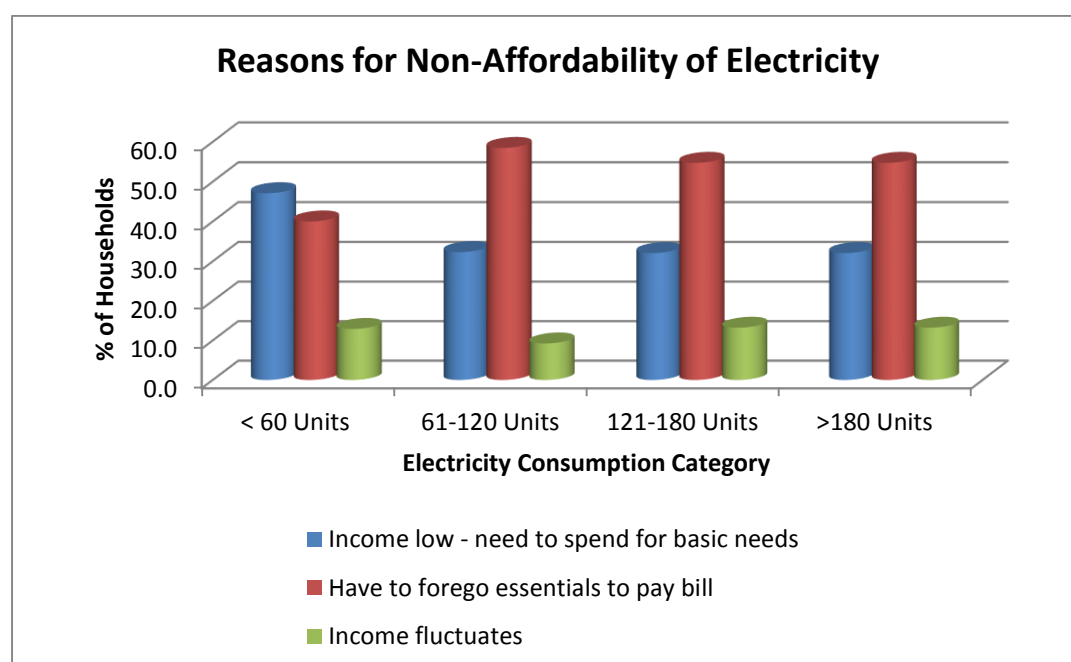


Figure 12: Reasons for Non-Affordability of Electricity

Among those reporting non-affordability, the major reason for the group consuming less than 60 units of electricity was low incomes (60%) followed by having to forego essentials and income fluctuations (20% each). In the group consuming 61-120 units, again the major reason was low incomes (47%) and having to forego essentials (40%), followed by income fluctuation (20%). Thus a greater proportion of households have to forego their essentials in order to pay for the electricity bill. In the case of the consumer group 121-180 units a high proportion (59%) had to forego essentials while 32% reported low incomes and 9% income fluctuations. In the case of the highest consumer group of > 180 units too, the majority (55%) indicated that they had to forego essentials to pay the bill while 32% indicated

low incomes and 13% income fluctuations. Thus while low income was the major reason for non-affordability in the lowest consuming group, foregoing essentials was the major cause of non-affordability for the two highest consuming groups. This suggests that there is a need to improve the incomes and reduce fluctuations in their incomes of the lower income groups if one is to improve their ability to pay the electricity bill.

Table 23: What Are Your Basic Needs if Electricity is Not-Affordable

Consumption Category	< 60 Units		61-120		121-180		>180		Total	
Why not Affordable?	No.	%	No.	%	No.	%	No.	%	No.	%
Food	31	52.5	70	45.2	20	30.8	12	22.6	133	40.1
Education	15	25.4	34	21.9	14	21.5	11	20.8	74	22.3
Water	21	35.6	37	23.9	11	16.9	8	15.1	77	23.2
Health	26	44.1	48	31.0	12	18.5	14	26.4	100	30.1
Transport	6	10.2	24	15.5	7	10.8	8	15.1	45	13.6
Small business	2	3.4	9	5.8	2	3.1	4	7.5	17	5.1
Clothing	6	10.2	23	14.8	9	13.8	3	5.7	41	12.3
Communications	3	5.1	17	11.0	3	4.6	4	7.5	27	8.1
Other	0	0.0	1	0.6	0	0.0	0	0.0	1	0.3
Total	59	100.0	155	100.0	65	100.0	53	100.0	332	100.0

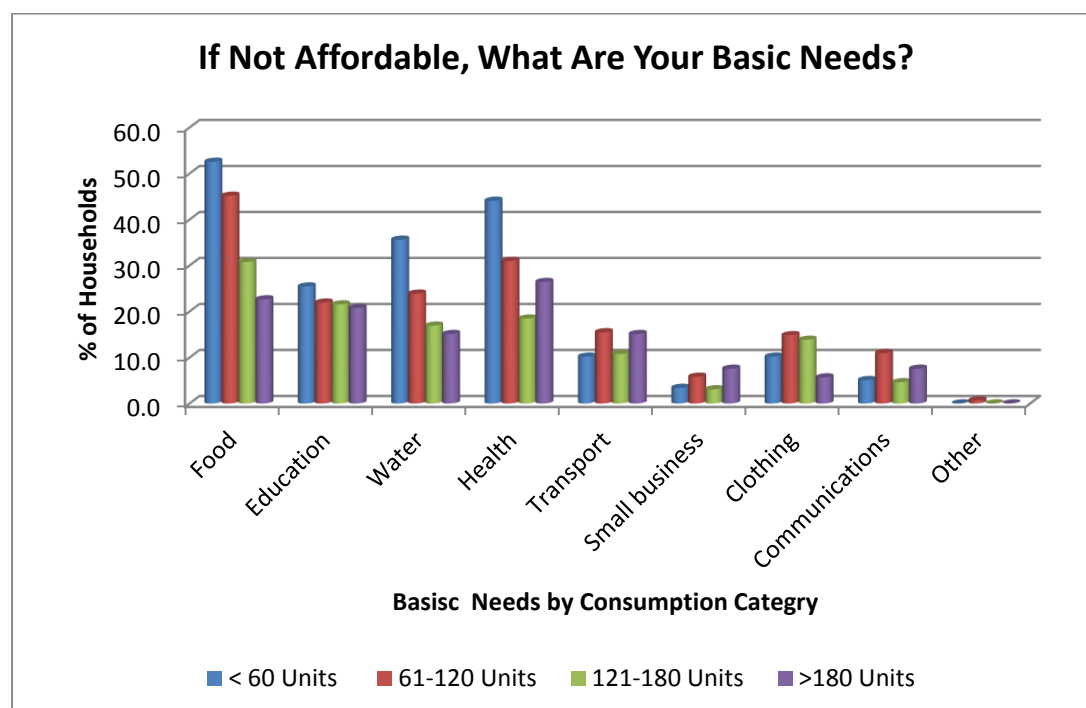


Figure 13: If Not-Affordable, What are your Basic Needs?

Among those reporting non-affordability, food, health, water, education and to an extent transport and clothing are the most important needs of the lowest consuming group (<60 Units). A similar need profile was reported by the 61-120 unit consumer group, but they reported a higher proportion of

need for transport and clothing. In the 121-180 consumer group, the major needs were for food, education and to some extent, health, water, transport and clothing. The highest consuming group (>180 Units), reported health as the greatest need, followed by food, education, water and transport. Thus as expected food, health, water and education were basic needs of the lower consumer groups. Food, health, education and transport were basic needs of the higher consuming groups.

Table 24: Basic Needs and Use of Electrical Equipment in Households < 60 Units of Consumption

Equipment Basic Needs	No of HH Reporting	% Reporting	Total No. Actually Owned	Average / HH
Lighting Bulbs (Normal)	283	44.1	1559	6
Lighting Bulbs(CFL)	358	55.8	1665	5
Lighting Bulbs(LED)	413	64.3	2730	7
Rice Cookers	323	50.3	323	1
Iron	431	67.1	433	1
Shaver	9	1.4	9	1
Phones and Mobile charging	453	70.6	853	2
Hair Dryer	13	2.0	14	1
Microwave	21	3.3	21	1
Refrigerator	276	43.0	276	1
Electric kettle	160	24.9	172	1
Blender, mixer	236	36.8	241	1
Toaster, Oven	55	8.6	62	1
Ceiling Fans	118	18.4	161	1
Pedestal/Wall/Table Fans	304	47.4	496	2
Air Conditioners	5	0.8	9	2
Electric Vehicle or PHEV Vehicle	4	0.6	4	1
Clothes Washer	63	9.8	63	1
Clothes Dryer	7	1.1	7	1
Dish Washer	1	0.2	1	1
Internet	60	9.3	66	1
Vacuum cleaner	4	0.6	4	1
Radio, CD, TV and other entertainment items	477	74.3	638	1
Computers / Laptops /tablets	55	8.6	57	1
Shower Heaters	6	0.9	6	1
Other	8	1.2	8	1
Total Number of HH	642	100.0	3924	6

Within this consumer group (<60 units), the major types of electrical equipment used were, radio, TV, mobile and other phones, LED and other types of bulbs and irons reported by over 60% of the households. Other equipment such as rice cookers, refrigerators and fans were reported by 45%-50% of the households. Nearly a third or more of the households reported having electric mixers, blenders or electric kettles. Ceiling fans were reported by 20% and washing machines by about 10% of the households.

Table 25: Basic Needs and Use of Electrical Equipment in Households 61-120 Units of Consumption

Equipment Basic Needs	No of HH Reporting	% Reporting	Total No. Actually Owned	Average / HH
Lighting Bulbs (Normal)	350	50.1	2578	7
Lighting Bulbs(CFL)	452	64.8	2721	6
Lighting Bulbs(LED)	461	66.0	3420	7
Rice Cookers	524	75.1	538	1
Iron	617	88.4	629	1
Shaver	40	5.7	42	1
Phones and Mobile charging	577	82.7	1328	2
Hair Dryer	40	5.7	40	1
Microwave	72	10.3	72	1
Refrigerator	567	81.2	567	1
Electric kettle	257	36.8	270	1
Blender, mixer	426	61.0	450	1
Toaster, Oven	161	23.1	171	1
Ceiling Fans	307	44.0	552	2
Pedestal/Wall/Table Fans	439	62.9	771	2
Air Conditioners	13	1.9	23	2
Electric Vehicle or PHEV Vehicle	10	1.4	10	1
Clothes Washer	229	32.8	230	1
Clothes Dryer	22	3.2	22	1
Dish Washer	2	0.3	2	1
Internet	137	19.6	157	1
Vacuum cleaner	14	2.0	14	1
Radio, CD, TV and other entertainment items	564	80.8	786	1
Computers / Laptops /tablets	174	24.9	197	1
Shower Heaters	31	4.4	32	1
Other	26	3.7	91	4
Total	698	100.0	6994	10.0

Within this consumer group, the major types of electrical equipment used were, radio, TV, mobile and other phones, refrigerator and irons reported by over 80% of the households. Equipment such as rice cookers was reported by 75% and other items such as table and pedestal fans, LED and CFL bulbs, mixers and blenders were reported by over 60% of the households. Nearly 40% or more of the households reported having ceiling fans, clothes washers and electric kettles. Computers or laptops, Internet facilities and toaster ovens were reported by 20%-25% of the households and microwave ovens reported by 10% of the households. Thus we can observe that this higher consuming group (61-120 units) owns more electrically operated equipment, such as washers, refrigerators, fans, mixers and kettles than the previous lower consuming group.

Table 26: Basic Needs and Use of Electrical Equipment in Households 121-180 Units of Consumption

Equipment Basic Needs	No of HH Reporting	% Reporting	Total No. Actually Owned	Average / HH
Lighting Bulbs (Normal)	104	43.5	1158	11
Lighting Bulbs(CFL)	174	72.8	1349	8
Lighting Bulbs(LED)	157	65.7	1608	10
Rice Cookers	191	79.9	197	1
Iron	217	90.8	231	1
Shaver	21	8.8	21	1
Phones and Mobile charging	218	91.2	598	3
Hair Dryer	42	17.6	42	1
Microwave	62	25.9	62	1
Refrigerator	229	95.8	229	1
Electric kettle	131	54.8	135	1
Blender, mixer	179	74.9	191	1
Toaster, Oven	110	46.0	116	1
Ceiling Fans	158	66.1	360	2
Pedestal/Wall/Table Fans	179	74.9	379	2
Air Conditioners	30	12.6	32	1
Electric Vehicle or PHEV Vehicle	6	2.5	8	1
Clothes Washer	142	59.4	143	1
Clothes Dryer	17	7.1	17	1
Dish Washer	0	0.0	0	0
Internet	110	46.0	139	1
Vacuum cleaner	4	1.7	4	1
Radio, CD, TV and other entertainment items	199	83.3	336	2
Computers / Laptops /tablets	117	49.0	140	1
Shower Heaters	45	18.8	52	1
Other	13	5.4	20	2
Total	239	100.0	7567	32

Within this consumer group, the major types of electrical equipment used were, mobile and other phones, refrigerator and irons reported by over 90% of the households. Other equipment such as cookers, table and pedestal fans, CFL bulbs, mixers and blenders were reported by 70%-80% of the households. Nearly 60% or more of the households reported having ceiling fans, clothes washers, LED bulbs and electric kettles. Computers or laptops, Internet facilities, toaster ovens and normal bulbs were reported by 40%-50% of the households and microwave ovens reported by 26% of the households. Shower heaters, hair dryers, were reported by about 20% of the households and air conditioners by 13% of the households. Thus we can observe that this third highest consuming group (12-180 units) owns more electrically operated equipment and high electricity consuming equipment, such as washers, refrigerators, fans, blenders and mixers, microwaves, air conditioners and kettles than the previous lower consuming group, contributing to high usage of electricity.

Table 27: Basic Needs and Use of Electrical Equipment in Households >180 Units of Consumption

Equipment Basic Needs	No of HH Reporting	% Reporting	Total No. Actually Owned	Average / HH
Lighting Bulbs (Normal)	44	38.9	517	12
Lighting Bulbs(CFL)	84	74.3	749	9
Lighting Bulbs(LED)	85	75.2	915	11
Rice Cookers	92	81.4	106	1
Iron	98	86.7	112	1
Shaver	14	12.4	19	1
Phones and Mobile charging	103	91.2	315	3
Hair Dryer	33	29.2	33	1
Microwave	44	38.9	46	1
Refrigerator	104	92.0	104	1
Electric kettle	63	55.8	65	1
Blender, mixer	81	71.7	86	1
Toaster, Oven	51	45.1	56	1
Ceiling Fans	80	70.8	230	3
Pedestal/Wall/Table Fans	84	74.3	181	2
Air Conditioners	18	15.9	34	2
Electric Vehicle or PHEV Vehicle	7	6.2	7	1
Clothes Washer	79	69.9	81	1
Clothes Dryer	10	8.8	10	1
Dish Washer	1	0.9	1	1
Internet	60	53.1	68	1
Vacuum cleaner	14	12.4	14	1
Radio, CD, TV and other entertainment items	96	85.0	152	2

Computers / Laptops /tablets	58	51.3	76	1
Shower Heaters	21	18.6	23	1
Other	12	10.6	19	2
Total	113	100.0	4019	36

Within this consumer group (>180 Units), the major types of electrical equipment used were, mobile and other phones and refrigerator reported by over 90% of the households. Other items such as table and irons, radio, TVs and other entertainment items were reported by over 85% of the households and rice cookers was reported by over 80%. Pedestal fans, CFL and LED bulbs, mixers and blenders, ceiling and pedestal or table fans and clothes washers were reported by over 70% of the households. Nearly 55% or more of the households reported having electric kettles. Computers or laptops, Internet facilities, toaster ovens, microwave ovens and normal bulbs were reported by 40%-50% of the households. Shower heaters, hair dryers, were reported by about 20%- 30% of the households, conditioners by 16% of the households and vacuum cleaners and shavers by 12% of the households. Thus we can observe that this highest consuming group (>180 units) owns a far greater number of electrically operated equipment and high electricity consuming equipment, such as washers, refrigerators, fans, blenders and mixers, microwaves, air conditioners and kettles than the previous lower consuming group, contributing to high usage of electricity.

Table 28: Basic Needs and Use of Electrical Equipment in Households – All Households

Equipment Basic Needs	No of HH Reporting	% Reporting	Total No. Actually Owned	Average / HH
Lighting Bulbs (Normal)	781	46	5,812	7
Lighting Bulbs(CFL)	1,070	63	6,484	6
Lighting Bulbs(LED)	576	34	8,673	15
Rice Cooker	1,130	67	1,164	1
Iron	1,363	81	1,405	1
Shaver	84	5	91	1
Phones and Mobile charging	1,351	80	3,094	2
Hair Dryer	128	8	127	1
Microwave	199	12	201	1
Refrigerator	1,176	70	1,178	1
Electric kettle	617	36	642	1
Blender, mixer	922	54	942	1
Toaster, Oven	377	22	405	1
Ceiling Fans	663	39	1,303	2
Pedestal/Wall/Table Fans	1,006	59	1,827	2
Air Conditioners	73	4	95	1
Electric Vehicle or PHEV Vehicle	27	2	27	1

Clothes Washer	513	30	517	1
Clothes Dryer	56	3	56	1
Dish Washer	4	0	4	1
Internet	367	22	430	1
Vacuum cleaner	56	3	56	1
Radio, CD, TV and other entertainment items	1,336	79	1,912	1
Computers / Laptops /tablets	404	24	473	1
Shower Heaters	103	6	113	1
Other	59	3	138	2
Total	1,692	100	37,169	22

When all households are taken together, the major types of electrical equipment used were, radio, TV, mobile, other phones and irons, as reported by 80% of the households. CFL bulbs, rice cookers, refrigerators, blenders or mixers, table and pedestal fans were reported by 50%-60% or more of the households. Normal bulbs, clothes washers, ceiling fans were reported by 40%-50% of the households. Other equipment such as lap tops or computers, internet facilities, LED bulbs, toaster ovens, electric kettles, was reported by 20%-40% of the households.

Table 29: Is Electricity Consumption Less Than Basic Needs? – All Households

Is electricity consumption less than basic needs?		Yes	No	Not reported	Total
Household Consumption Category	Units				
< 60 Units	No.	297	335	10	642
	%	46.3	52.2	1.6	100.0
61-120	No.	322	361	15	698
	%	46.1	51.7	2.1	100.0
121-180	No.	111	128	0	239
	%	46.4	53.6	0.0	100.0
>180	No.	45	68	0	113
	%	39.8	60.2	0.0	100.0
Total	No.	775	892	25	1692
	%	45.8	52.7	1.5	100.0

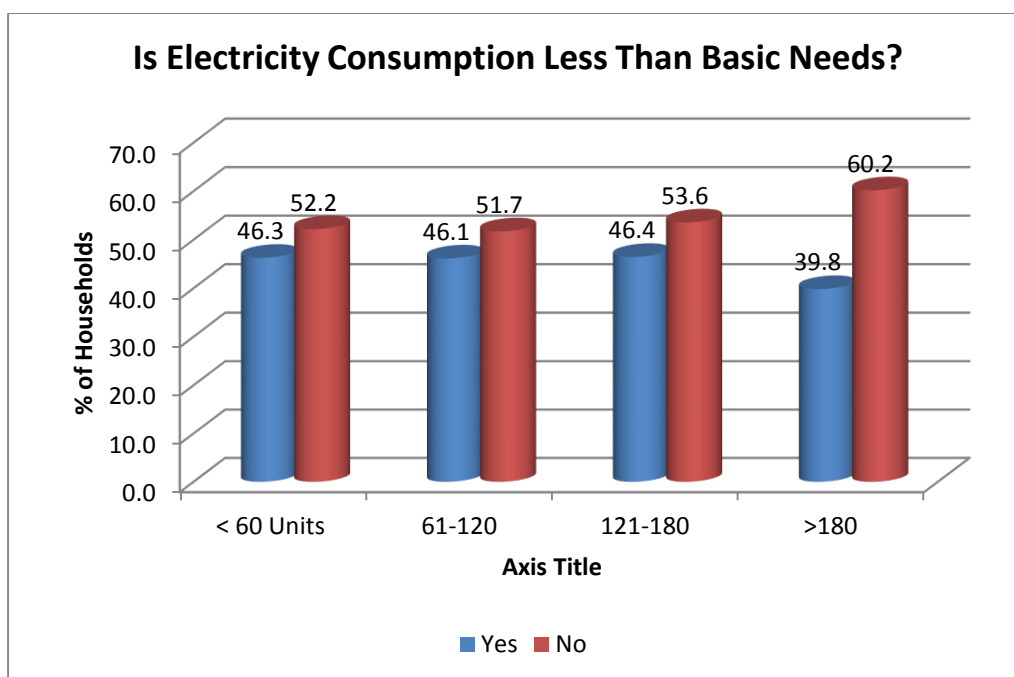


Figure 14: Is Electricity Consumption Less Than Basic Needs?

About 46 % of the households reported that electricity consumption was less than their basic needs and this proportion was more or less the same for all consumer groups (40%- 46%). Thus nearly half of the households was consuming less than their basic needs of electricity.

Table 30: Electricity Needed for Basic Needs (Rs and Number of units)

Electricity Needed for Basic Needs	Household Consumption Category				
	< 60 Units	61-120	121-180	>180	Total
Number of HH	632	683	239	113	1,667
Number of Units Needed for Basic Needs	30,668	62,660	33,511	26,123	152,962
Amount of Bill Needed for Basic Needs (minimum) Rs.	241,122	665,467	523,162	487,620	1,917,371
Amount of Bill Needed for Basic Needed (maximum) Rs.	259,019	707,682	548,967	471,150	1,986,818
Number of Units Needed for Basic Needs (No/HH) Minimum	49	92	140	231	92
Amount of Bill Needed for Basic Needs (Amount/HH) Minimum (Rs)	382	974	2,189	4,315	1,150
Amount of Bill Needed for Basic Needs (Amount/HH) Maximum (Rs)	410	1036	2297	4169	1192
Ave. Price per unit Rs (Minimum)	8	11	16	19	13

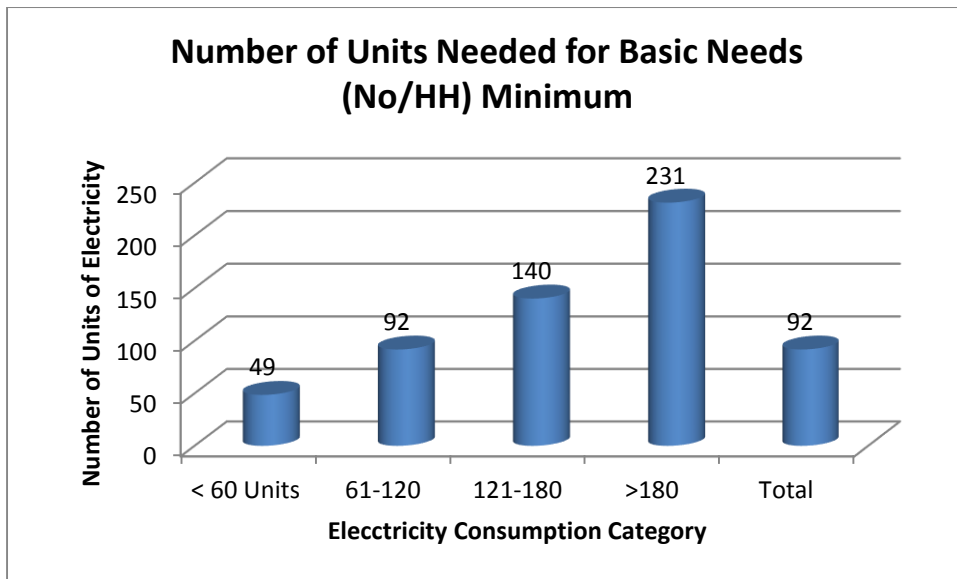


Figure 15: Electricity Needed for Basic Needs (Units)

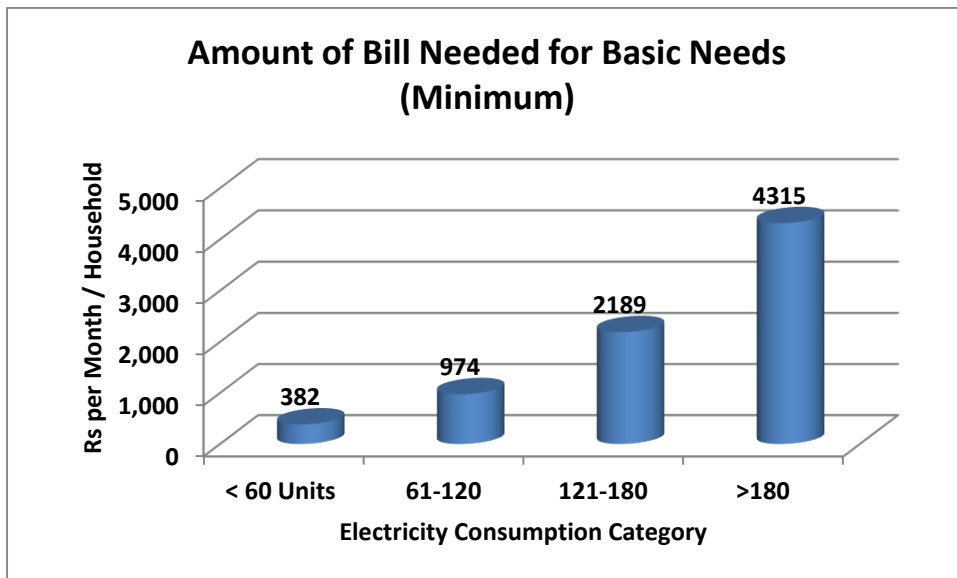


Figure 16: Amount of Bill Needed for Basic Needs (Rs)

Basic needs more than quadrupled between the lowest and highest consuming groups from 49 units per month to 230 units per month. Minimum amount of bill per month increased from Rs 382 for the lowest consumer group to Rs 4300 for the highest consumer group, which is over a tenfold increase between these two groups. Average price per unit increased from Rs 8 for the lowest group to Rs 19 per unit for the highest group. The two highest consuming group pays more than double of that the lowest consuming group. Thus there appears to be inequality in the pricing regime among the low consuming and high consuming groups.

4.1.5 Willingness to Pay Electricity Bill, Alternatives to Electricity and Future Plans on Use of Electricity

Table 31: Willingness to Pay Current Electricity Bill

Willingness To Pay Current Bill	Units	Willing	Not Willing	Total	If Not Willing, Maximum Amount Willing to Pay	
Household Consumption Category					Amount all HH (Rs)	Amount / HH (Rs)
< 60 Units	No. of HH	565	67	632	26,032	389
	%	89.4	10.6	100		
61-120	No. of HH	527	156	683	152,775	979
	%	77.2	22.8	100		
121-180	No. of HH	178	61	239	111,100	1821
	%	74.5	25.5	100		
>180	No. of HH	67	46	113	160,700	3493
	%	59.3	40.7	100		
Total	No. of HH	1337	330	1667	450,607	1365
	%	80.2	19.8	100		

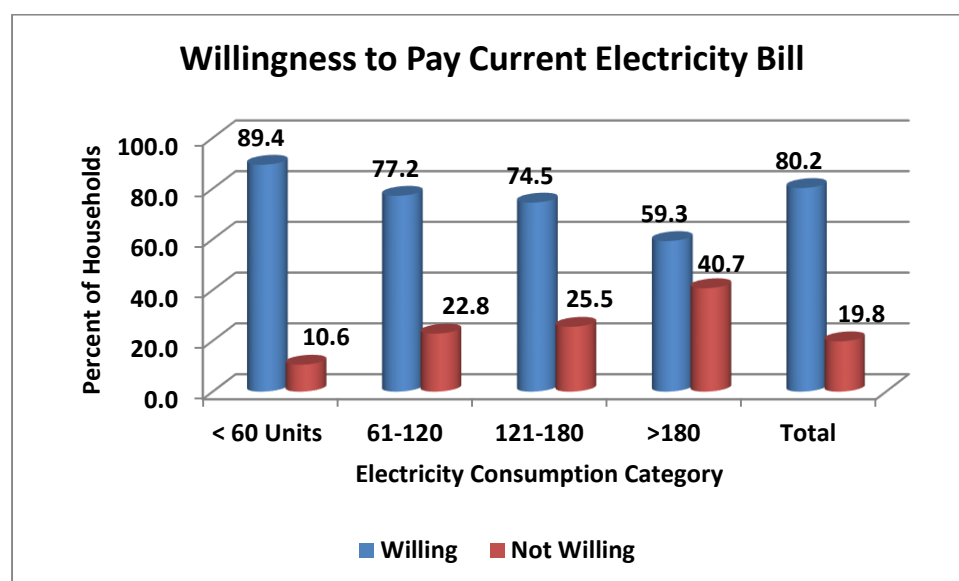


Figure 17: Willingness to Pay Current Electricity Bill

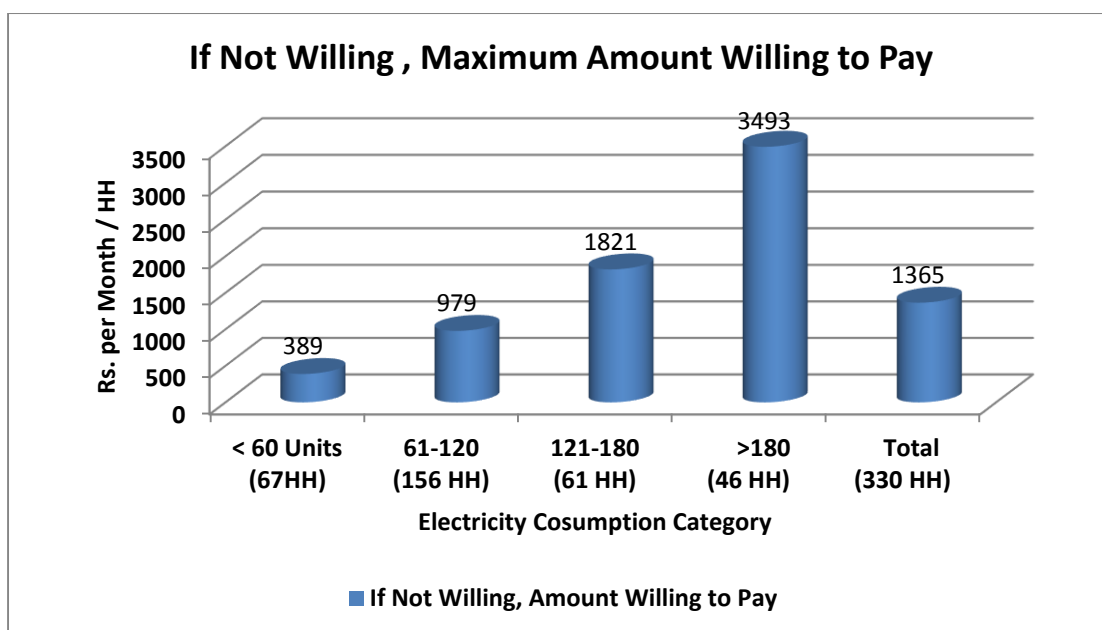


Figure 18: If Not Willing, Maximum Amount Willing to Pay

The willingness to pay bill declines with the increase in the consumption category. Overall about 20% of the households are not willing to pay the current bill. The proportion unwilling to pay increases from 11% for the lowest consuming group (<60 units), and increases to 23% for the 61-120 unit consuming group, to 26% for the 121-180 unit consuming group and to 41% for the above 189 unit consumption group. Thus consumers at a higher level of consumption are not willing to pay bill compared to the consumers at the lower level of consumption.

Table 32: Alternatives to Using Electricity

Household Consumption Category	< 60 Units		61-120		121-180		>180		Total	
Alternatives to Using Electricity	No.	%	No.	%	No.	%	No.	%	No.	%
Are you using less electricity than requirements as you cannot afford it? No	250	38.9	253	36.2	100	41.8	36	31.9	639	37.8
Are you using less electricity than requirements as you cannot afford it? Yes	392	61.1	445	63.8	139	58.2	77	68.1	1053	62.2
If yes or no, what are the alternatives to electricity or electricity saving methods that you use in order to compensate for or for reducing the use of electricity?										
Use gas, kerosene or firewood for cooking	422	65.7	434	62.2	146	61.1	53	46.9	1055	62.4
Put on the lights only when it is absolutely needed	440	68.5	478	68.5	163	68.2	78	69.0	1159	68.5
Do not use any electrical appliances, everything is done manually	119	18.5	87	12.5	32	13.4	16	14.2	254	15.0
Put off the refrigerator for several hours a day	85	13.2	114	16.3	43	18.0	26	23.0	268	15.8
Use the air conditioner, shower heater, television, radio, etc. very sparingly	109	17.0	132	18.9	51	21.3	34	30.1	326	19.3

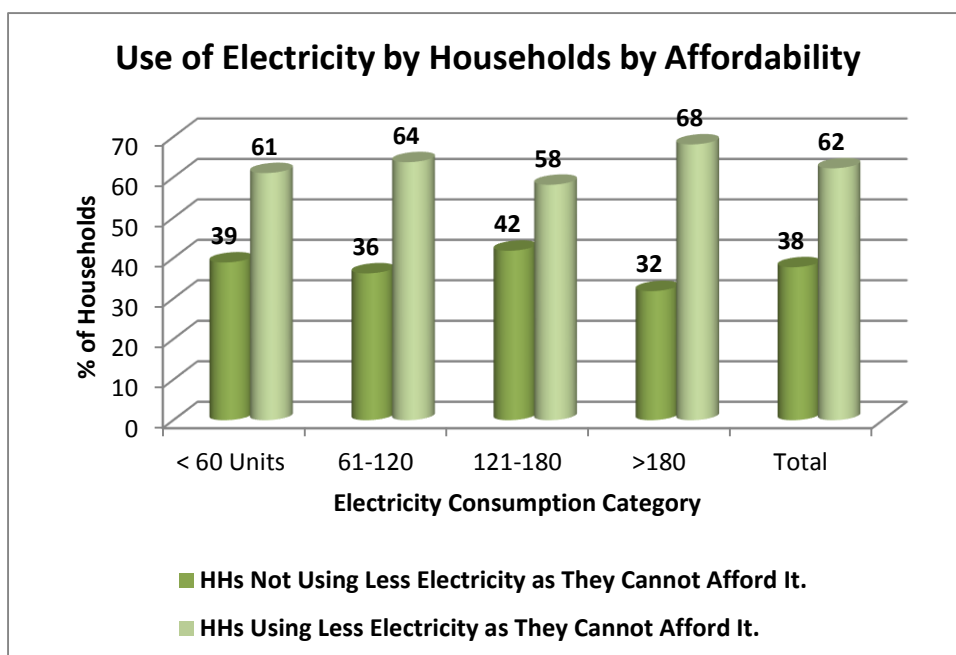


Figure 19: Use of Electricity by Households by Affordability

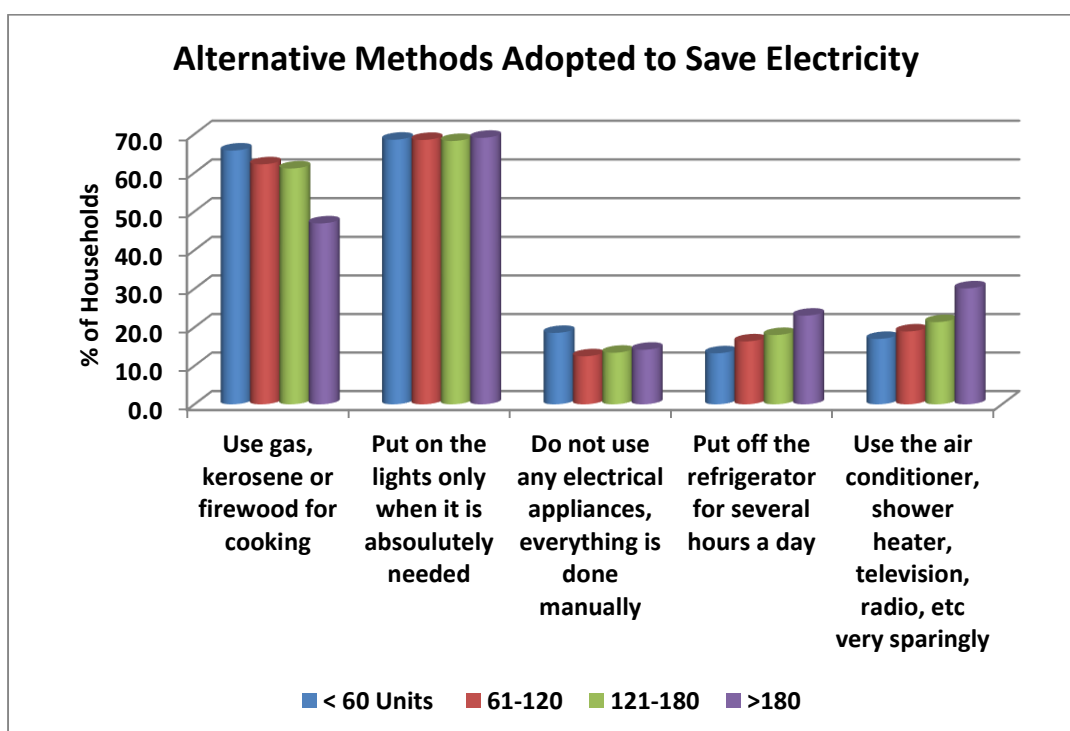


Figure 20: If Using Less Electricity Alternatives Adopted by Households

When households were asked whether they used less electricity as they could not afford it, about 60% replied yes, suggesting that a majority of the HH were not able to afford their electricity bills. The lowest proportion (58%) reporting unaffordability was the group consuming 120-180 units and the highest proportion was the group consuming more than 180 units (68%). About 61%-63% reported unaffordability under the groups consuming below 120 units. Thus about two thirds of the HH are using less electricity than their actual requirement as they cannot afford it. The alternatives used by

consumers to reduce their bills were as follows: Using gas, kerosene or firewood 47% (>180 units), 61% (120-180 Units), 62% ((60-120 units) and 66% (>60 units). The lower consumer categories used more of this alternative than the higher consumer groups. Almost 70% of all the categories practiced the alternative of putting on the lights only when necessary. Doing manually rather than using electrical equipment was practiced by only a small proportion ranging from 13% to 19% , the highest being the lowest consuming group (<60 units). Putting off the refrigerator for several hours a day was most practiced by 23% of the highest consuming group (> 180 units), 18% by the 120-180 unit group, 16% by the group 60-120 unit group and 13% by the < 60 unit group. Thus there is a gradual increase in the proportion practicing this alternative from the lower to the higher consuming groups. Using air conditioners, heaters, TV, and other equipment sparingly was practiced by 17% (<60 unit group), 19% (60-120 unit group), 21% (120-180 unit group and 30% (>180 unit group). Thus there is a gradual increase in the proportion of HH practicing this alternative from the lower to the higher consuming groups. Thus about two thirds of the HH in all categories practiced the first two alternatives while only 15%-20% practiced the last three alternatives. Thus it appears that when it comes to important labour saving or comfort providing equipment very few practice savings from such equipment and this applies to all groups of consumers.

Table 33: Future Plans for Electricity Use

Household Consumption Category	< 60 Units		61-120		121-180		>180		Total	
Planning to keep electricity consumption at current level	No.	%	No.	%	No.	%	No.	%	No.	%
Yes, Keep at Current Level	550	87.0	580	84.9	175	73.2	77	68.1	1382	82.8
No, Increase Use	55	8.7	79	11.6	55	23.0	31	27.4	220	13.2
No, Reduce electricity use further	27	4.3	24	3.5	9	3.8	5	4.4	65	3.9
Total	632	100.0	683	100.0	239	100.0	113	100.0	1667	99.8
If you think that you will increase electricity usage in the future, how will you meet the extra costs?										
Increase my income through improved business	17	44.7	13	36.1	3	27.3	3	42.9	36	39.6
Request electricity board to reduce tariffs	11	28.9	11	30.6	4	36.4	3	42.9	29	30.8
Install solar power to reduce costs	9	23.7	11	30.6	4	36.4	1	14.3	25	27.5
Other	1	2.6	1	2.8	0	0.0	0	0.0	2	2.2
Total	38	100.0	36	100.0	11	100	7	100	92	100.0

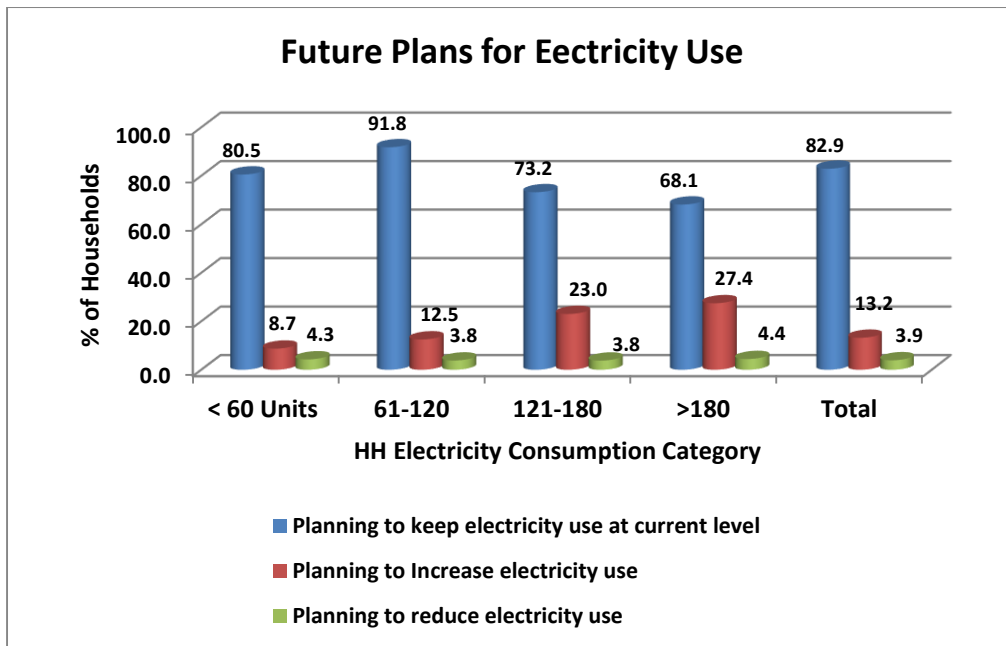


Figure 21: Future Plans for Electricity Use Adopted by Households

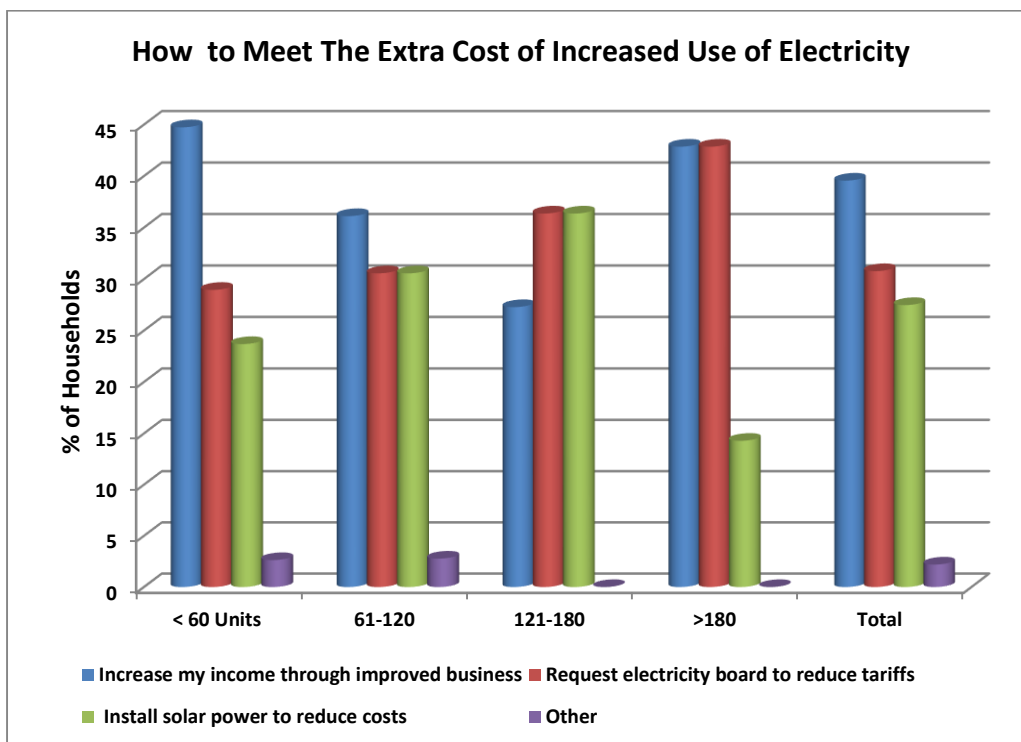


Figure 22: How to Meet the Extra Cost of Increased Electricity

A majority of the households plan to keep their consumption of electricity at the current level, with the highest proportion (87%) in group <60 units, and decreasing to 85% in group 60-120 units, 73% in group 120-180 units and 68% in group > 180 units. Thus the higher consuming groups appear to be more inclined to plan for a change in future use of electricity. About 13% plan to increase their use of electricity, 4% plan to reduce electricity use in the future or a total of 65 HH plan to reduce their

current level of consumption. The highest proportion of HH wanting to reduce electricity was from the lowest and the highest consuming categories. The proportion of HH who planned to increase electricity use was 13% or 220 HH. When asked how they would meet the extra costs of increased electricity use, 36% indicated (range 27%-45%) that they propose to increase their incomes through improved business, 29% (range 29%-43%) want to request the CEB to reduce the tariffs and 25% (14%-36%) want to install solar power. Thus even among the lower consumer groups at least 25%- 30% of the HH plan to install solar power. However, only 92 HH out of the 220 HH who want to increase electricity use responded to this question.

Table 34: Actions Proposed to Reduce Electricity Use Further

Household Consumption Category	Total No who wish to increase electricity use further		What actions would you take to reduce electricity use in future?			
			Change to LED bulbs	Use table fans instead of ceiling fans	Use energy saving appliances or devices	Switch off all electrical outlets when not in use
< 60 Units	No.	55	32	14	15	24
	%	25.0	58.2	25.5	27.3	43.6
61-120	No.	79	50	30	30	42
	%	35.9	63.3	36.1	35.7	35.9
121-180	No.	55.0	29.0	22	24	36
	%	25.0	52.7	40.0	43.6	65.5
>180	No.	31	18	17	15	15
	%	14.1	58.1	54.8	48.4	48.4
Total	No.	220	129	83	84	117
	%	100.0	58.6	37.7	38.2	53.2

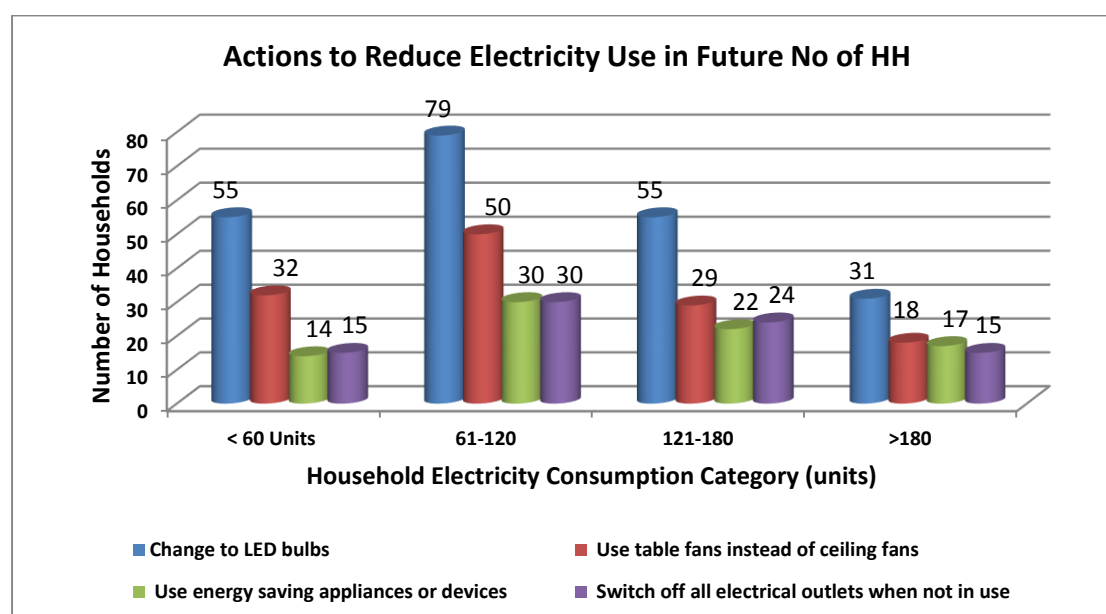


Figure 23: Actions to Reduce Electricity Use in Future (No of HH)

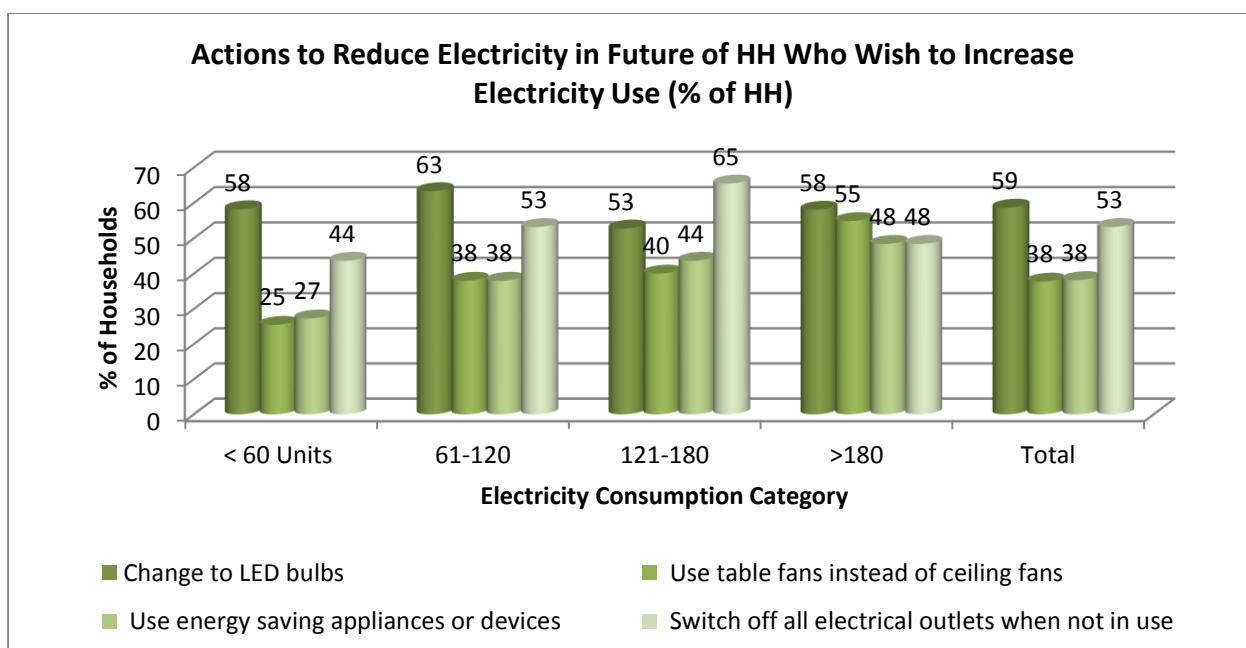


Figure 24: Actions to Reduce Electricity Use in Future (% of HH)

Overall, 59% (range 53%-63%) of those who wish to increase electricity use, want to change to LED bulbs, 38% (range 26%-55%) want to use table fans instead of ceiling fans, 38% (range 27%-48%) want to use energy saving appliances, and 53% (range 44%-66%) want to switch off all electrical outlets when not in use. It appears that the higher consuming groups appear more inclined to use these options.

4.1.6 Coping with Tariff Increases

Table 35: Actions Proposed to Cope with an Increase in Tariff

Consumption Category	What actions would you take to cope with any increases in electricity tariff in the future						
	Unit	Cut down on electricity consumption by reducing the number of hours usage	Switch off certain number of equipment and appliances	Install solar power	Use energy saving appliances	Switch to time of use or some other type of tariff to reduce costs	Total House holds
< 60 Units	No.	398	341	123	145	98	632
	%	63.0	54.0	19.5	22.9	15.5	100.0
61-120	No.	391	365	153	184	108	683
	%	57.2	53.4	22.4	26.9	15.8	100.0
121-180	No.	132	123	73	61	40	239
	%	55.2	51.5	30.5	25.5	16.7	100.0
>180	No.	56	58	44	34	21	113
	%	49.6	51.3	38.9	30.1	18.6	100.0
Total	No.	977	887	393	424	267	1667
	%	58.6	53.2	23.6	25.4	16.0	100.0

Comment on Solar Alternative

Though using solar power is the best alternative energy; we cannot afford the higher cost for installation charges.

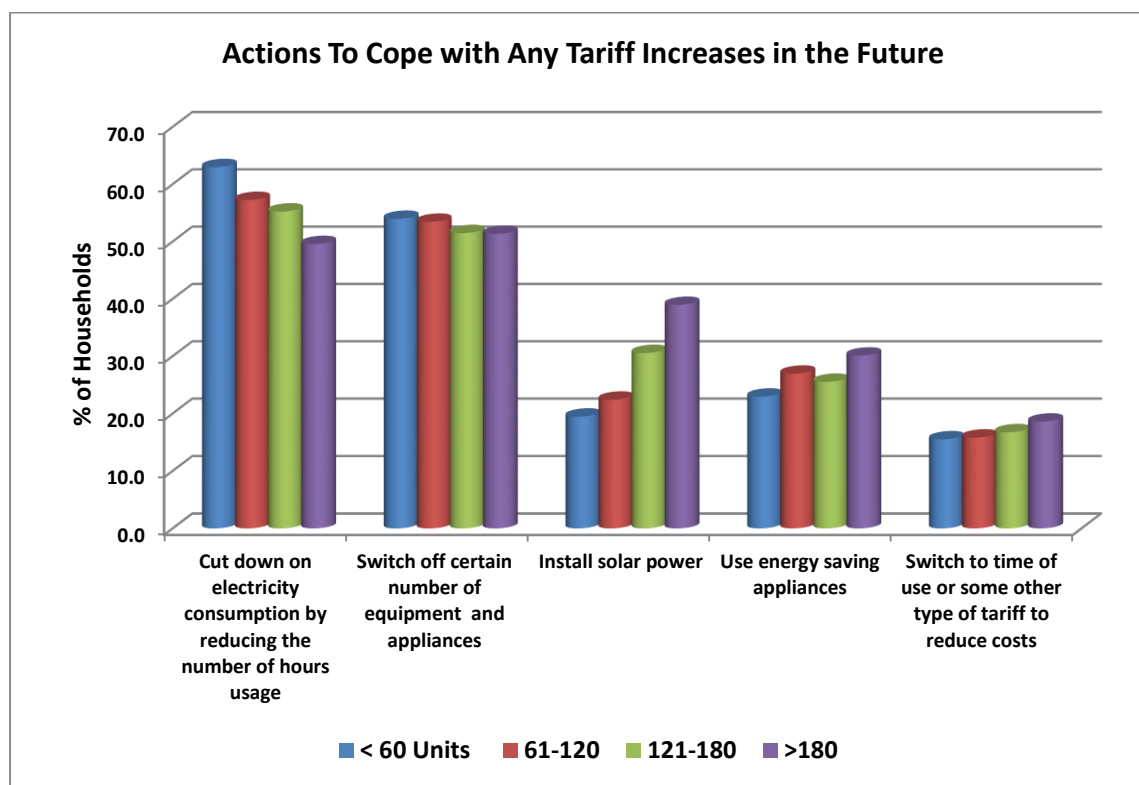


Figure 25: Actions to Cope with any Future Electricity Tariff Increases (% of HH)

When all HH were asked how they would cope with any increase in electricity tariffs in the future, 58% (range 50%-63%) indicated that they would cut down electricity by reducing the number of hours of usage, 53% (range 51%-54%) indicated that they would switch off certain number of equipment and appliances, 24% (range 20%-40%) want to install solar power, 25% (range 23%-30%) want to use energy saving appliances, 16% (range 15%-19%) want to change to time of use or other tariff to reduce costs. The first two actions appear to be the major options among all consumer groups. The proportion of HH wishing to install solar power increased from the lower to the higher consuming groups, suggesting that more of the higher consuming categories want to install solar power to reduce costs. Use of energy saving appliances was supported by almost a quarter or more of the HH in each category suggesting that this action could be popular among all categories. Switching to other tariff modes was proposed by less than 20% in all categories of consumers. Thus promoting such actions through awareness programmes may help in increasing these numbers.

Table 36: Are Current Electricity Tariffs Equitable

Household Consumption Category	Unit	Do you think that the current tariff rates for electricity are fair and equitable?				
		Yes	No	Total	Not reported	Total
< 60 Units	No.	491	141	632	10	642
	%	77.7	22.3	100	40	140
61-120	No.	473	210	683	15	698

	%	69.3	30.7	100	60	160
121-180	No.	161	78	239	0	239
	%	67.4	32.6	100	0	100
>180	No.	71	42	113	0	113
	%	62.8	37.2	100	0	100
Total	No.	1196	471	1667	25	1692
	%	71.7	28.3	100	100	100

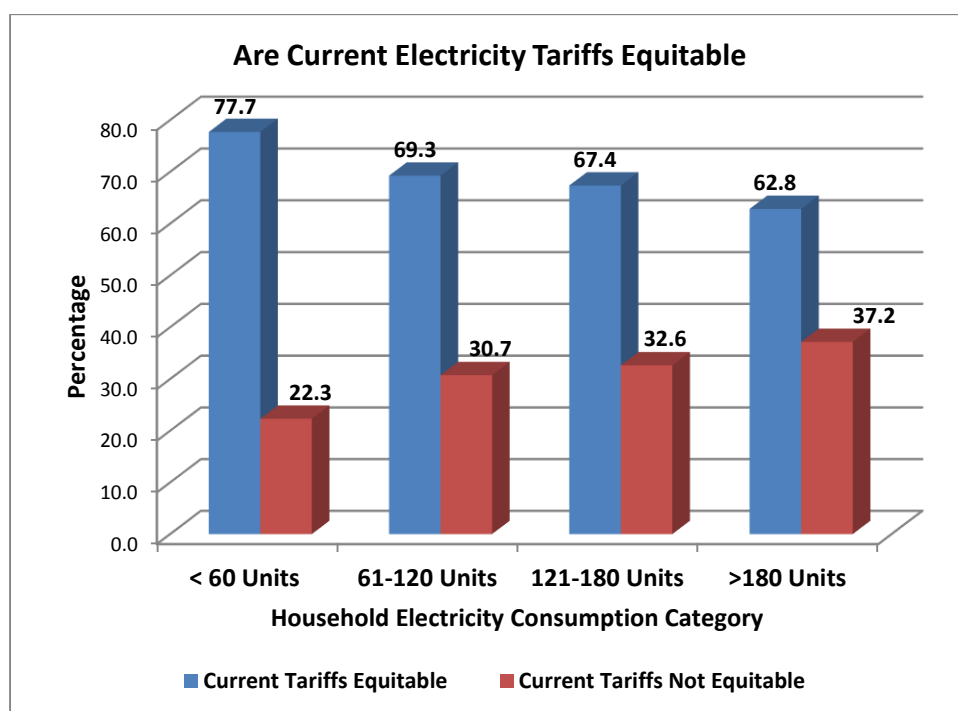


Figure 26: Equitability and Fairness of Current Electricity Tariffs (% of HH)

A majority of over 70% of the HH are of the opinion that the current electricity tariffs are equitable. The proportion of HH (78%) indicating this was the highest in group < 60 units, followed by group 60-120 units (69%), group 120-180 units (67%) and by group > 180 units (63%). Thus the proportion decreases from the lower to the higher consuming groups. Thus as expected the lower use categories of consumers and those paying lower bill feel that the tariffs are equitable, which means they may not be wanting further decreases in their tariff (which is already subsidized). In the case of the higher consumer groups a greater proportion feel that the Tariffs of the CEB are not equitable. This proportion increases from 22% (< 60 units), 31% (60-120 units), 33% (120-180 units) and 37% (>180 units).

Table 37: Suggestions on Tariff Rates of the CEB

Household Consumption Category	Units	If tariff rates are not fair and equitable, what suggestions would you give the CEB?					
		Give the medium income earning households a subsidy	Increase the rates for the higher income earning institutions	Reduce the inefficiencies and losses incurred by the CEB	Build more low cost power plants	Find optimal energy sources	Total
< 60 Units	No.	104	75	53	59	52	141
	%	73.8	53.2	37.6	41.8	36.9	100.0
61-120	No.	132	117	53	78	79	210
	%	62.9	55.7	25.2	37.1	37.6	100.0
121-180	No.	49	38	8	30	33	78
	%	62.8	48.7	10.3	38.5	42.3	100.0
>180	No.	22	21	6	20	20	42
	%	52.4	50.0	14.3	47.6	47.6	100.0
Total	No.	307	251	120	187	184	471
	%	65.2	53.3	25.5	39.7	39.1	100.0

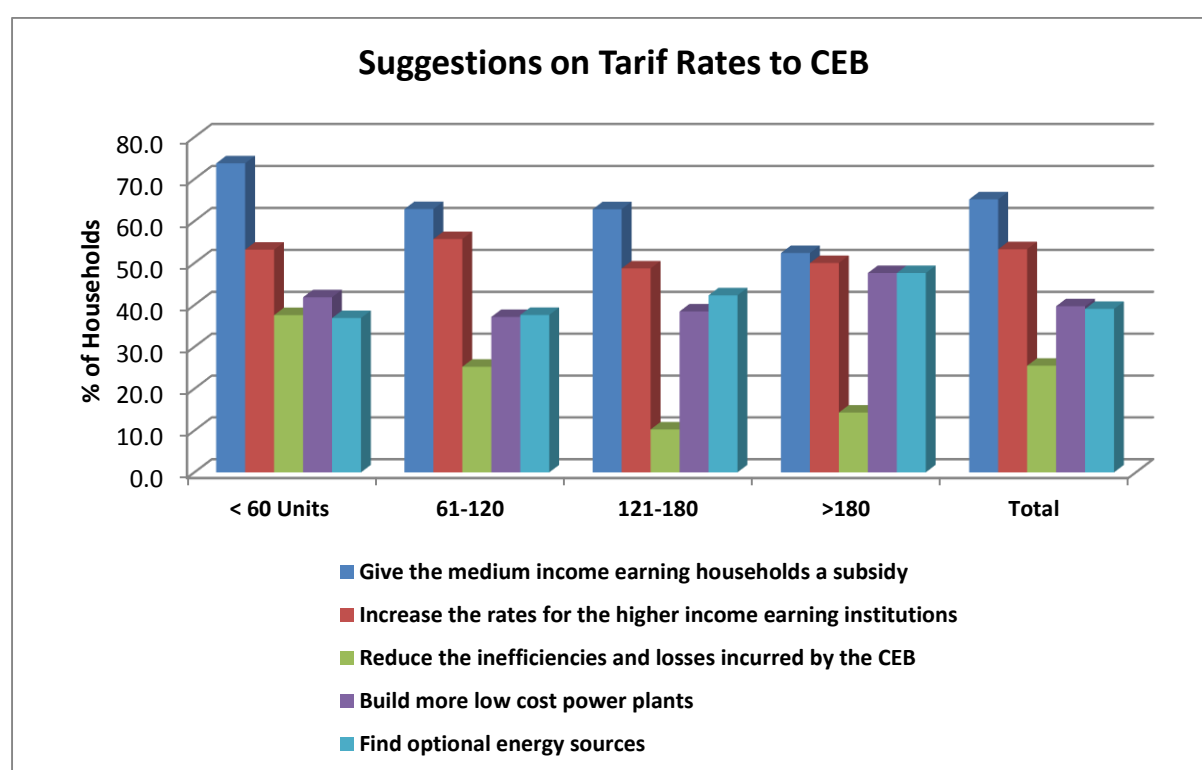


Figure 27: Suggestions on Tariff Rates to CEB

The suggestion supported by a majority of the HH which felt that the tariffs were not equitable, was to provide a subsidy to medium income earning HH (52%), ranging from 74% (<60 units), 63% (60-

120 units), 63% (120-180 units) and 52% (>180 units). Increase the rates for higher income groups 53% (ranging from 49%-56%), reduce inefficiencies of the CEB 26% (ranging from 10% to 14% for higher consuming groups and 25%-38% for lower consuming groups). Build more low cost power plants 40%, ranging from 37%-48%, Find optimal energy sources 39%, ranging from 37%-48%. Most of these options have been proposed by half to three quarters of the HH which felt that the tariffs were not equitable or fair.

4.1.7 Constraints Faced in Electricity Supply, Quality of Services and of Electrical Products

Table 38: Constraints Faced in Electricity Supply Services

Household Consumption Category	Constraints faced in obtaining electricity connections, augmentation and other electricity related services?						
		Cost of connection is high	Time taken to obtain connection is too long	Electricity breakdown and repair services takes too long	Electricity meters are not working properly	Meter reader comes late and as a result the bill is high	Total
< 60 Units	No.	400	182	174	30	73	632
	%	63.3	28.8	27.5	4.7	11.6	100
61-120	No.	406	195	217	59	96	683
	%	59.4	28.6	31.8	8.6	14.1	100
121-180	No.	140	77	66	23	36	239
	%	58.6	32.2	27.6	9.6	15.1	100
>180	No.	73	31	38	19	16	113
	%	64.6	27.4	33.6	16.8	14.2	100
Total	No.	1019	485	495	131	221	1667
	%	61.1	29.1	29.7	7.9	13.3	100

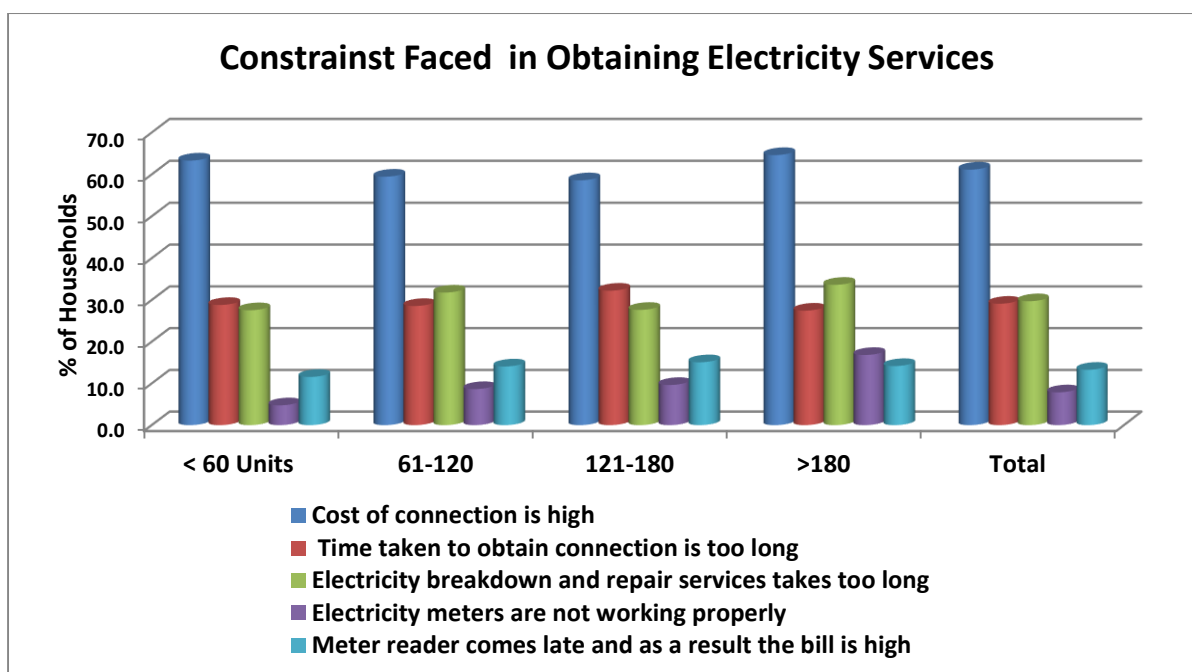


Figure 28: Constraints Faced in Obtaining Electricity Supply Services

With regards to constraints faced, the major one reported by over 60% of the HH was that of high costs of connection. The proportion reporting ranged from about 60% (61-180 unit consumer groups) and 63%-65% (< 60 units and > 180 unit consumer groups). Two other constraints reported by about 30% of the HH were long time to obtain connection and long time for repair of breakdowns in service (range 27%-34%). Electricity meters not working properly was reported by 8% of the HH (range 5%-17%) and meter reader coming late reported by 13% (range 11%-15%). Generally a higher percentage of the high end consumer reported most of these constraints.

Table 39: Quality of Services of CEB

Quality of Services of CEB		Quality of Services						
Household Consumption Category	Units	Very good	Good	Satisfactory	Poor	V. Poor	No Comments	Total
< 60 Units	No.	202	298	118	6	3	5	632
	%	32.0	47.2	18.7	0.9	0.5	0.8	100
61-120	No.	224	306	129	19	3	2	683
	%	32.8	44.8	18.9	2.8	0.4	0.3	100
121-180	No.	73	104	53	9	0	0	239
	%	30.5	43.5	22.2	3.8	0.0	0.0	100
>180	No.	37	51	20	4	0	1	113
	%	32.7	45.1	17.7	3.5	0.0	0.9	100
Total	No.	536	759	320	38	6	8	1667
	%	32.2	45.5	19.2	2.3	0.4	0.5	100

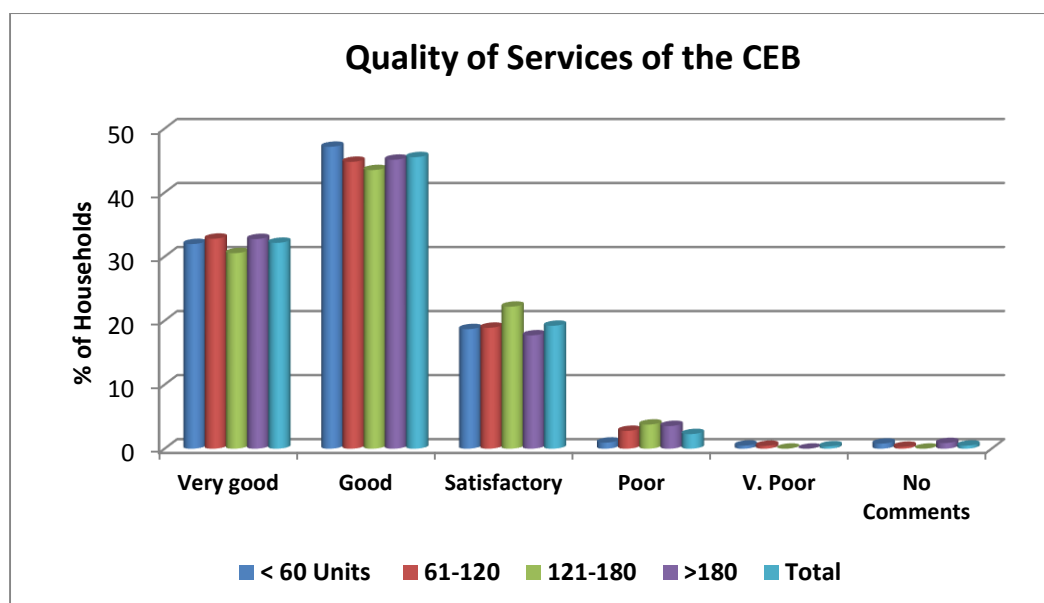


Figure 29: Quality of Services of CEB

The quality of services was reported as very good by 32% of the HH and good by 46% of the HH. It was reported as satisfactory by 19%, poor by 2.3% and very poor by 0.4% of the HH. Thus nearly 80% of the HH reported that the services were either very good or good, suggesting that the most of the HH were satisfied with the overall services of the CEB. Less than 3% (44 HH) reported it to be poor or very poor. The proportions reported were similar in all four consumer groups.

Table 40: Impact of Poor or Very Poor Quality of Services of CEB

Household Consumption Category	Units	If the services are poor or very poor what kind of impact does the poor quality of services have on your household?					
		Regular breakdown of services	Voltage fluctuations causing damage to our electrical equipment resulting in losses	Dim lights which affect children's studies	Difficulties in operating equipment and machinery of our small enterprises	Long delays in restoring electricity after breakdowns	Total
< 60 Units	No.	4	2	3	1	8	9
	%	44.4	22.2	33.3	11.1	88.9	100
61-120	No.	11	3	2	4	15	22
	%	50.0	13.6	9.1	18.2	68.2	100
121-180	No.	3	2	2	1	5	9
	%	33.3	22.2	22.2	11.1	55.6	100
>180	No.	2	1	0	1	2	4
	%	50.0	25.0	0.0	25.0	50.0	100
Total	No.	20	8	7	7	30	44
	%	45.5	18.2	15.9	15.9	68.2	100

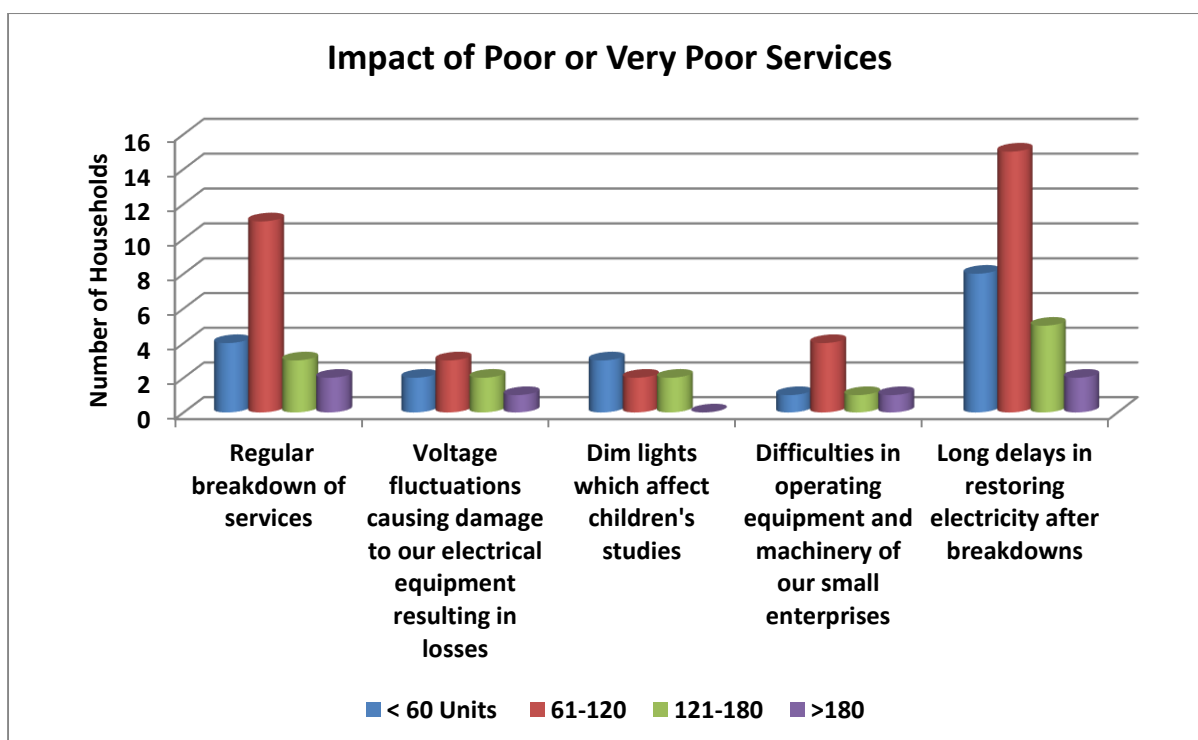


Figure 30: Impact of Poor or Very Poor Quality of Services of CEB

Of those households reporting poor or very poor services, 46% (20HH) reported regular breakdown of services, 18% (8 HH) reported voltage fluctuations and damage to equipment, 16% (7HH) reported dim lights, 16% (7HH) reported difficulties in operating equipment and 68% (30 HH) reported long delays in restoring electricity after breakdowns. Thus the major impacts of the poor quality of services were regular breakdowns and delays in restoring power after breakdowns. In terms of overall satisfaction with the services only 2.6% reported poor or very poor services, which suggest that CEB has provided a good or satisfactory service to almost all its customers.

Table 41: Self-Assessment of Quality of Electrical Products Used

Self -Assessment of Quality of Electrical Products (Number)					
Electrical Appliances	Working well	Working Satisfactorily	Not working well	Purchased before 2015	Purchased after 2015
TV	1206	258	14	639	839
Cooker	779	161	17	390	567
Refrigerator	987	171	18	574	602
Air conditioners	97	37	6	68	72
Blender, mixer	691	143	21	387	468
Vacuum cleaner	87	31	5	67	56
Microwave	150	550	11	100	116
Electric kettle	495	87	23	238	367
Radio, CD and other entertainment items	804	217	17	505	533
Iron	1052	166	32	520	730

Toaster	259	53	15	159	168
Ceiling Fans	538	85	20	336	307
Pedestal/wall/table fans	864	165	18	393	594
Land line Phones	542	122	30	397	297
Mobile Phones	1264	283	114	451	121
Hair Dryer	117	27	20	74	90
Oven	333	181	137	210	441
Shaver	76	26	9	65	46
Clothes Washer	391	70	19	207	273
Clothes Dryer	74	15	19	64	44
Dish Washer	34	15	13	47	15
Lighting Bulbs (Normal)	613	129	22	239	525
Lighting Bulbs(CFL)	856	150	34	291	749
Lighting Bulbs(LED)	959	133	20	254	858
Plugs and plug bases	993	235	18	713	533
Internet	318	77	20	123	301
Computers / Laptops /tablets	378	62	17	160	297
Shower heater	100	19	21	69	71
Total	15,057	3,668	730	7,740	10,080
%	77.4	18.9	3.8	43.4	56.6

A self-assessment by consumers of the quality of electrical products used by them shows that 77% of the equipment is working well and 30% working satisfactorily. About 4% of the electrical items used were reported to be not working well. About 43% of the goods were purchased prior to 2015 and the rest purchased after this year. The highest reported equipment not working well was ovens (21%), dish washers (20%), clothes dryers (18%), hair dryers (12%), shavers (8%) and mobile phones (7%). Other items reported as not working well by 4%-5% of the HH were air conditioners, vacuum cleaners, toasters, electric kettles, clothes washers, land line phones and internet. The proportion reported as not working well for all other listed equipment ranged from 1%-4.

4.1.8 Electric Shocks, Safety in Electricity Use and Awareness of Policies on Safety of Products

Table 42: Appliances That Have Caused Shocks within the last five years (2015-2020)

Appliance	No. of HH Experiencing Shocks	Treatment Given (No.)				Parts Causing Shock (No.)				
		Died	Hospitalized	Outdoor Treatment	No Treatment	Metal Body	Power Cable	Handle	Knobs	Total
TV	11	1	1	5	4	1	3	4	3	11
Cooker	6	1	1	3	1	3	0	0	3	6
Refrigerator	6	1	1	1	3	2	0	3	1	6
Blender / Mixer	4	1	0	1	2	1	0	2	1	4
Electric Kettle	5	1	0	2	2	1	0	2	2	5

Iron	9	1	0	7	1	1	3	4	1	9
Ceiling Fan	4	1	1	2	0	1	1	2	0	4
Light bulb	11	3	0	0	8	2	3	2	4	11
Plugs & Bases	6	0	1	2	3	2	0	2	2	6
Total Number	62	10	5	23	24	14	10	21	17	62
Percentage	100	16.1	8.1	37.1	38.7	22.6	16.1	33.9	27.4	100.0

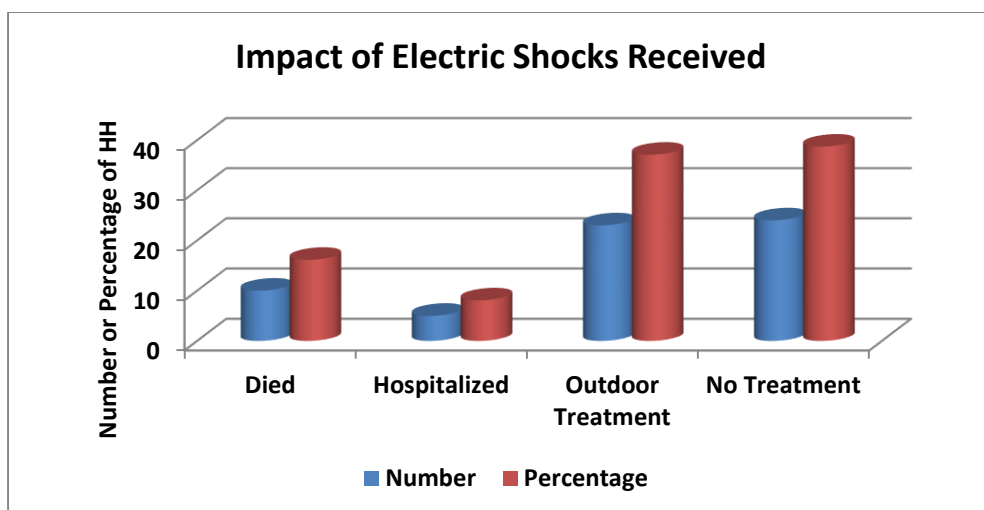


Figure 31: Impacts of Electric Shocks on Households

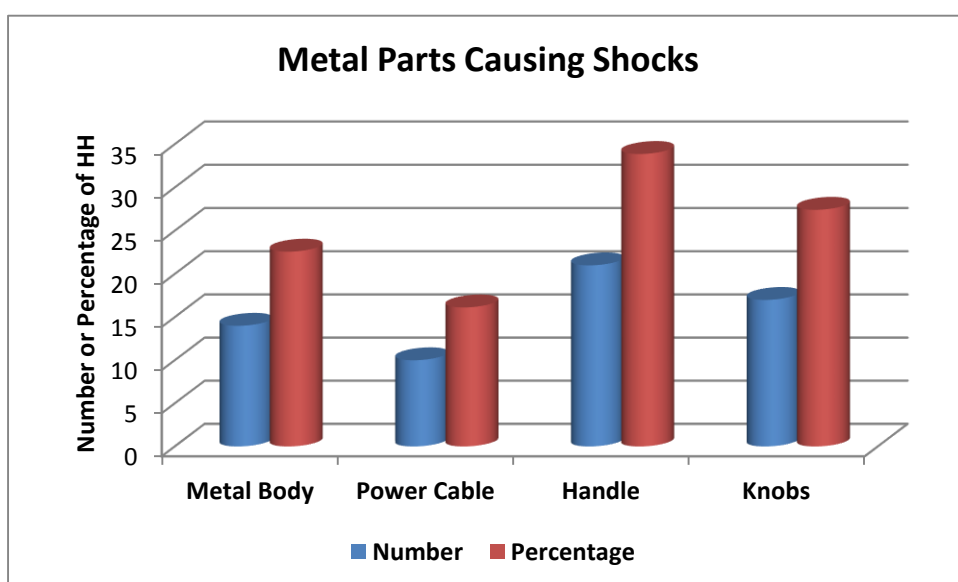


Figure 32: Metal Parts Causing Shocks

Shocks received were most prevalent from TV and light bulbs, followed by irons, cooker, refrigerators, plugs and bases, electric kettles, blenders and ceiling fans. Ten persons had died from shocks, 3 from handling bulbs and one each from the rest of the equipment except plugs and bases. The majority who received shocks (39%) did not receive any treatment. A further 37% received outdoor treatment, 16% died and 8% was hospitalized. The most reported part causing the shocks was the handle (34%), followed by knobs (27%), metal body (23%) and power cable (16%).

Table 43: Household Members Affected by Shock (All HH)

Member Affected	Number	%
HH Head	1	16.7
Spouse	2	33.3
Daughter	1	16.7
Son	2	33.3
Total	6	100

Out of the 62 persons receiving shocks, only 6 members of the HH received shocks and they included the HH head, spouses, sons and daughter.

Table 44: Safety Related to Electricity Use (All HH)

Household Consumption Category	Safety Practices			
	Units	Have Earthed Premise	Have Trip Switches	Total
< 60 Units	No.	502	566	638
	%	78.7	88.7	100
61-120	No.	540	585	683
	%	79.1	85.7	100
121-180	No.	203	218	239
	%	84.9	91.2	100
>180	No.	102	105	113
	%	90.3	92.9	100
Total	No.	1347	1474	1667
	%	80.8	88.4	100

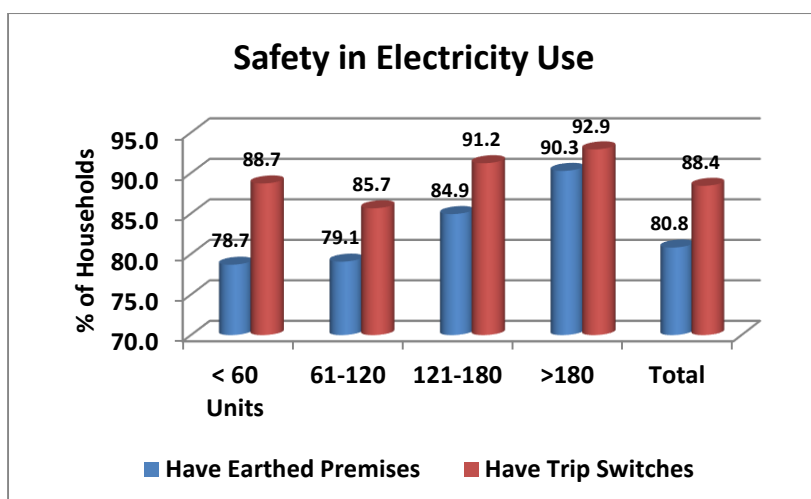


Figure 33: Safety in Electricity Use

Safety measures followed by HH included fixing of earth for electrical connections of premises and installing of trip switches. About 80% reported having earthed their premises and 88% have installed trip switches. The Proportion of households having earths and trip switches increased with the increase in the units consumed. Thus a greater proportion of the higher consumption categories had earths and trip switches installed compared to the lower consuming categories.

Table 45: Frequency of Testing of Trip Switches

Household Consumption Category	< 60 Units		61-120		121-180		>180		Total	
How Often Trip Switch Tested	No.	%	No.	%	No.	%	No.	%	No.	%
Never	90	14.1	103	15.1	45	18.8	16	14.2	254	15.2
Once a month	140	21.9	165	24.2	57	23.8	32	28.3	394	23.6
Once in 6 months	162	25.4	158	23.1	53	22.2	32	28.3	405	24.3
Once a year	58	9.1	90	13.2	33	13.8	12	10.6	193	11.6
Do not know how to check	116	18.2	69	10.1	30	12.6	13	11.5	228	13.7
Total Responded	566	88.7	585	85.7	218	91.2	105	92.9	1474	88.4
Total No. of HH	638	100.0	683	100.0	239	100.0	113	100.0	1667	100.0

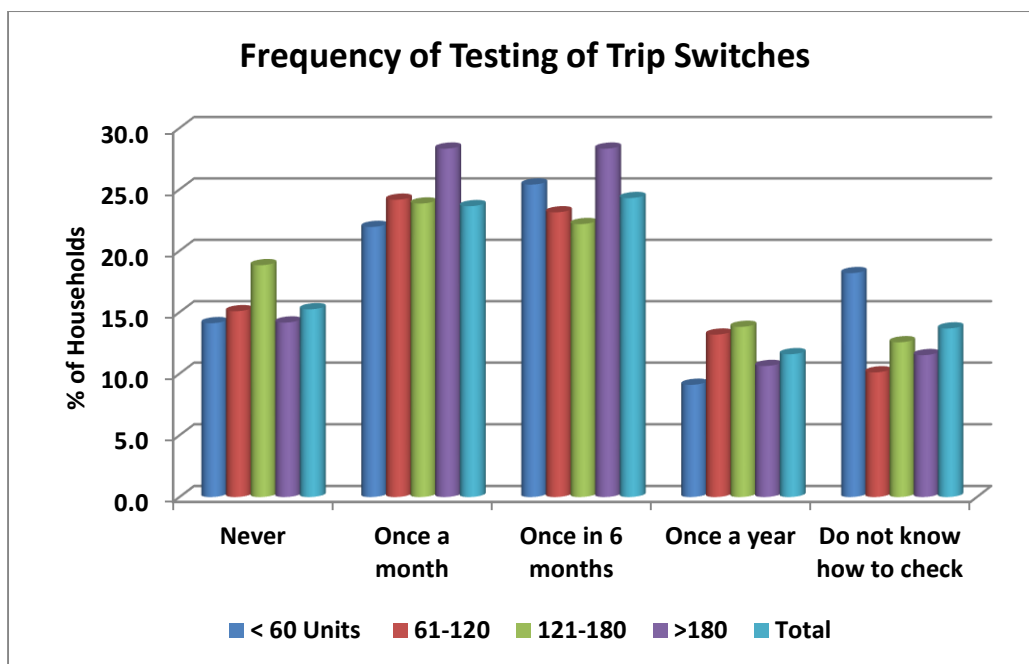


Figure 34: Frequency of Testing of Trip Switches

Testing of the trip switches were reported by about 85% to over 90% of the HH when all consumption categories were included. About 14%-16% of the households in all categories had never tested their trip switches. About 20% to 28% of the HH tested it once a month in all categories of consumption. A further 23% to 28% tested once in six months. About 9%-14% tested it once a year and 10% to 18% do not know how to test the trip switch. Thus about half of the HH tested their trip switches at least once a month or once in six months in all categories of consumption, suggesting that a majority of the HH do undertake such safety measures.

Table 46: Awareness of New Policies Related to Electrical Fittings – All Households

Awareness on new policy that electrical outlets should be square pin type		
Awareness	Number	%
Aware	1242	74.5
Not Aware	424	25.5
Total	1666	100
Type of electrical outlet in premises		
Round	704	42.3
Square	232	13.9
Both	602	36.1
Use Adapter Also	128	7.7
Total	1666	100

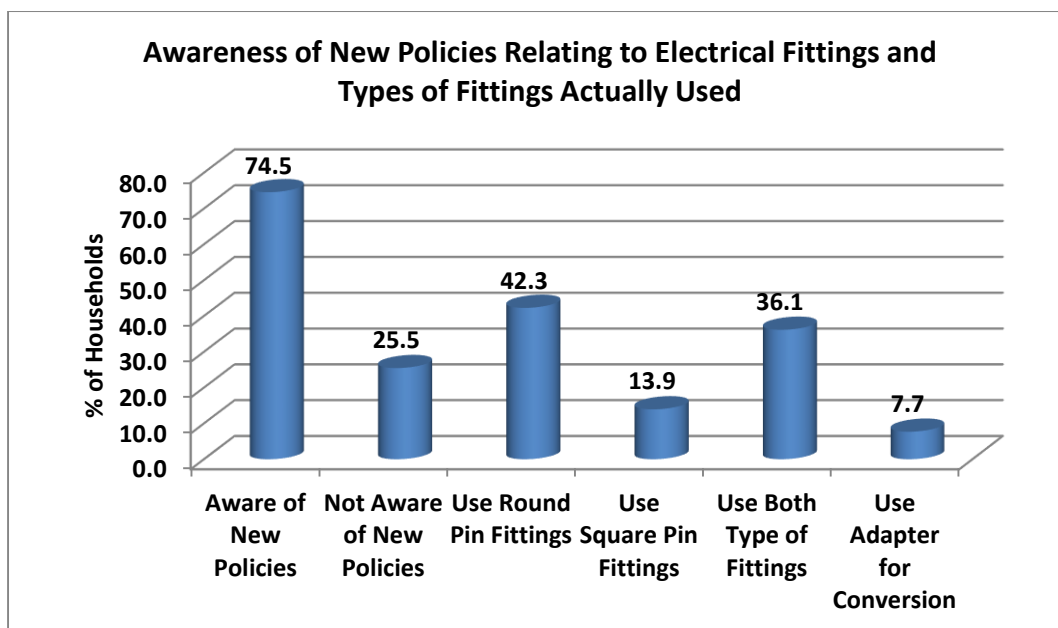


Figure 35: Awareness of New Policies Relating to Electrical Fittings – All Households

About 75% of the HH were aware of the new policies on promoting square type of plug outlets. A majority of the HH (over 40%) still use round type of outlets, and only 14% use square outlets. A little over one third of the HH have both types of outlets in their homes while 8% use adapters to meet this requirement.

4.1.9 Impacts of Lightning and Measures for Improving Quality of Electrical Products

Table 47: Impacts of Lightning – All Households

Lightning Impacts	Number	%
Installed Lightning Arrestor	365	21.9
Not Installed	1144	68.7
Don't Know	157	9.4
Total	1666	100
Total Number Struck by Lightning	53	3.2
Damage Due to Lightning	Number	%
Very minor or no damage	16	30.2
Some damage to phones, radio, TV, refrigerator, cooker, micro wave and other household equipment	16	30.2
Damage to premises structure or damage due to fire	3	5.7
Considerable damage to premises, equipment and telephones, TV and other equipment	13	24.5
Damages to trees	0	0.0
Death	3	5.7
Other	2	3.8
Total	53	100

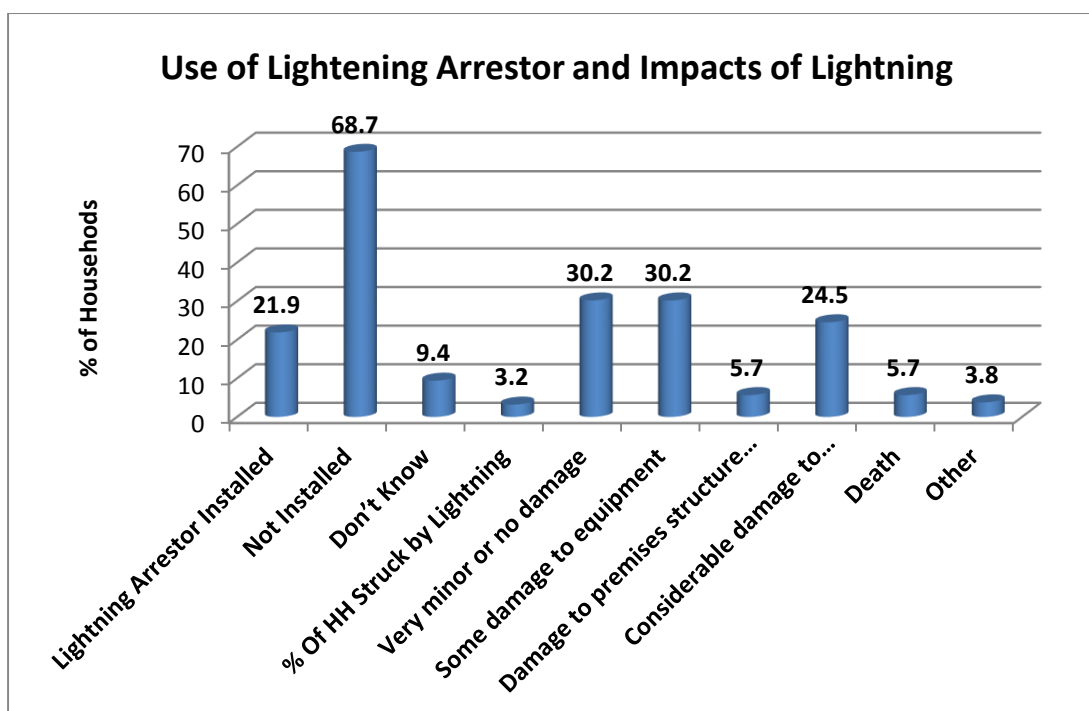


Figure 36: use of Lightning Arrestor and Impacts of Lightning – All Households

About 22% of the HH have installed lightning arrestors in their homes. The majority 69% do not have lightning arrestors. About 10% do not know whether such arrestors have been installed in their homes. A total of 53 members of HH reported being struck by lightning. About 30% reported minor or no damages. A further 30% reported some damage to phones, radios, TVs, refrigerators, cookers and microwaves. Damages to structures were reported by 6% and damages to premises and equipment reported by 25%. Deaths were reported by 3 households.

Table 48: Measures Needed to Ensure Quality of Electrical Fittings

Measures needed to ensure that sub-standard electrical products do not reach the customer or markets		
Measures needed	Number	%
There should be regulatory interventions to remove sub-standard electrical products from the market	1055	62.4
Should educate customers to choose quality products through awareness programmes	880	52.0
Should make warranty mandatory for all electrical products	719	42.5
Impose quality standards on all electrical products and mandatory certification by a state quality control body	614	36.3
Seller should be made liable for all accidents caused by electrical equipment sold, resulting from faulty equipment	292	17.3
Stop importing sub-standard electrical items	0	0
Total	1692	100

Opinions of the HH on measures needed to ensure quality of electrical fittings were obtained. Over 60% indicated that measures are needed to remove sub-standard products from the market. Secondly 52% of the HH suggested that customers should be educated to buy quality products through awareness programmes. About 42% indicated that warranty should be made mandatory for electrical products. About 36% suggested that quality standards should be imposed for all electrical products. A further 17% suggested that the seller of electrical goods should be made liable for all electrical accidents.

4.2 Survey of Institutions

4.2.1 Details of Sampling, Respondent Details and Electricity Users

Table 49: Sampling for Survey – All Institutions

Sample	No Selected	No. Sampled	% Sampled	Original Sample % by Category	Actual Sample % by Category
1. Industry	209	68	32.5	28.4	16.6
2. Gen Purpose	417	276	66.2	56.7	67.5
3. Hotels	50	34	68.0	6.8	8.3
4. Religious	60	31	51.7	8.2	7.6
Total	736	409	55.6	100.0	100

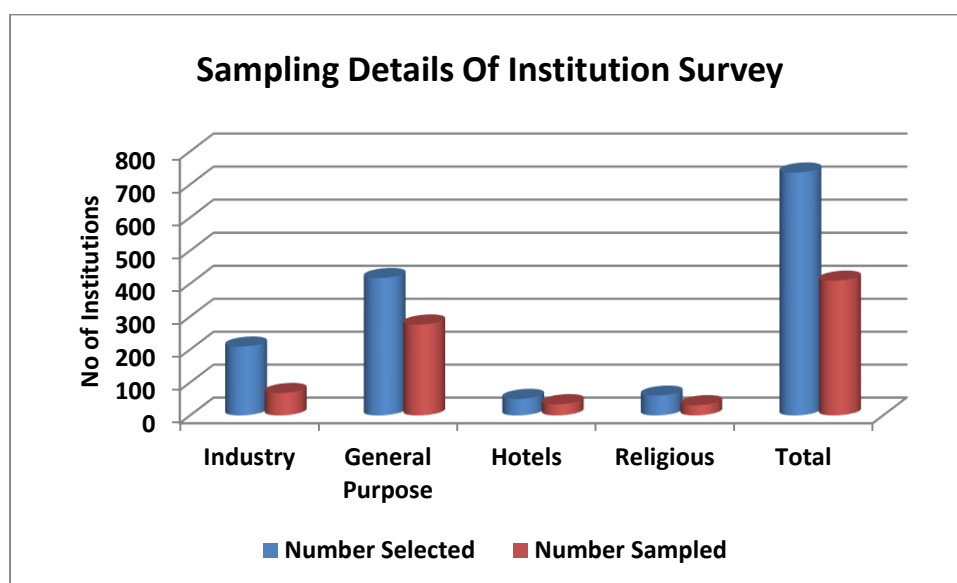


Figure 37: Sampling Details of Institutions Surveyed

Although 736 samples were selected, it was not possible to interview all the selected samples due to COVID 19 situation. Thus only 409 samples or 56% of the selected sample were interviewed for the institutional survey. However adequate samples were obtained from each category of institutions, to ensure validity of the results.

Table 50: Details of Respondents – All Institutions

Respondent	No	%
Head of Institution	367	89.7
Other	42	10.3
Total	409	100

The head of the institution participated in the interviews in nearly 90% of the institutions. In the other 10% of the institutions a responsible officer of the institution was interviewed.

Table 51: Electricity Users within the Institution

Institution	Non-Resident Employees	Resident Employees	Visitors	Total
Industry No.	557	447	13,658	14,662
Industry %	3.8	3.0	93.2	100
Ave No. / Institution	8	7	201	216
Gen. Purpose No.	1,052	810	59,723	61,585
Gen. Purpose %	1.7	1.3	97.0	100
Ave No. / Institution	4	3	216	223
Hotels No.	177	131	12,694	13,002
Hotels %	1.4	1.0	97.6	100
Ave No. / Institution	5	4	373	382
Religious No.	212	165	5,881	6,258
Religious %	3.4	2.6	94.0	100
Ave No. / Institution	7	5	190	202
Total No	1,998	1,553	91,956	95,507
%	2.1	1.6	96.3	100
Ave No. / Institution	26	19	980	1,023

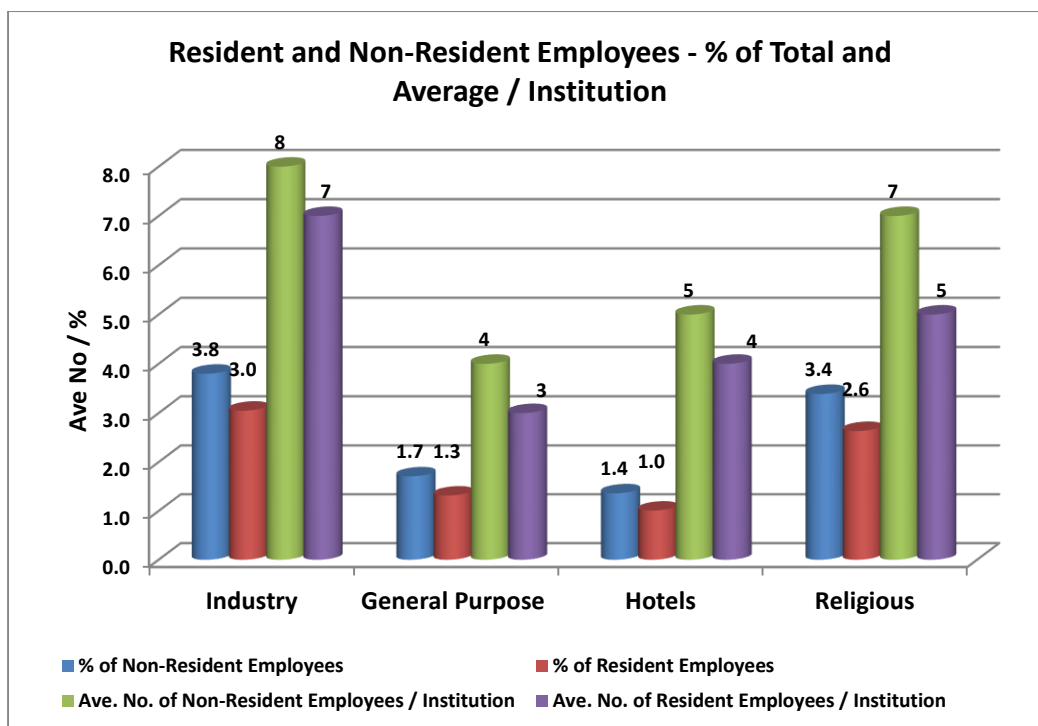


Figure 38: Resident and Non Resident Employees of Institutions

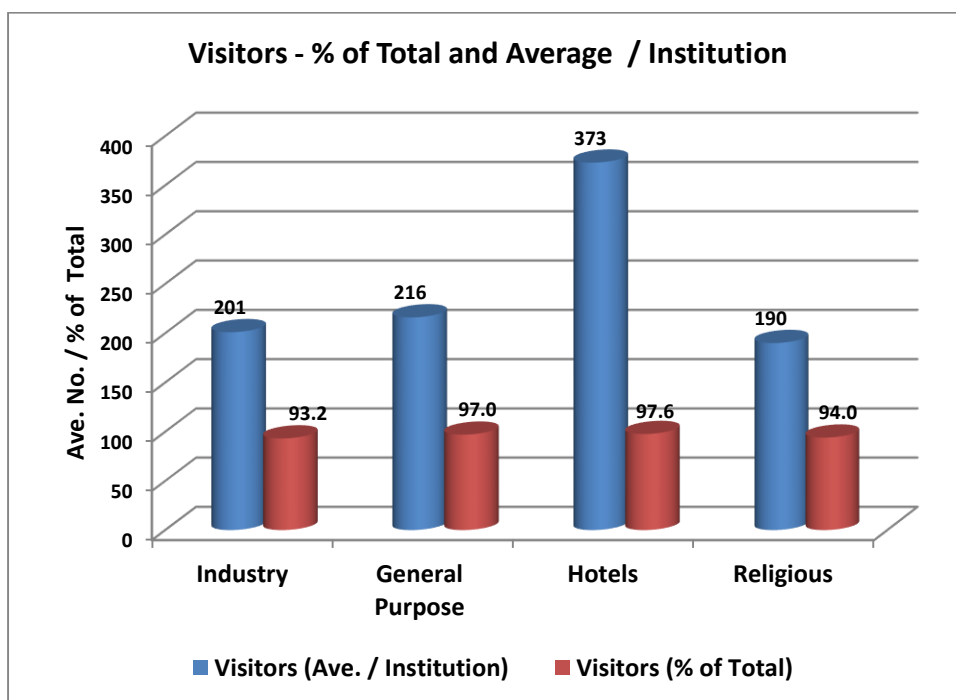


Figure 39: Visitors to Institutions

Overall, there was an average of 26 non-resident and 19 resident employees per institution. The average number of visitors per institution was 980. In the industry sector, there was an average of 15 employees per institution and 201 visitors. In the general purpose sector, there was an average of 7 employees and 216 visitors per institution. In the hotels sector, there was an average of 9 employees

and 373 visitors per institution. In the religious sector, there was an average of 12 employees and 190 visitors per institution. Visitors comprised about 95% of the total electricity users taking all institutions together. There was not much variance in this proportion among the different institutions. Thus one could conclude that a large proportion of the electricity use may be attributed to the use of the premises by visitors. In the case of hotels and religious places the actual use of electricity may be high because the visitors are either residing in hotels or visitors visit for religious services and spend considerable time in these places for these services. In the case of general purpose and industries, persons visiting may be for short term business purposes and probably spend less time within the premises.

4.2.2 Expenditure of Institutions

Table 52: Expenditure of Institution (Industry)

Total Exp. / Month	Total	Ave / Inst.	% of Exp
Material Inputs	25,991,950	382,235	70.1
Rent / Lease	1,597,000	23,485	4.3
Emp. Salaries	5,516,500	81,125	14.9
Water Bill	106,200	1,561	0.3
Electricity Bill	1,068,585	15,714	2.9
Telecom Costs	274,800	4,041	0.7
Transport	1,100,500	16,184	3.0
Env. Costs	354,600	5,215	1.0
Loan Repayment	1,072,000	15,765	2.9
Other	8,000	118	0.0
Total Exp. / Month	37,090,135	545,443	100.0
Total Rev. / Month	18,940,000	278,529	

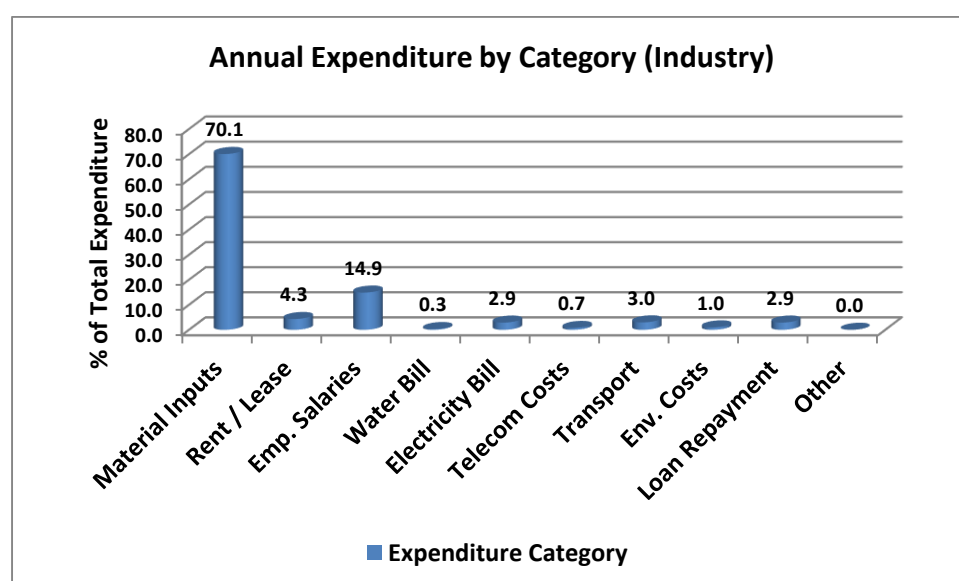


Figure 40: Annual Expenditure (Industry Sector)

The major expenditure for the industries was for material inputs (70%) and wages (15%). Stated revenues were half of that of expenditure. This may be due to non-disclosure of actual incomes received. The expenditure on electricity was moderate (2.9%).

Table 53: Expenditure of Institution (General Purpose)

Total Exp. / Month	Total	Ave / Inst.	% of Exp
Material Inputs	60,725,009	220,018	66.5
Rent / Lease	5,343,475	19,360	5.9
Emp. Salaries	16,141,001	58,482	17.7
Water Bill	206,618	749	0.2
Electricity Bill	3,120,089	11,305	3.4
Telecom Costs	1,029,712	3,731	1.1
Transport	1,785,300	6,468	2.0
Env. Costs	195,660	709	0.2
Loan Repayment	2,702,100	9,790	3.0
Other	86,000	312	0.1
Total Exp. / Month	91,334,964	330,924	100.0
Total Rev. / Month	101,946,000	369,370	

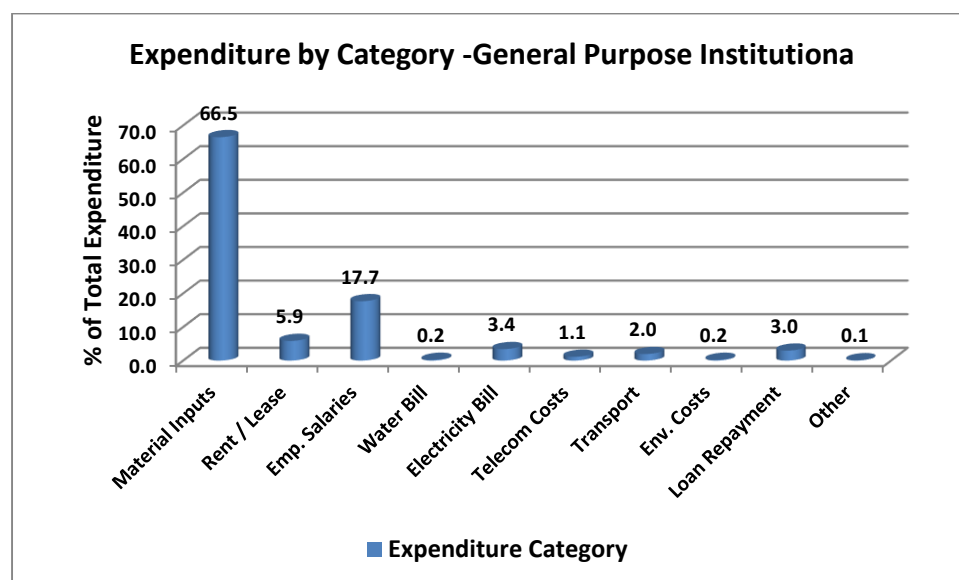


Figure 41: Annual Expenditure (General Purpose Institutions)

The major expenditure for the general purpose institutions was for material inputs (67%) and wages (18%). Stated revenues were slightly above that of expenditure. The actual revenue may be even higher but due to non-disclosure of actual incomes received, the profitability is low. However, many of the general purpose institutions may be service oriented and profitability may be low. The expenditure on electricity was moderate (3.4%)

Table 54: Expenditure of Institution (Hotels)

Total Exp. / Month	Total	Ave / Inst.	% of Exp
Material Inputs	12,930,000	380,294	75.6
Rent / Lease	510,001	15,000	3.0
Emp. Salaries	1,456,030	42,824	8.5
Water Bill	139,000	4,088	0.8
Electricity Bill	1,038,548	30,546	6.1
Telecom Costs	119,500	3,515	0.7
Transport	118,000	3,471	0.7
Env. Costs	32,602	959	0.2
Loan Repayment	689,650	20,284	4.0
Other	80,750	2,375	0.5
Total Exp. / Month	17,114,081	503,355	100.0
Total Rev. / Month	4,676,500	137,544	

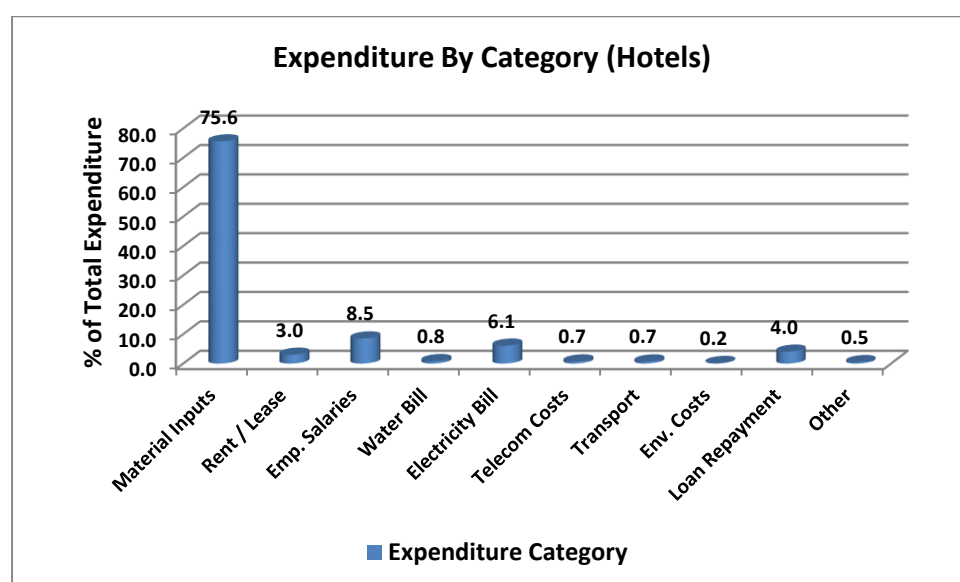


Figure 42: Annual Expenditure (Hotels)

The major expenditure for the hotel sector institutions was for material inputs (76%) and wages (9%). The expenditure on electricity was also high (6.1%) due to high usage of electricity in hotels. Stated revenues were very much below that of expenditure due to current COVID pandemic situation.

Table 55: Expenditure of Institution (Religious Places)

Total Exp. / Month	Total	Ave / Inst.	% of Exp
Material Inputs	1,208,000	38,968	50.1
Rent / Lease	95,100	3,068	3.9
Emp. Salaries	805,000	25,968	33.4
Water Bill	28,750	927	1.2

Electricity Bill	79,278	2,557	3.3
Telecom Costs	49,350	1,592	2.0
Transport	133,700	4,313	5.5
Env. Costs	14,010	452	0.6
Loan Repayment	0	0	0.0
Other	0	0	0.0
Total Exp. / Month	2,413,188	77,845	100.0
Total Rev. / Month	975,500	31,468	

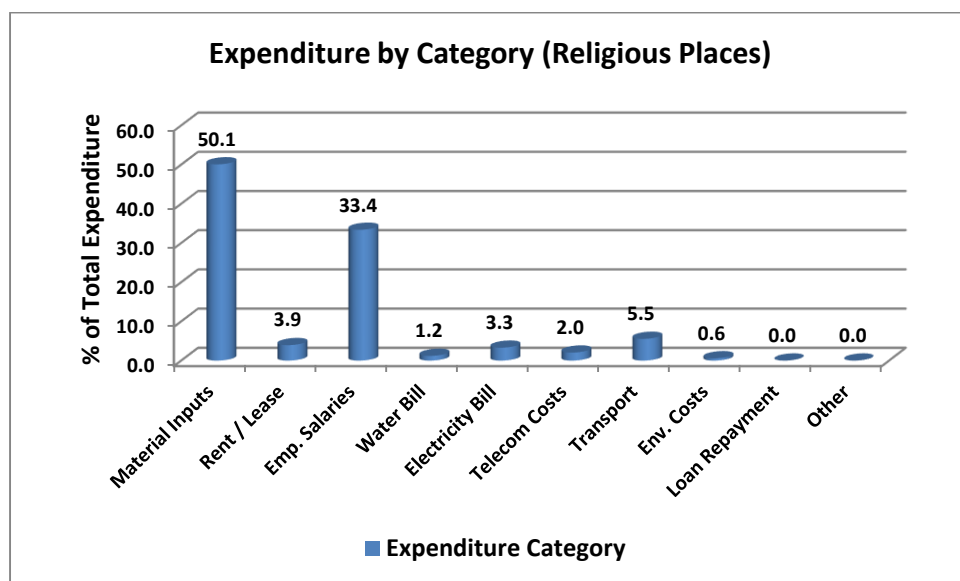


Figure 43: Annual Expenditure (Religious Places)

The major expenditure for the religious institutions was for material inputs (50%) and wages (33%). The expenditure on electricity was moderate (3.3%) due to fair amount of use electricity in these places (air conditioners and fans are used heavily during services). Stated revenues were very much below that of expenditure due to service nature of these institutions. These institutions depend for the expenditure on mostly donations from users or some government contribution.

Table 56: Expenditure of Institution (All Institutions)

Total Exp. / Month	Total	Ave / Inst.	% of Exp
Material Inputs	100,854,959	246,589	68.2
Rent / Lease	7,545,576	18,849	5.1
Emp. Salaries	23,908,531	58,481	16.2
Water Bill	480,568	1,175	0.3
Electricity Bill	5,306,500	12,974	3.6
Telecom Costs	1,473,362	3,602	1.0
Transport	3,137,500	7,671	2.1
Env. Costs	596,872	1,459	0.4
Loan Repayment	4,463,760	10,914	3.0

Other	174,750	427	0.1
Total Exp. / Month	147,942,378	361,717	100.0
Total Rev. / Month	126,538,000	309,384	

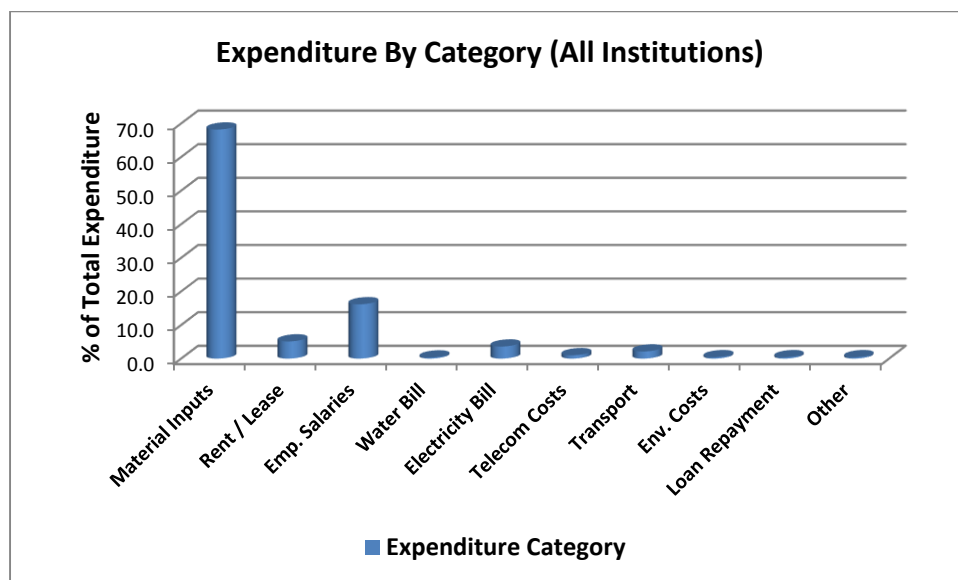


Figure 44: Annual Expenditure (All Institutions)

When all institutions were taken together, the major expenditure for the institutions was for material inputs (68%) and wages (16%). The expenditure on electricity was moderate (3.6%) due to fair amount of use electricity in these places. Stated revenues were below that of expenditure due to the current economic down turn due to the COVID pandemic situation and the nature of these institutions.

4.2.3 Electricity Connection, Electricity Use, Affordability and Cost

Table 57: Type of Wiring of Institution

Type of Wiring (Connection)				
Institution	Unit	3 phase	Single phase	Total
Industry	No	28	40	68
	%	41.2	58.8	100.0
Gen Purpose	No	80	196	276
	%	29.0	71.0	100.0
Hotels	No	9	25	34
	%	26.5	73.5	100.0
Religious Places	No	8	23	31
	%	25.8	74.2	100.0
Total	No	125	284	409
	%	30.6	69.4	100.0

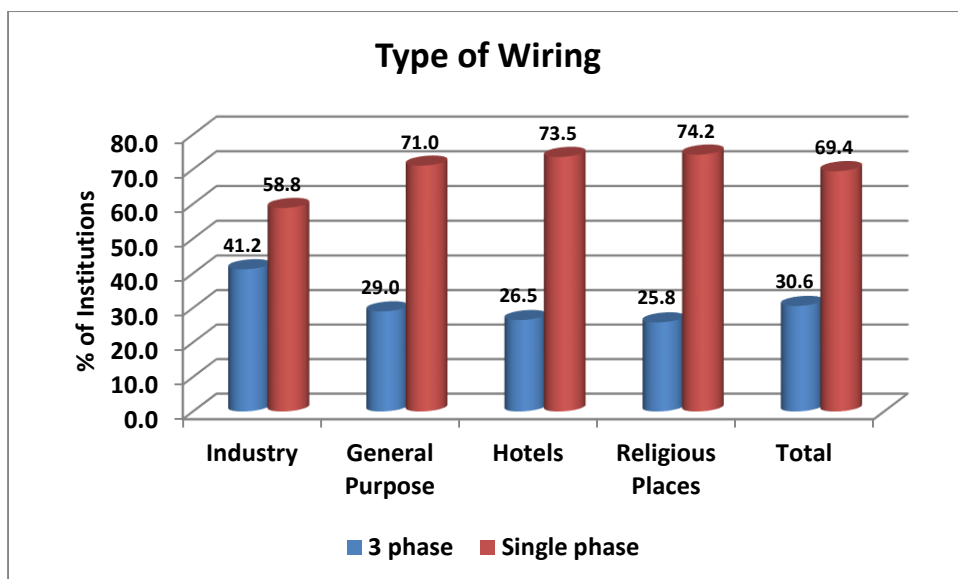


Figure 45: Type of Connection (Wiring)

All except the industry sector institutions have a majority of over 70% with single phase wiring. The highest proportion of three phase wiring was in the industry sector (40%). This may be because, industries using different type of machinery may have a higher need for three phase wiring for such equipment.

Table 58: Electricity Use and Cost

Electricity Use and Cost	Units	Total	No. of Inst.	Average / Inst.
Industry	No. of Units/ Month	49,906	68	734
	Elect. Bill / Month (Rs)	837,233	68	12,312
Gen Purpose	No. of Units/ Month	87,817	276	318
	Elect. Bill / Month (Rs)	2,881,006	276	10,438
Hotels	No. of Units/ Month	42,975	34	1,264
	Elect. Bill / Month (Rs)	876,000	34	25,765
Religious Places	No. of Units/ Month	8,995	31	290
	Elect. Bill / Month (Rs)	80,149	31	2,585
Total	No. of Units/ Month	189,693	409	464
	Elect. Bill / Month (Rs)	4,674,388	409	11,429

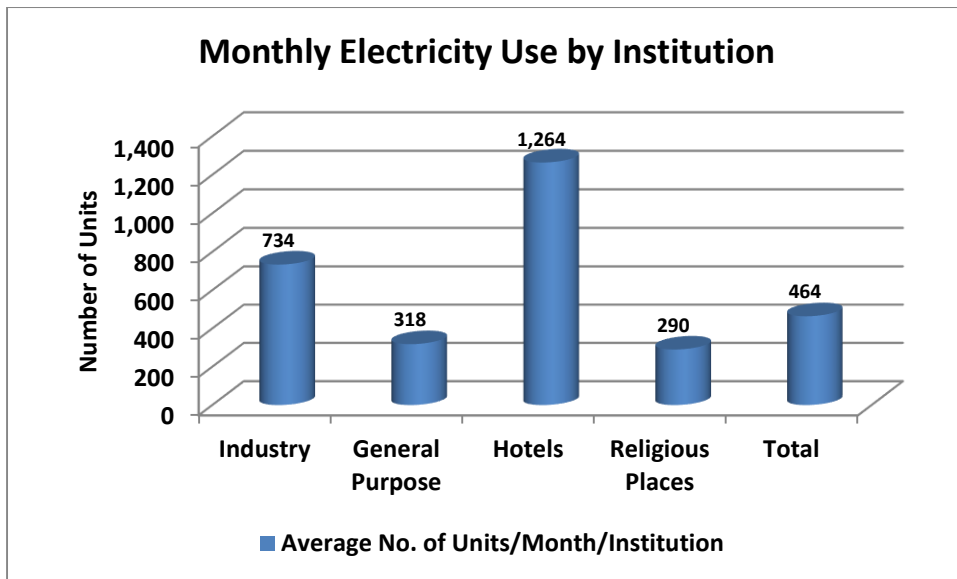


Figure 46: Monthly Average Electricity Use by Institution

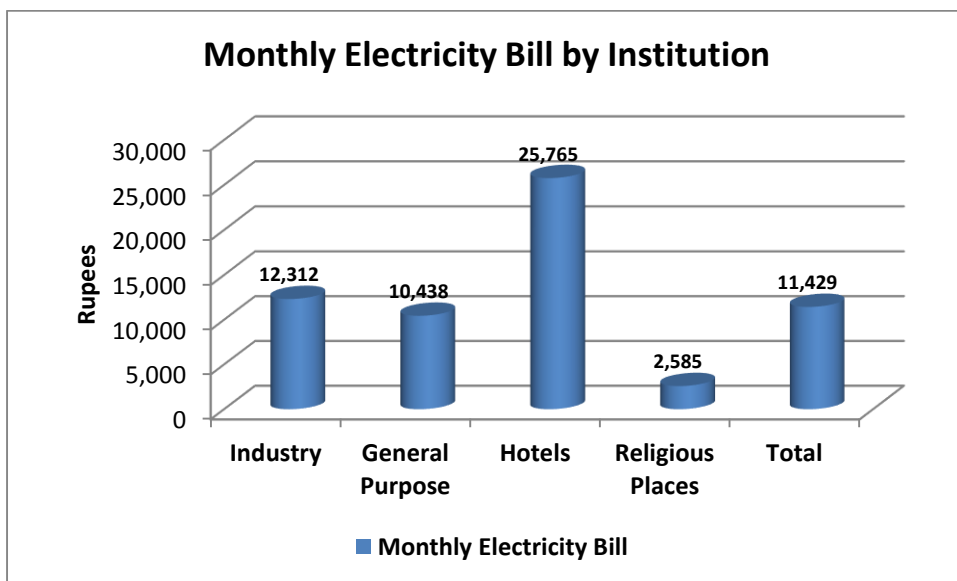


Figure 47: Monthly Average Electricity Bill by Institution

The Hotel sector used the highest amount of electricity of over 1200 units per month per institution with an average monthly bill of over Rs 25,000. The industry sector was the next highest user with a monthly usage of over 700 units and an average bill of Rs 12,300. This was followed by the general purpose institutions using about 320 units per month per institution with an average monthly bill of Rs. 10,400. The religious institutions also used about 290 units of electricity per month per institution. Since the electricity tariff rates are subsidized, the average monthly bill per institution was low at Rs. 2600.

Table 59: Affordability of Electricity Bill

Can You Afford the Bill?	Unit	Yes	No	Total.
Industry	No	51	17	68
	%	75	25	100
Gen Purpose	No	210	66	276
	%	76.1	23.9	100
Hotels	No	23	11	34
	%	67.6	32.4	100.0
Religious Places	No	27	4	31
	%	87.1	12.9	100.0
Total	No	311	98	409
	%	76.0	24.0	100.0

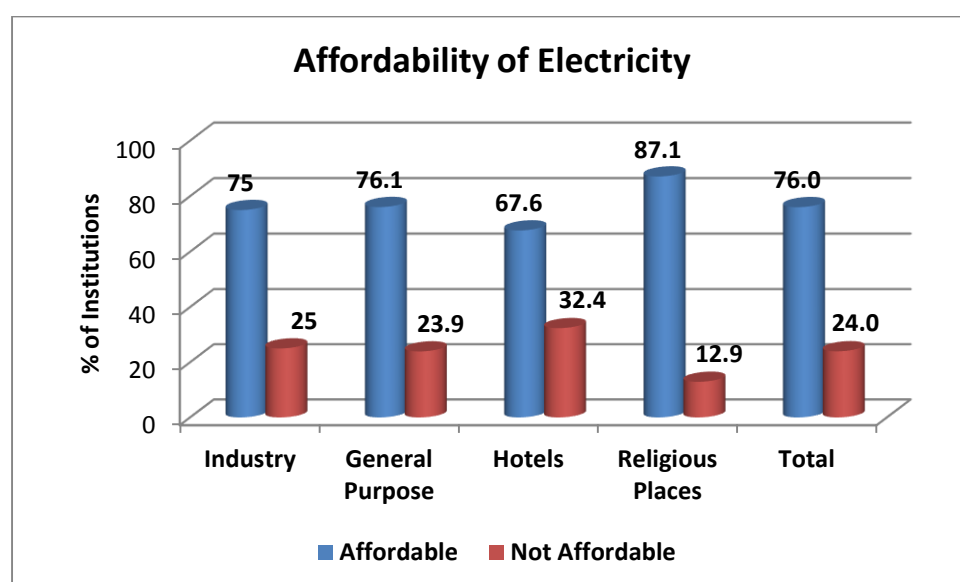


Figure 48: Affordability of Electricity by Institution

Overall 76% of the institutions reported that they could afford to pay the bill. The affordability for industry and general purpose institutions was about 75%. Affordability declined to 67% for hotels and increased to 87% for religious places (rates are subsidized for these institutions). Since hotels generally use electricity 24 hours per day the costs are high and consequently less affordable to these institutions.

Table 60: Reasons for Non-Affordability of Electricity Bill

Why Electricity is not Affordable	Units	Income low	Have to forego essentials to pay bill	Income fluctuates	High tariff rates	Total
Industry	No	9	9	11	9	38
	%	23.7	23.7	28.9	23.7	100.0

General Purpose	No	46	25	30	37	138
	%	33.3	18.1	21.7	26.8	100.0
Hotels	No	10	3	3	4	20
	%	50.0	15.0	15.0	20.0	100.0
Religious Places	No	2	0	0	2	4
	%	50.0	0.0	0.0	50.0	100.0
All Institutions	No	67	37	44	52	200
	%	33.5	18.5	22.0	26.0	100

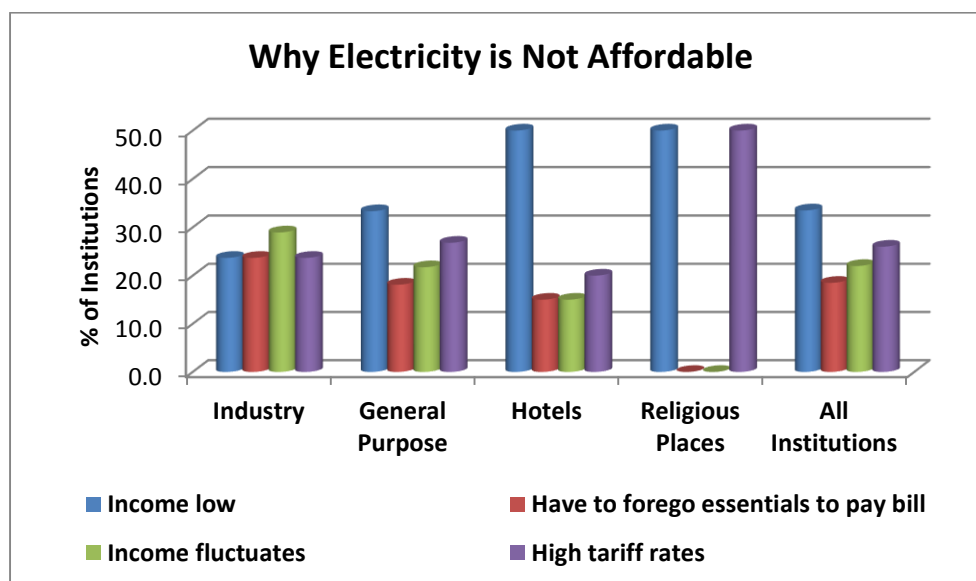


Figure 49: Reasons for Non-Affordability of Electricity Bill

Low income was stated as one reason for non-affordability by hotels (50%), religious places (50%), general purpose institutions (33%) and industry (24%). High tariff was quoted as another reason for non-affordability by religious places (50%), general purpose institutions (27%), Industry (24%) and hotels (20%). Income fluctuations as another reason for non-affordability with the highest proportion of 29% reported by industry, followed by general purpose (22%), and hotels (15%). Having to forego essentials in order to pay bill was another reason for non-affordability reported by industry sector (24%) followed by general purpose institutions (18%). The two main reasons for non-affordability appear to be low incomes and high tariffs.

4.2.4 Use of Electrical Equipment and Basic Needs of Electricity

Table 61: Use of Electrical Equipment (All Institutions)

Equipment Used	No of Institutions Reporting	% Reporting	Total No. Owned	Average / Institution
Machinery	179	43.8	1,837	10
Equipment	157	38.4	1,370	9
Air conditioners	77	18.8	230	3
Fans	293	71.6	1,771	6
Microwave	17	4.2	43	3

Refrigerator	149	36.4	334	2
TV	160	39.1	388	2
Phones and Mobile	338	82.6	2,485	7
Vacuum cleaner	31	7.6	139	4
Radio, CD and other entertainment items	111	27.1	162	1
Computers / Laptops /tablets	176	43.0	1,763	10
Internet Equipment	156	38.1	1,002	6
Office Equipment	71	17.4	626	9
Lighting bulbs	1	0.2	50	50
CCTV	146	35.7	1,405	10
Rice Cooker	1	0.2	1	1
Iron	1	0.2	3	3
Digital Sign Boards	2	0.5	2	1
Water Heater	1	0.2	1	1
Other	15	3.7	131	9
Total	409	100	13,743	34

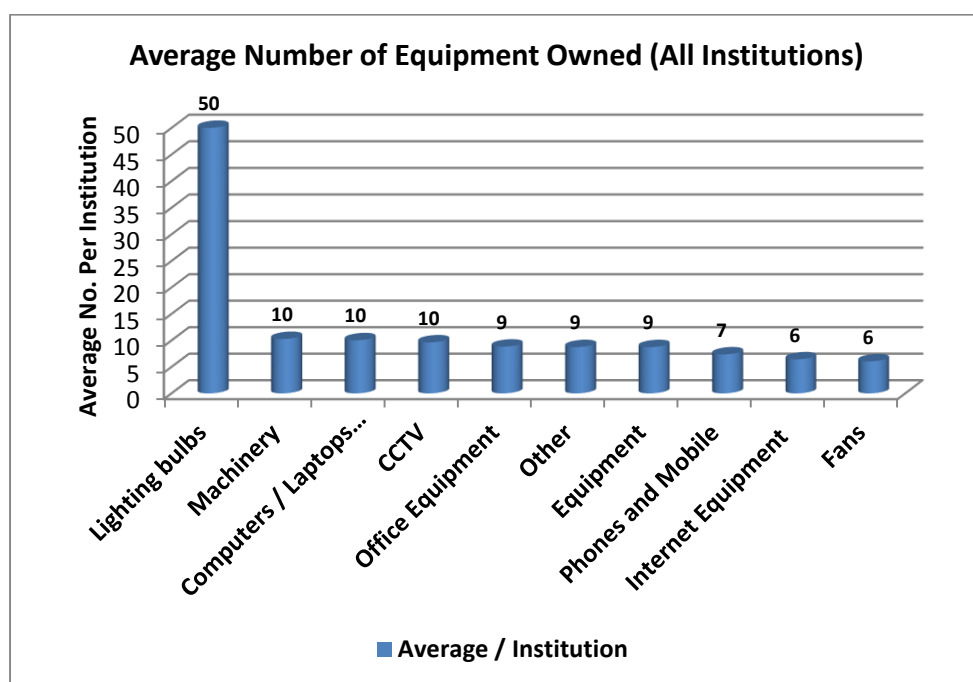


Figure 50: First Ten Highest Average Number of Equipment Owned (All Institutions)

The most reported equipment used were mobile phones (83%), fans (72%), machinery (44%), equipment (38%), computers and laptops (43%), TV (39%), refrigerator (39%), internet (38%), CCTV (36%), radio, CD players and other entertainment equipment (27%) and air conditioners (19%). The average number owned varied from 1-50 per institution.

Table 62: Is Electricity Consumed Less Than Basic Needs?

Is electricity consumed less than basic needs?	Basic Needs Consumption of Electricity			
	Unit	Yes – Less	No – More	Total.
Industry	No	30	38	68
	%	44.1	55.9	100.0
Gen Purpose	No	87	159	276
	%	31.5	57.6	100.0
Hotels	No	17	17	34
	%	50.0	50.0	100.0
Religious Places	No	10	21	31
	%	32.3	67.7	100.0
Total	No	144	265	409
	%	35.2	64.8	100.0

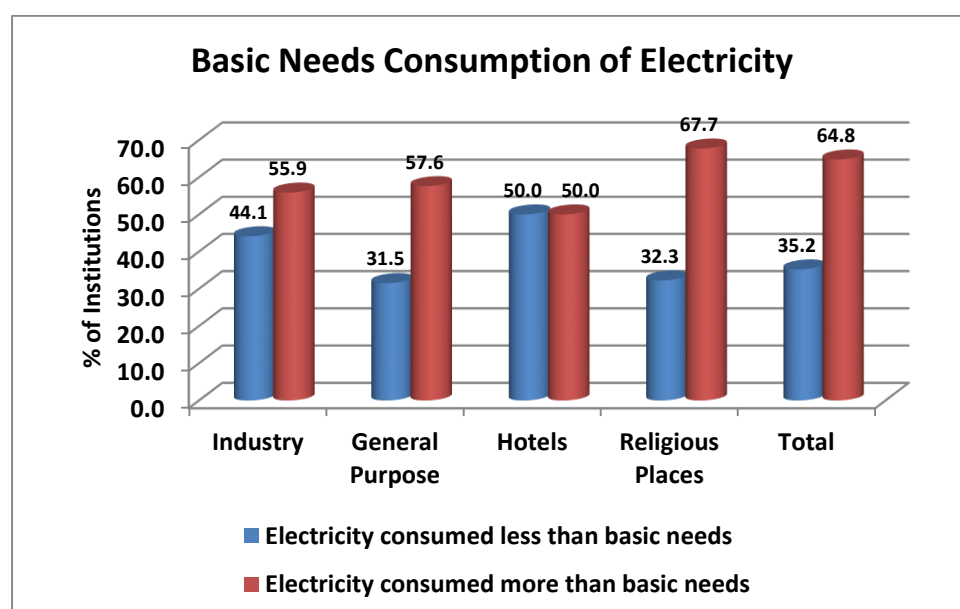


Figure 51: Is Electricity Consumed Less Than Basic Needs?

The proportion of institutions responding that the use of electricity was less than their basic needs was hotels (50% reporting), followed by industry (44%), religious places (32%) and general purpose institutions (32%). Thus hotels and industries were the institutions reporting consumption less than their basic needs. Overall, 35% (144 institutions out of 409) reported consuming less than their basic needs of electricity.

Table 63: Electricity Consumption for Basic Needs

Electricity Consumption for Basic Needs	Units	Number of Units / Bill Needed for Basic Needs	
		Total	Average / Institution
Industry	No of Units/ Month	49,740	731

	Amount of Bill Needed for Basic Needs	916,000	13,470
Gen Purpose	No of Units/ Month	79,494	288
	Amount of Bill Needed for Basic Needs	1,625,163	5,888
Hotels	No of Units/ Month	33,522	986
	Amount of Bill Needed for Basic Needs	569,601	16,753
Religious Places	No of Units/ Month	11,571	373
	Amount of Bill Needed for Basic Needs	73,700	2,377
Total	No of Units/ Month	174,327	426
	Amount of Bill Needed for Basic Needs	3,184,464	7,786

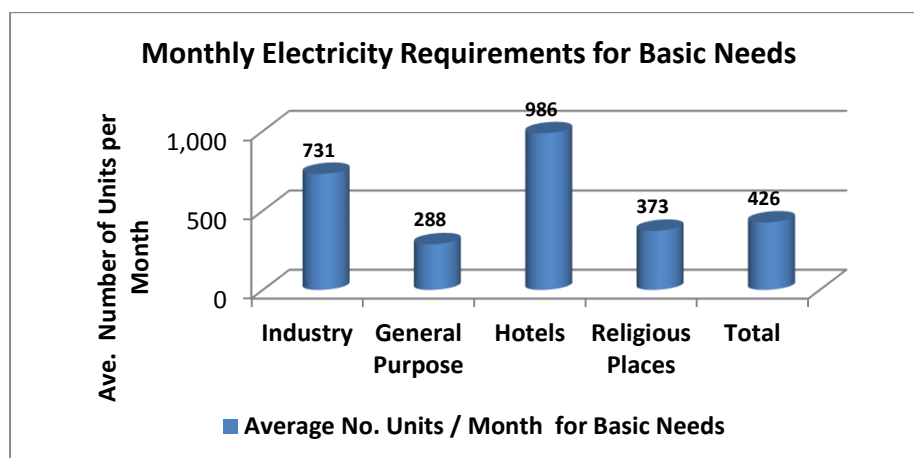


Figure 52: Electricity Requirements for Basic Needs (Units)

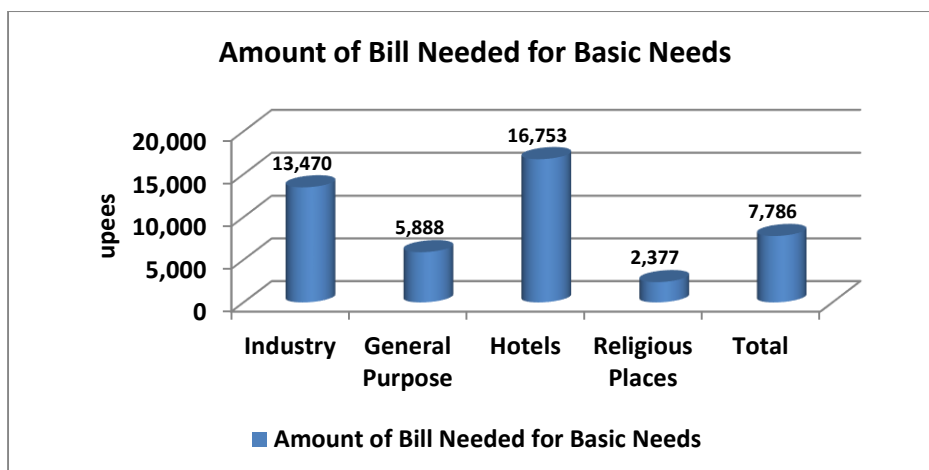


Figure 53: Amount of Bill Needed for Basic Needs (Rs.)

The highest average requirement for basic needs was for hotels and the amount reported was 986 units and a bill of Rs 16,753 per month. The requirement for the industry sector was reported as 731 units and Rs 13,400 per institution per month. The requirement for religious places was 373 units and a bill of Rs. 2,400 per month. The requirement for general purpose institutions was reported as 288 units and a bill of Rs 5,900 per institution per month. As expected the basic needs of the hotel sector was the highest followed by the industry sector.

4.2.5 Willingness to Pay Electricity Bill and Alternatives to Electricity

Table 64: Willingness to Pay the Current Bill

Willingness to Pay		Willing	Not willing	If Not Willing ,	Actual Amount Willing to Pay (Rs./Month)
Industry	No	53	15	Total	119,000
	%	77.9	22.1	Ave. / Inst.	7,933
Gen Purpose	No	210	66	Total	287,700
	%	76.1	23.9	Ave. / Inst.	4,359
Hotels	No	25	9	Total	389,500
	%	73.5	26.5	Ave. / Inst.	43,278
Religious Places	No	26	5	Total	23,600
	%	83.9	16.1	Ave. / Inst.	4,720
Total	No	314	95	Total	819,800
	%	76.8	23.2	Ave. / Inst.	8,629

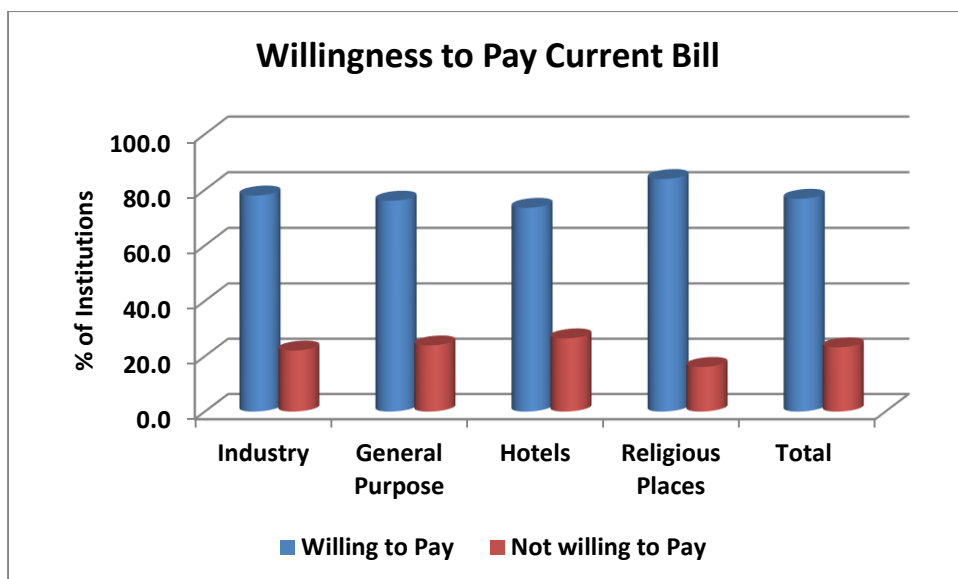


Figure 54: Willingness to Pay Current Bill

Over 75% of all institutions were willing to pay the current bill, with 84% of the religious institutions, 78% of the industries, 76% of the general purpose institutions and 74% of the hotels willing to pay the current bill. Thus a majority of the institutions are willing to pay the bill, with a greater proportion of religious institutions willing to as they are getting a subsidy. The amounts the institutions are willing to pay was the highest for hotels (Rs 43,300 /month/institution), followed by industries (Rs 7900/month/institution), religious places (Rs 4700) and General Purpose (Rs 4400).

Table 65: Alternatives to Electricity Use (All Institutions)

Are you using less electricity because you are not able to pay the bill if you use electricity for all your basic requirement of electricity?	No.	%
Yes	216	52.8
No	193	47.2
If yes, what are the alternatives to electricity or electricity saving methods that you use in order to compensate for or for reducing the use of electricity?		
Use alternative fuel	53	24.5
Use energy saving equipment	150	69.4
Change production methods to reduce electivity use	60	27.8
Use electricity only when needed	111	51.4
Use Man Power	1	0.5
No solution	1	0.5
Use capacitor banks /Var compensation, to reduce demand	26	12.0
Total	216	100

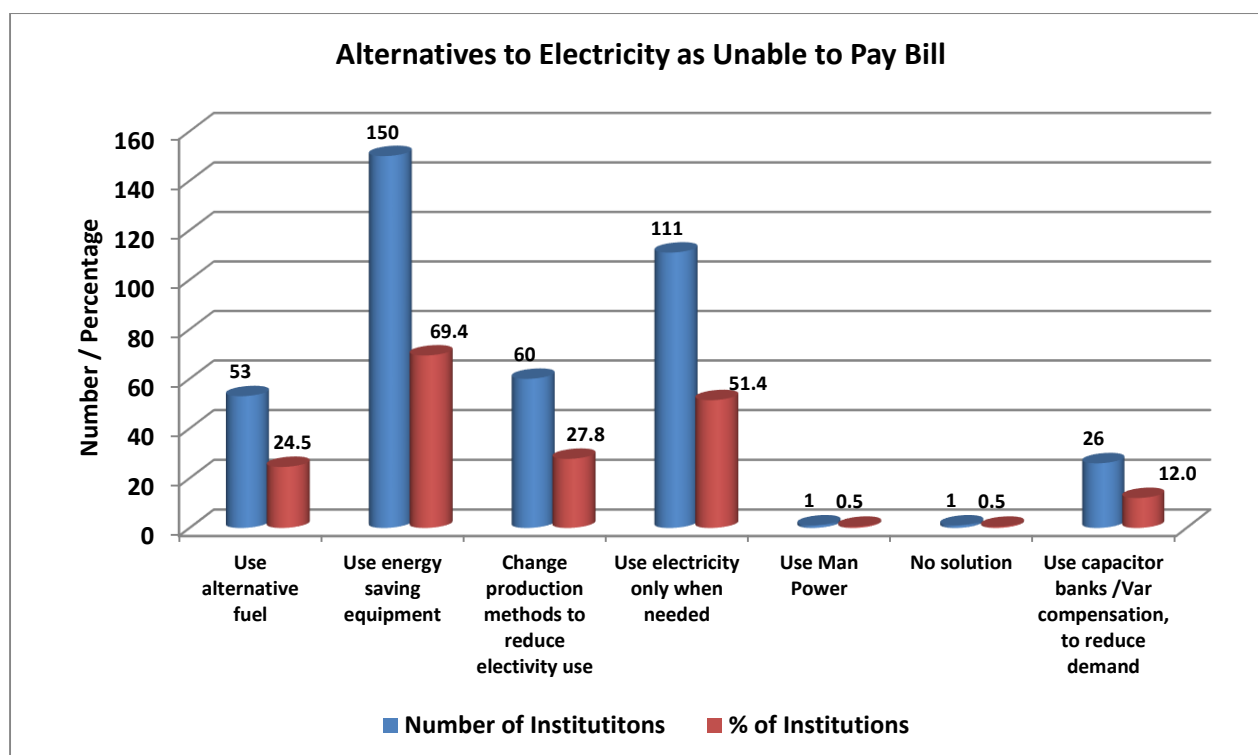


Figure 55: Alternatives to Electricity Adopted by Institutions Unable to Pay Bill (All Institutions)

Over half of the institutions interviewed reported that they were using less electricity as they cannot afford to pay if they were to fulfil their entire needs of electricity. Some of the alternatives that these institutions are using or electricity saving methods that they are adopting include use of energy saving equipment (69%), use of electricity only when needed (51%), changing production methods (28%), use of alternate fuel (25%) and use of capacitor banks/ variable compensation etc. to reduce demand (12%). Thus a large proportion of institutions which are unable to pay the bill are adopting alternatives to electricity in order to meet the bill.

4.2.6 Future Plans for Use of Electricity and Meeting any Increased Costs of Electricity

Table 66: Future Plans of Institutions on Electricity Use (All Institutions)

Future Plans of Institutions on Electricity Use	Number	%
Keep consumption at current levels	327	80.0
Increase electricity use	21	5.1
Reduce electricity use	61	14.9
If you think that you may increase electricity usage in the future, how will you meet the extra costs? (All Institutions saying yes or no to keeping electricity at current level)		
	Number	%
Hope to increase my income through improved business	216	52.8
Request electricity board to reduce tariffs	190	46.5
Install solar power to reduce costs	151	36.9
Manage equipment usage	171	41.8
Other	1	0.2
Total	409	100.0

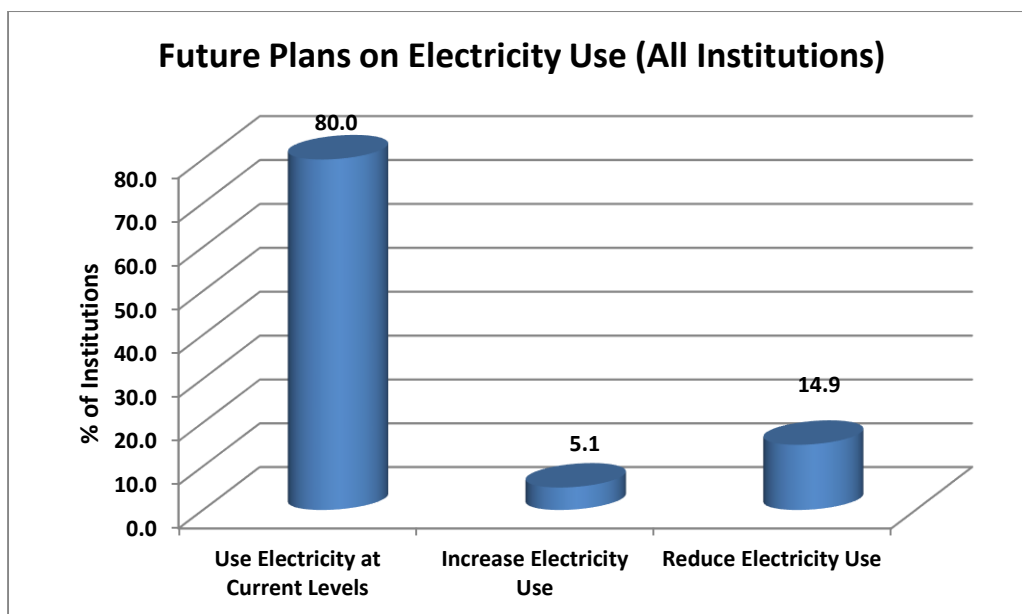


Figure 56: Future Plans on Electricity Use (All Institutions)

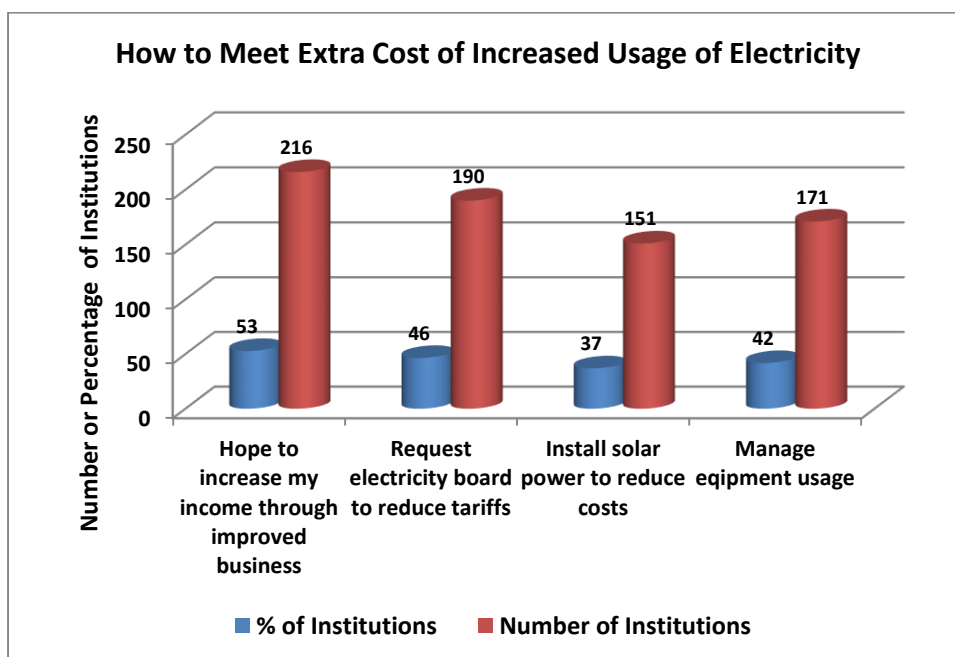


Figure 57: How to Meet Cost of Increased Usage of Electricity (All Institutions)

About 80% (327 institutions) of the users plan to keep their electricity consumption at current level, 5.1% (21 institutions) plan to increase their electricity use while 14.9% (61 institutions) plan to reduce their electricity use further. When all the institutions (409) were asked what action they would take if they want to increase their electricity use in the future, the following responses were obtained. About 53% hoped to increase their incomes, about 48% would request CEB to reduce tariff, about 40% would manage the equipment usage and 37% would install solar power to reduce electricity use. Thus

about one third to half of the institutions which are hoping to either increase or reduce electricity use have some plan to reduce electricity consumption.

Table 67: Coping with Increases in Electricity tariff (All Institutions)

How do you propose to cope with any increases in electricity tariff in the future	Number	%
Cut down on electricity consumption by reducing the number of hours usage	176	43.0
Switch off certain number equipment and appliances	172	42.1
Install solar power	148	36.2
Use energy saving appliances	221	54.0
Switch to time of use or some other type of tariff to reduce costs		
Request workers to use electricity very sparingly		
Cannot reduce electricity consumption, due to the nature of the business.		
No solution other than paying the bill.		
Total	409	100

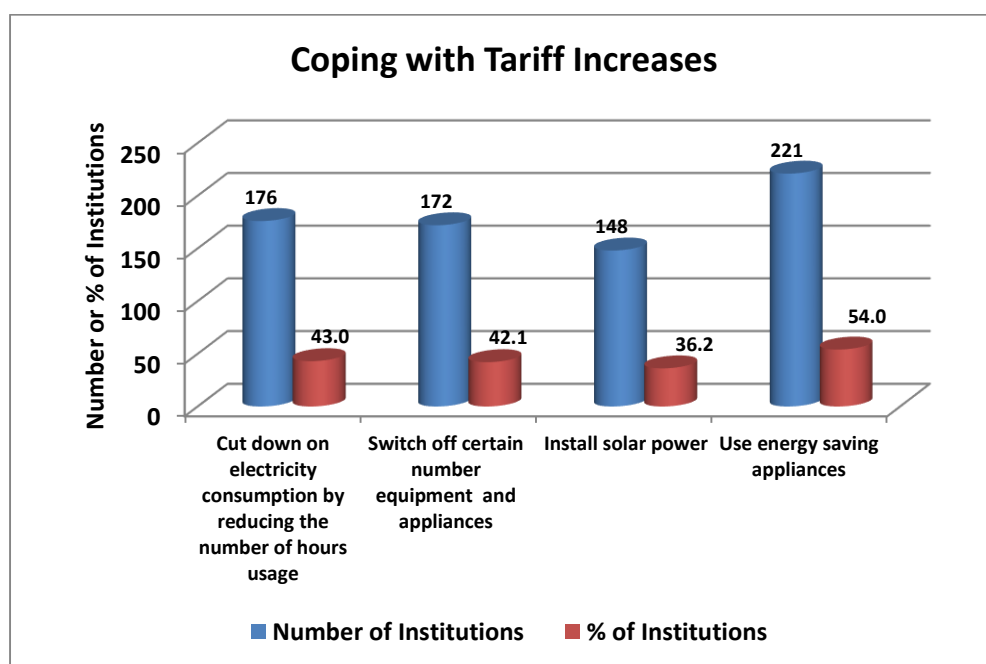


Figure 58: Responding to Any Tariff Increases (All Institutions)

When all institutions were asked how they would respond to increases in electricity tariff about a third to half of the institutions had indicated that they had some strategies that they would adopt to counter this. Over 50% would adopt energy saving devices, 43% would cut down the hours of usage, 42% would switch off some equipment and 36% would install solar power. Thus a good proportion of the institutions will adopt one or more of these strategies in order to counter the increase in electricity tariff.

4.2.7 Equality and Fairness of Current Tariffs, Quality of Services and Constraints Faced in Obtaining Services

Table 68: Equitability and Fairness of Current Electricity Tariffs

Do you think that the current tariff rates for electricity are fair and equitable?	Industry		Gen Purpose		Hotels		Religious Places		Total	
	No	%	No	%	No	%	No	%	No	%
Yes	51	75	161	58.3	20	58.8	23	74.2	255	62.3
No	17	25	115	41.7	14	41.2	8	25.8	154	37.7
Total	68	100	276	100	34	100	31	100	409	100
If not ,what suggestions you would give the CEB										
Give the institutions a further subsidy	15	88.2	67	58.3	7	50.0	6	75.0	95	61.7
Give the small and medium income earning institutions a subsidy	13	76.5	81	70.4	10	71.4	4	50.0	108	70.1
Increase the rates for the higher income earning institutions	11	64.7	48	41.7	5	35.7	1	12.5	65	42.2
Reduce the inefficiencies and losses incurred by the CEB	12	70.6	57	49.6	8	57.1	3	37.5	80	51.9
Build more low cost power plants	12	70.6	44	38.3	10	71.4	3	37.5	69	44.8
Different tariff to suit different income level	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	17	100	115	100	14	100	8	100	154	100.0

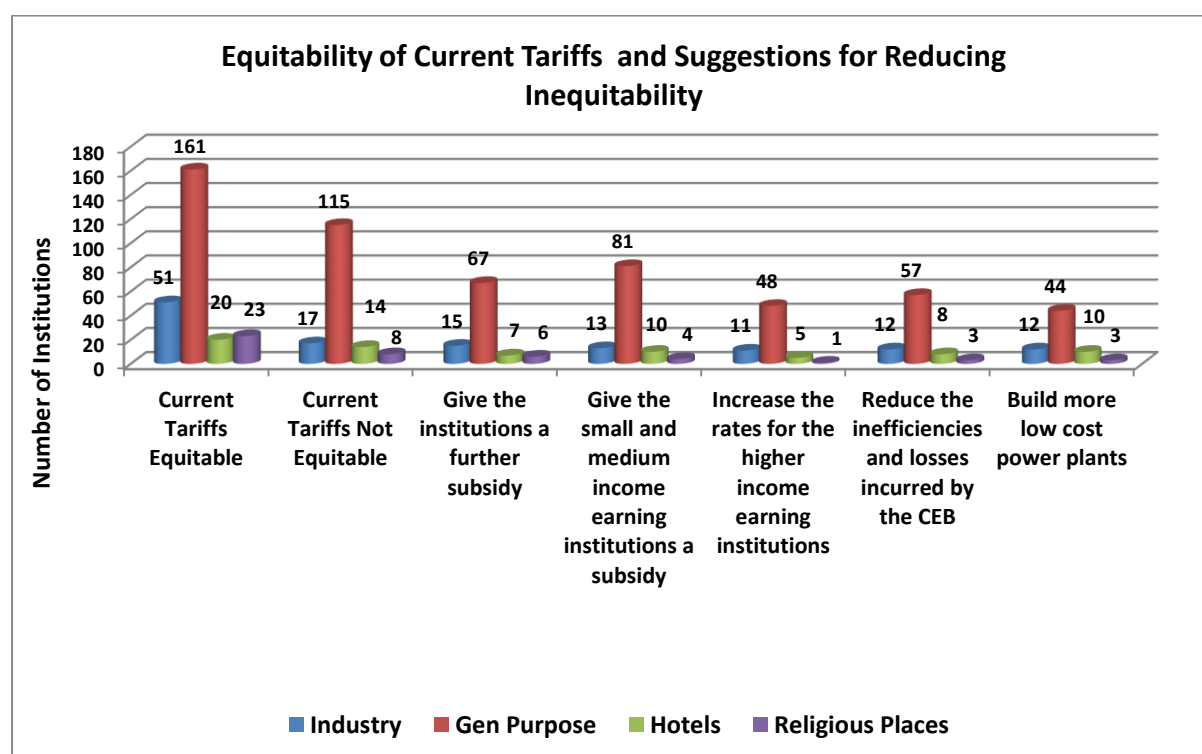


Figure 59: Equitability of Tariffs and Suggestions for Reducing Inequality (All Institutions)

About 75% of the industrial institutions and 75% of religious places felt that tariff rates were fair and equitable, while 58% of the hotels and general purpose institutions felt the same. When all institutions are taken into account about nearly two thirds or 62% or the majority felt that the tariffs were fair and

equitable. When those institutions which felt that the tariffs were inequitable were requested to give suggestions as to how the tariffs could be more equitable, the following responses were received. 1. Give the institutions a further subsidy (62% reporting) 2. Give small and medium income earning institutions a subsidy (70%) 3. Reduce the inefficiencies and losses of the CEB (52%) 4. Build more low cost power plants (45%) and 5. Increase the tariffs for the higher income earning institutions (42%). In the case of industries 65% to 90% approved of these suggestions. In the case of general purpose institutions, 38%-70% approved these suggestions. In the case of hotels 36%-71% approved these suggestions and in the case of religious institutions, 13% to 75% of the institutions approved the suggestions.

Table 69: Constraints Faced in Obtaining Electricity Services (All Institutions)

What are the constraints you face in obtaining electricity connections, augmentation and other electricity related services?	Number	%
Cost of connection is high	285	69.7
Cost of increasing capacity is high	139	34.0
Time taken to obtain connection is too long	118	28.9
Electricity breakdown and repair services takes too long	103	25.2
Electricity meters are not working properly	0	0.0
High charge for meter testing	74	18.1
Charges for Miscellaneous services (meter shifting, disconnecting/reconnection) are high	56	13.7
Miscellaneous services are not offered in a timely manner	29	7.1
Obtaining a net metering/Accounting/+ connection is difficult	14	3.4
No Idea	0	0.0
Total	409	100

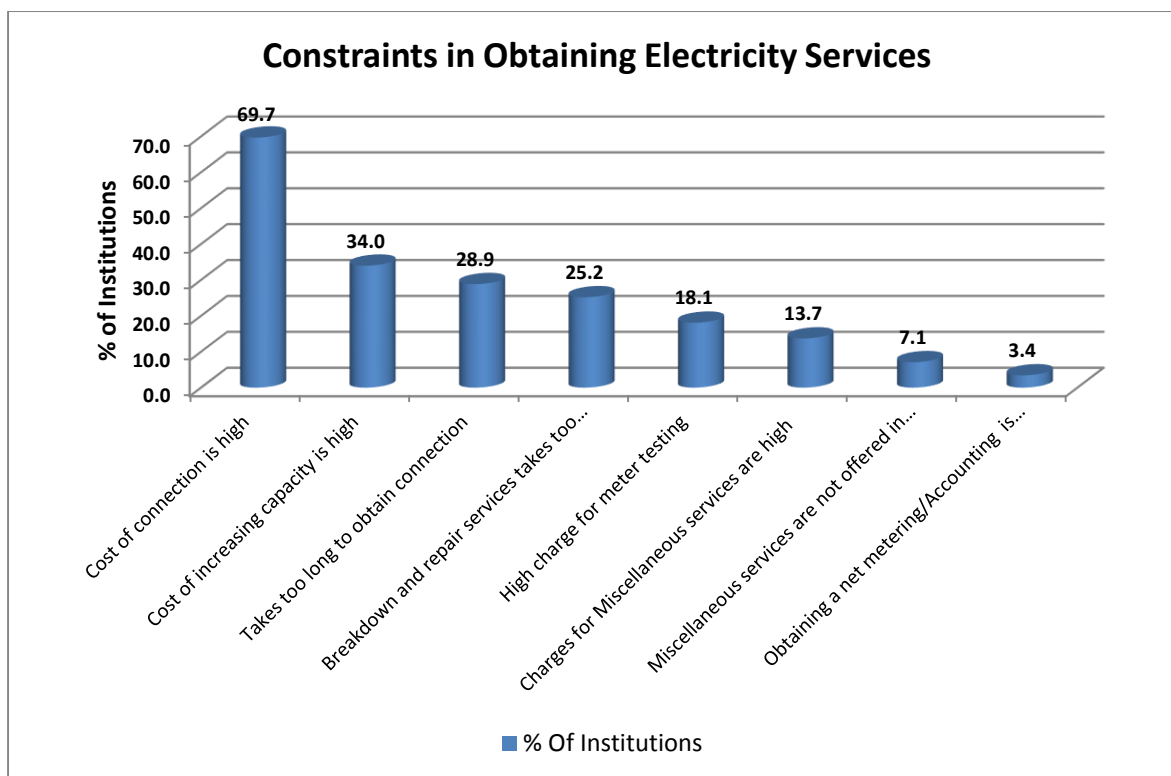


Figure 60: Constraints in Obtaining Electricity Services

The major constraint indicated by about 70% of the institutions was that the cost connection as high. Other constraints were; Cost of increasing capacity high (34%) ; Time taken to obtain connection too long (29%) ; Electricity breakdown repair takes too long (25%); High charge for meter testing (18%); charges for miscellaneous services high (14%) and Obtaining net metering difficult (3%).

Table 70: Quality of Services Provided by CEB (All Institutions)

How good is the quality of services provided by the CEB?	No.	%
Very good	52	12.7
Good	254	62.1
Satisfactory	83	20.3
Poor	11	2.7
Very poor	2	0.5
No comments	7	1.7
Total	409	100

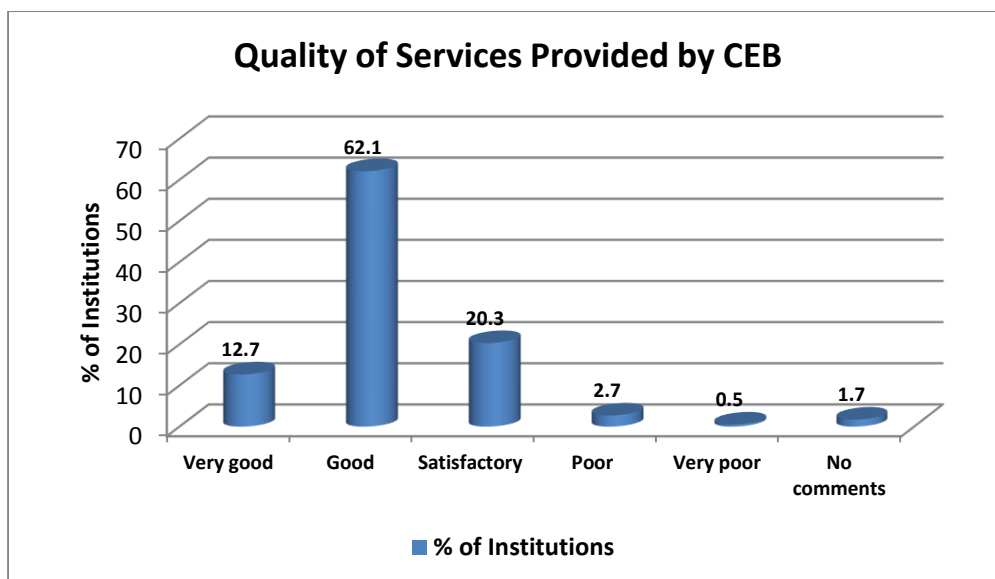


Figure 61: Quality of Services Provided by CEB

The quality of services was reported to be very good by 13% of the institutions, good by 62% of the institutions and satisfactory by 20 % of the institutions. Thus about 96% of the institutions are satisfied with the services and only about 3% reported it to be poor or very poor. Thus despite the various issues discussed above, the consumers feel that overall, the services of the CEB were good or satisfactory.

Table 71: Impact of Poor Quality of Services Provided by CEB (All Institutions)

If the services are poor or very poor what kind of impact does the poor quality of services have on your institution?	No.	%
Regular breakdown of services	8	61.5
Voltage fluctuations causing damage to our electrical equipment resulting in losses	9	69.2
Difficulties in operating equipment and machinery of our small enterprises	9	69.2
Long delays in restoring electricity after breakdowns	11	84.6
Frequency of breakdowns/interruptions is high	6	46.2
Cost of interruptions (food items damaged as a result of long outage)	4	30.8
Total	13	100.0

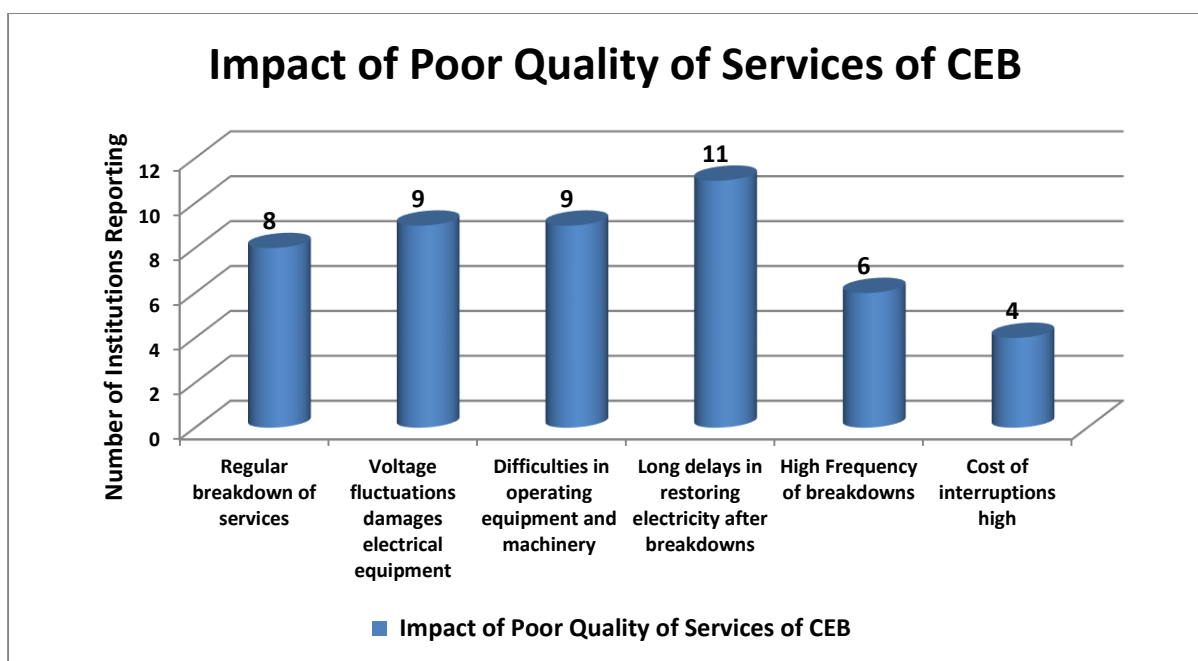


Figure 62: Impact of Poor Quality of Services Provided by CEB (All Institutions)

Only 13 institutions (3% of total) reported poor or very poor services. Of those reporting long delays in restoration of power after breakdown was reported 85%, followed by voltage fluctuations and difficulties in operating small institutions reported by about 70% of the institutions and experience of regular breakdown of services (62%), high frequency of breakdowns (46%) and cost of interruptions (food spoilage, etc.) high reported by 31% of the institutions. However, if one looks at the overall quality of services a large majority feel that the services are good and the impacts are small.

4.2.8 Appliances Causing Shocks and Policies and Measures for Safety and to Ensure Sub-Standards Products Do Not Reach Customers

Table 72: Appliances Causing Shocks, Treatment, Cause and Action Taken to Avoid Future Accidents (All Institutions)

Appliances that have caused Shocks or Injuries and Deaths	Number	%
Equipment / Machinery Giving Shock		
Not mentioned the name	6	75.0
Power adapter	1	12.5
TV routers	1	12.5
Total	8	100
Treatment Given / Impact		
No Treatment	7	87.5
Treatment at Local Clinic	1	12.5
Hospitalized	0	0
Died	0	0
Part/s Causing the Shock / Problem		
Power cable	2	25
Handle	1	12.5
Other	5	62.5

Action Taken to Prevent Future Accidents		
Discarded Item	2	25.0
Replaced with new Item	6	75.0
Repaired Item	0	0.0
Year of Purchase		
Before 2010	2	25.0
2010-2015	1	12.5
After 2015	5	62.5

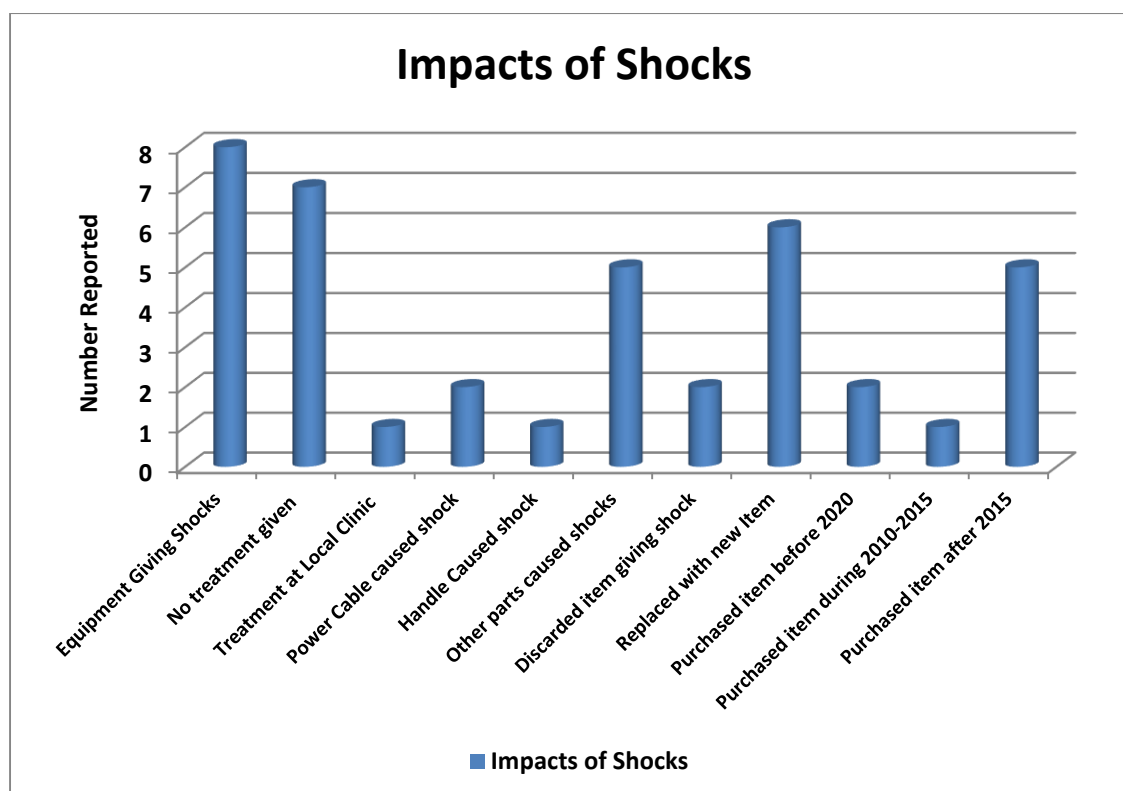


Figure 63: Impacts of Shocks (All Institutions)

It appears that the institutions had not suffered much due to shocks. Only 8 instances of shocks with no deaths were reported. No treatment was given to 7 persons, while one person received treatment at a local clinic. Most of the items that had given shocks were either discarded or replaced. Five out of the 8 items giving shocks were purchased after 2015.

Table 73: Safety in Use of Electricity (All Institutions)

Safety in Use of Electricity	Number	%
Have Installed Earth for Premises	333	81.4
Have Installed Trip Switches	388	94.9
How often do you test your Trip Switch?		
Never	32	7.8

Rarely	0	0
Once a month	166	40.6
Once in six months	118	28.9
Once a year	60	14.7
Don't know how to test it	12	2.9
Not stated	21	5.1
Total	409	100

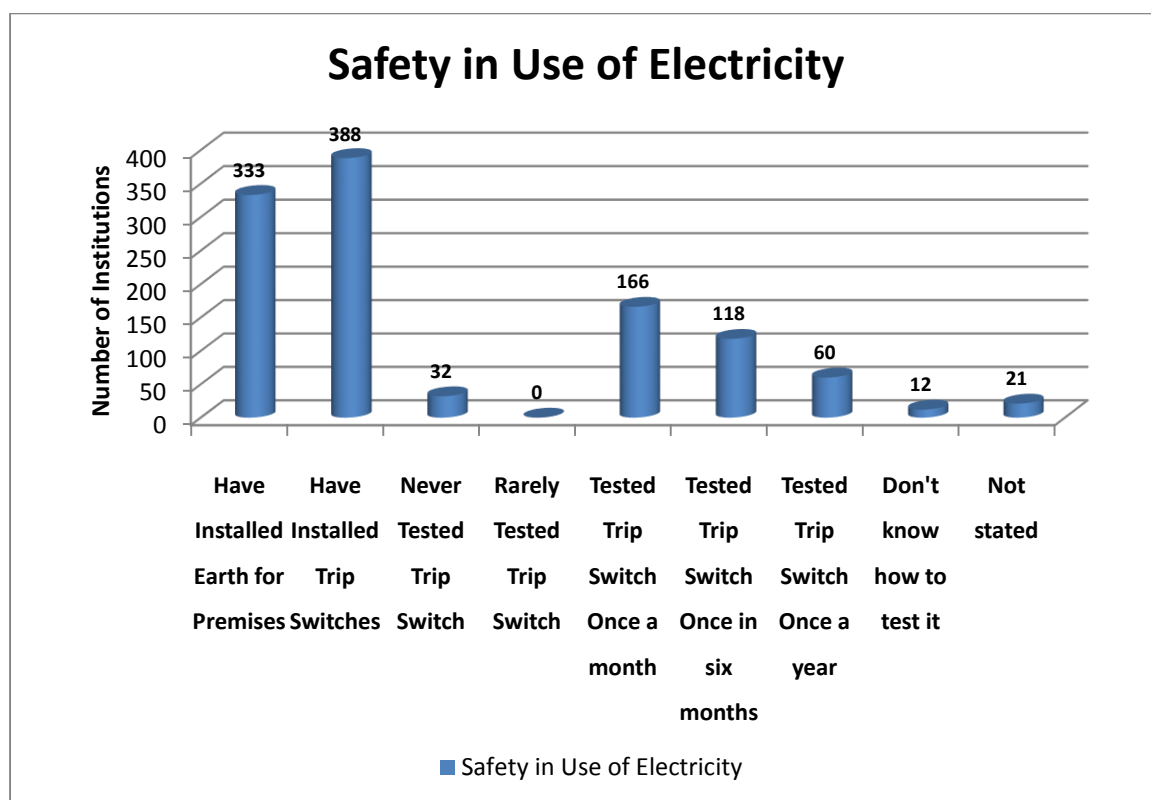


Figure 64: Safety in Use of Electricity (All Institutions)

Over 80% of the institutions have installed earth for the premises and 95% installed trip switches. About 40% of the institutions tested the trip switches once a month, 29% tested it once in six months, 15% tested it once a year, 8% have never tested it, while 3% do not know how to test it. Thus about 70% of the institutions test their trip switches either monthly or once in six months. One can assume that the majority of the institutions are following safety precautions properly in the use of electricity. Only about 10% never test or do not how to test it.

Table 74: Awareness on the New Policy on the Type of Electrical Outlets That are Allowed (All Institutions)

Awareness		
Awareness on new policy that electrical outlets should be square pin type	Number	%
Aware	375	91.7
Not Aware	34	8.3
Type of electrical outlet in premises		

Round	69	16.9
Square	99	24.2
Both	201	49.1
Adapter	40	9.8
Total	409	100

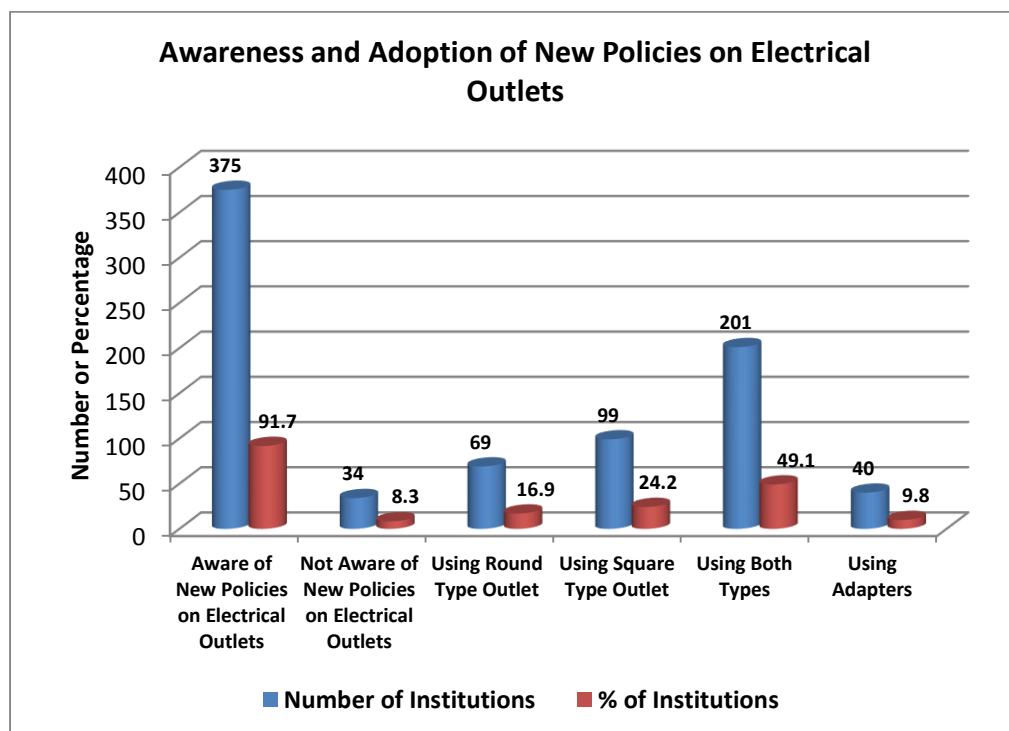


Figure 65: Awareness and Adoption of New Policies on Electrical Outlets (All Institutions)

About 92% of the institutions are aware of the policy of using only square pin outlets. Thus awareness on this policy is very high among the institutions. Regarding the type of outlets currently installed in the premises, 50% have both square as well as round pin outlets, 24% have only square pin outlets, while 17% are still using round pin outlets. About 10% are using adapters to convert round to square pin outlets. Full conversion to square pin outlets may take place gradually over a period of time. Currently, about 75% have round, both square and round or adapters which means that a majority of the institutions need to fully convert to the square type electrical outlet. This may be facilitated as round pin outlets cannot be manufactured or imported anymore.

Table 75: Measures to Ensure Sub-Standard Products Do Not Reach Customer (All Institutions)

Measures needed to ensure that sub- standard electrical products do not reach the customer or markets	Number	%
There should be regulatory interventions to remove sub- standard electrical products from the market	279	68.2
Should educate customers to choose quality products through awareness programmes	243	59.4

Should make warranty mandatory for all electrical products	188	46.0
Impose quality standards on all electrical products and mandatory certification by a state quality control body	157	38.4
Seller should be made liable for all accidents caused by electrical equipment sold, resulting from faulty equipment	76	18.6
Create awareness for customers	0	0

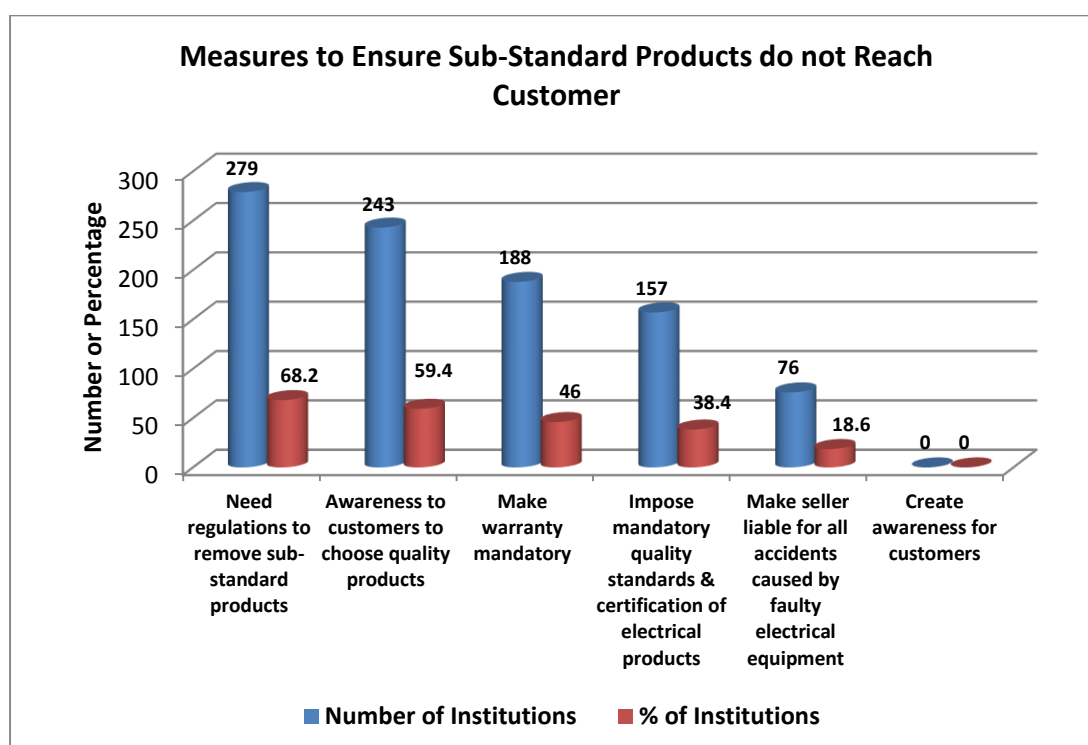


Figure 66: Measures to Ensure Sub-Standard Electrical Products do not Reach Customer

Regarding measures needed to ensure that sub-standard products do not reach the markets, about 68% of the institutions indicated that there should be regulatory interventions to remove sub-standard products from the market. About 60% of the institutions suggested that awareness programmes should be conducted to educate the customers. About 46% suggested that warranty should be made mandatory for electrical goods. About 38% suggested that quality standards should be imposed on all electrical products. Lastly 19% of the institutions suggested that the seller should be made liable for all accidents caused by faulty electrical equipment sold by them.

4.2.9 Incidence and Impacts of Lightning

Table 76: Impacts of Lightning (All Institutions)

Lightning Impacts	Number	%
Installed Lightning Arrestor	57	13.9
Struck by Lightning	3	0.7
Damage Caused by Lightning		
Very minor or no damage	1	33.3
Some damage to phones, radio, TV, refrigerator, cooker, micro wave and other household equipment	2	66.7
Damage to premises structure or damage due to fire	0	0
Considerable damage to premises, equipment and telephones, TV and other equipment	0	0
Death	0	0
Injuries	0	0

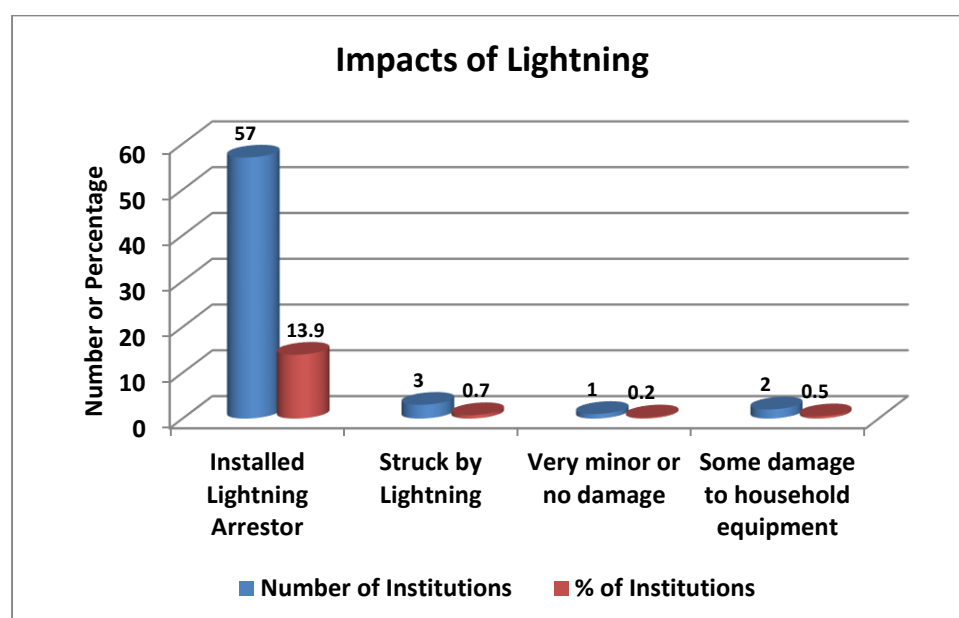


Figure 67: Impacts of Lightning

Only 14% of the institutions have installed lightning arrestors. However, only 3 institutions (1%) reported being struck by lightning. One institution reported only minor damage. The other two reported damage to equipment (phones, TV, refrigerators and other household appliances). There were no other major damages reported.

5 Key Findings

5.1 Key Findings of Household Survey

- Over 80% of the respondents were male of which 88% were household heads, while 6% of the respondents were the spouses and 6% other members of the households. Thus a high majority of those who answered the questionnaires were male household heads. Thus there is still a high level of male dominance in the society.
- The highest proportion of female household heads (22%) was in the lowest consumer category of less than 60 units, suggesting that the poorer households had more female headed households than the other groups.
- The female household heads appear to be less educated than their male counterparts with 26% with either no education or having only primary education. Over 50% of both male and female HH heads had completed up to or passed GCE (OL) classes.
- About 75% of the HH heads were married and over 20% were either widows or widowers, while about 4% were single.
- The major occupation of all groups was private sector employment, ranging from 21% for the below 60 unit consumer category to 32% for the 61-120 unit consumer category. This was followed by government or semi-government employees and crop farmers.
- A higher proportion of employers were observed in the highest consuming category (>180 units).
- Less than 5% reported secondary occupation, the major secondary occupation was crop farming (30%), followed by other and employer.
- Income from the primary occupation of household heads ranged from Rs 38,000 to Rs 65,000 per month.
- The lowest income was observed for the less than 60 unit consumption group, gradually increasing for the higher consumption groups with the highest being observed for the highest consumption group.
- Higher income earners use more units of electricity per month while the lower income groups consume less electricity, suggesting that as income increases HH tend to use more electrical equipment.
- Wages provided a third and up to half of the total income earned. Paddy farming provided 10%-25% of the income, followed by remittances.
- The major expenditure item was food. The lower electricity consumption group spent the highest proportion (45%) with a gradual reduction in the proportion spent on food, as electricity consumption increased.
- A low proportion of the expenditure was spent on electricity. There was a gradual increase in the proportion spent on electricity as the amount of electricity used increased.
- The proportion spent on electricity increased from 1.6% for the lowest consuming group (<60 units/month) to 3.5% for the 61-120 units consumer, to 5.5% for the 121-180 unit consumer and 8.7% for the highest consuming group (>180 units/month). In terms of the bill paid for electricity, the highest consuming group spent twenty times more than lowest consuming group for electricity.
- The proportion spent on communication (Telephone /TV/Cable/Internet) increased from the lowest to highest consumption group from 3.8%-4.9% among the 4 consumer groups. The proportion spent on transport increased from the lowest to the highest consumer group from

5.2%, to 6.9%. The proportion spent on water also increased from 0.8% for the lowest consuming group to 1.4-1.5 for higher income groups. The proportion spent on gas declined from the lowest to the highest consumption group from 2.4% to 2.1%.

- A majority of over 80% reported having single phased wiring, with a similar proportion in each consumption group.
- As expected the average use of electricity increased over the consumption categories, from 47 units per month for the less than 60 unit consumers to 97 units for 61-120 unit consumers, to 149 units for 121-180 unit consumers and to 233 units for > 180 unit consumers.
- Likewise the average monthly bill increased from Rs 396 for the lowest consuming group to Rs 6130 for the highest consuming group.
- Nearly 80% of the all households indicated that they could afford to pay the electricity bill. The affordability declined as the consumption category increased starting with 90% affordability for the lowest consuming group (<60 units) to only 53% affordability for the highest consuming group (> 180 Units). This may be due to the subsidy given to the lower consuming groups.
- The main reasons attributed to non-affordability were low incomes, foregoing of other essentials to pay electricity bill and to a smaller extent income fluctuation.
- Among those reporting non-affordability, food, health, water, education and to an extent transport and clothing are the most important needs of the lowest consuming group as well the other higher consumer groups.
- Within this consumer group (<60 units), the major types of electrical equipment used were, radio, TV, mobile and other phones, LED and other types of bulbs and irons. In the Group 60-120 units, in addition to above, refrigerators, fans and rice cookers were also used. In the 120-180 unit consumer group, in addition to above, CFL bulbs, mixers and blenders clothes washers, fans, LED bulbs and electric kettles were also used. In the highest consuming group (>180 units), in addition to the above items, laptops, internet facilities, microwave cooker, and shower heaters were also used.
- The electrical equipment used changed from bulbs, irons etc. in the lowest consumption category to refrigerators, fans, mixers and grinders, washing machines, microwaves, laptops and internet in the higher consumption categories.
- Nearly half of the households reported that electricity consumption was less than their basic needs and this proportion was more or less the same for all consumer groups (40%- 46%).
- Basic needs more than quadrupled between the lowest and highest consuming groups from 49 units per month to 230 units per month.
- Minimum amount of bill for basic needs increased from Rs 382 per month for the lowest consumer group to Rs 4300 for the highest consumer group, which is over a tenfold increase between these two groups.
- The two highest consuming groups pay more than double of that the lowest consuming groups. Thus there appears to be inequality in the pricing regime between the low consuming and high consuming groups.
- The willingness to pay bill declines with the increase in the consumption category. Overall about 20% of the households are not willing to pay the current bill. Consumers at a higher level of consumption are not willing to pay bill compared to the consumers at the lower level of consumption.

- About two thirds of the HH are using less electricity than their actual requirements as they cannot afford it. Middle and higher consuming groups, reported a greater proportion of unaffordability than lower consuming categories. When it comes to important labour saving or comfort providing equipment very few practice savings from such equipment and this applies to all groups of consumers.
- A majority (82%) of the households plan to keep their consumption of electricity at the current level. About 13% plan to increase their use of electricity, 4% plan to reduce electricity use in the future.
- Of those wanting to increase electricity use (only 50% responded), about one third want to increase their incomes to meet the additional cost, about 30% want to request a reduction in tariff from CEB, and 25% want to install solar power.
- Other actions proposed by those wanting to increase electricity use were, change to LED bulbs, use table fans instead of ceiling fans, use energy saving appliances, switch off electrical outlets when not in use.
- Coping measures for any tariff increases included the following, reduce number of hours of usage, switch off certain equipment, install solar power, use energy saving appliances and change to time of tariffs.
- A majority of over 70% of the HH are of the opinion that the current electricity tariffs are equitable. The lower use categories of consumers and those paying lower bill feel that the tariffs are equitable. A greater proportion HH in the higher consuming groups felt that the Tariffs of the CEB are not equitable.
- A majority of HH suggest that the CEB should give medium users a subsidy and increase the rates for higher users. A smaller proportion of HH suggested the following; reduce inefficiencies of the CEB; build low cost power plants or find optional energy sources.
- High cost of connection was the major complaint of all HH (60%). The other complaints reported by about a third of the HH were, long time taken to obtain a connection and for repair of breakdowns. Meters not working properly and meter readers coming late were reported by about 10% of the HH. More of these complaints were made by high end consumers.
- Overall, the quality of CEB services was good with 78% of the HH reporting it to be very good or good and 19% reporting it to be satisfactory.
- Less than 3% reported that the quality was poor or very poor. The major complaints by this group were, regular breakdown of services, voltage fluctuations causing dim lights, damage to equipment, and long delays in restoring power.
- A self-assessment by consumers of the quality of electrical products used by them shows that 77% of the equipment is working well and 30% working satisfactorily. About 4% of the electrical items used were reported to be not working well. Main items not working well were ovens, dish washers, clothes dryers, hair dryers, shavers and air conditioners.
- A total of 62 HH (3.7% of total no. of HH) reported receiving shocks. A majority of those receiving shocks (39%), did not take any treatment, 37% received outdoor treatment, 8% were hospitalized and 16% died (10 persons).
- Electric shocks received were mostly from handling of bulbs, followed by irons, cookers, refrigerators, plugs and bases, electric kettles, blenders and ceiling fans. The most reported

part causing the shocks was the handle (34%), followed by knobs (27%), metal body (23%) and power cable (16%).

- About 80% of the HH reported having earthed their premises and 88% have installed trip switches. The Proportion of households having earths and trip switches increased with the increase in the units consumed.
- About half of the HH tested their trip switches at least once a month or once in six months in all categories of consumption and about 10% tested it once a year, suggesting that a majority of the HH do undertake such safety measures. About 15% never tested the switches and 14% do not know how to test it.
- About 75% of the HH were aware of the new policies on promoting square type of plug outlets. A majority of the HH (over 40%) still use round type of outlets, and only 14% use square outlets, 36% use both types and 8% use adapters.
- The majority (69%) of the HH do not have lightning arrestors. Only about 22% of the HH have installed lightning arrestors and 10% do not know whether such arrestors have been installed or not.
- A total of 53 members of HH reported being struck by lightning. About 30% reported minor or no damages, 30% reported some damage to phones, radios, TVs, refrigerators, cookers and microwaves. Damages to structures were reported by 6% and damages to premises and equipment reported by 25%. Deaths were reported by 3 households.
- Regarding measures needed to ensure quality of electrical fittings, the majority (60%) said that sub-standard products should be removed from the market. Half (52%) of the HH suggested that customers should be given awareness about quality, about 42% indicated that warranty should be made mandatory and over a third suggested that quality standards should be imposed for all electrical products and 17% suggested that the seller of electrical goods should be made liable for all accidents.

5.2 Key Findings of Institutions Survey

- Overall, there was an average of 26 non-resident and 19 resident employees and 980 visitors per institution. The highest number of visitors was in the hotels sector (373), followed by about 200 visitors in the other three sectors. In hotels and religious places time spent by visitors may be of longer duration. In the case of industries and general purpose sectors time spent by visitors may be of shorter duration and consumption of electricity may be less.
- The major expenditure for all institutions was for material inputs (50%-Religious Places, 67%-General Purpose, 70%-Industries, and 76%-Hotels). Wages comprised the next major expenditure (9%-Hotels, 15%- Industries, 18%-General Purpose and 33%-Religious Places) and wages (15%). Overall expenditure on electricity was 3.6% (2.9% - Industries, 3.3% -Religious, 3.4%- General Purpose, and 6.1%-Hotels). Water and Telecom bills were about 2% or less for all institutions.
- The highest electricity consumption was reported by the hotel sector (Ave. 1200 units & Rs 25,000/month), followed by industry sector (Ave. 700 units & Rs 12,200/month), general purpose sector (Ave. 320 units & Rs. 10,400) and religious places (Ave. 290 units & Rs.2600 /

month). Since the electricity tariff rates are subsidized, the average monthly bill per institution was low at Rs. 2600.

- A majority of the institutions (76%) stated that electricity was affordable. The highest affordability was reported by religious places (87%), followed by general purpose (76%), industry (75%) and least affordability by hotels (68%).
- The main reasons for non-affordability were; low income (24%-50%); high tariffs (20%-50%); income fluctuations (15%-30%) and having to forego essentials (18%-24%).
- The most reported equipment used were mobile phones (83%), fans (72%), machinery (44%), equipment (38%), computers and laptops (43%), TV (39%), refrigerator (39%), internet (38%), CCTV (36%), radio, CD players and other entertainment equipment (27%) and air conditioners (19%).
- Overall, 35% (144 institutions out of 409) reported consuming less than their basic needs of electricity. (hotels -50%, industry – 44%, religious places -32% and general purpose-32%)
- The highest average requirement for basic needs was for hotels (986 units & Rs 16,753 per month), followed by industry (731 units & Rs 13,400), general purpose (288 units & Rs 5900) and religious places (373 units & Rs.2400 per month). As expected the basic needs of the hotel sector was the highest followed by the industry sector.
- A majority (75%) of the institutions are willing to pay the current electricity bill (84% of the religious institutions, 78% of the industries, 76% of the general purpose institutions and 74% of the hotels).
- Over half of the institutions reported that they were using less electricity than actually needed. Alternatives adopted by them include; energy saving equipment (69%), use of electricity only when needed (51%), changing production methods (28%), use of alternate fuel (25%) and use of capacitor banks/ variable compensation (12%).
- Regarding future plans, 80% will continue with the current level of consumption, 5% plan to increase use and 15% plan to reduce use. The following would be adopted by all institutions in case they want to increase use of electricity; increase incomes (53%), request CEB to reduce tariffs (48%), manage equipment usage (40%), install solar power (37%).
- In case the CEB imposes higher tariffs, the following would be adopted by the institutions; adopt energy saving devices (50%), cut down usage (43%), switch off some equipment (42%) and install solar power (36%).
- About two thirds of the institutions felt that the tariffs were fair and equitable (75% of the industries and religious places and 58% of the hotels and general purpose institutions).
- Suggestions to improve fairness and equality of tariffs suggested by those felt that tariffs were not equitable include; Give small and medium institutions a subsidy (70%); Give all institutions a further subsidy (62%); Reduce the inefficiencies and losses of the CEB (52%); Build more low cost power plants (45%) and Increase the tariffs for the higher income earning institutions (42%).
- The major constraints faced in obtaining services reported were; high cost of connection (70%); high cost of increasing capacity (34%); electricity breakdown repair takes too long (25%); high charge for meter testing (18%); high charges for miscellaneous services (14%); and difficulties in obtaining net metering services (3%).
- About 96% of the institutions are satisfied with the services (very good 13%, good 62% and satisfactory 20 %) and only about 3% reported it to be poor or very poor.

- Impacts of poor or very services reported by 3% of the institutions include the following; long delays in restoring power (85%); regular breakdown of services (70%); high frequency of breakdowns (46%); high cost of interruptions to electricity (31%).
- It appears that the institutions had not suffered much due to shocks. Only 8 instances of shocks with no deaths were reported. No treatment was given to 7 persons, while one person received treatment at a local clinic.
- Most of the items that had given shocks were either discarded or replaced. Five out of the 8 items giving shocks were purchased after 2015.
- Over 80% of the institutions have installed earth for the premises and 95% installed trip switches. About 40% of the institutions tested the trip switches once a month, 29% tested it once in six months, 15% tested it once a year, 8% have never tested it, while 3% do not know how to test it.
- The awareness on the policy of using only square pin outlets was high (92%). Currently, 50% of the institutions have both square as well as round pin outlets, 24% have only square pin outlets, while 17% are still using round pin outlets. About 10% are using adapters to convert round to square pin outlets.
- The following suggestions were made regarding measures for ensuring that sub-standard products do not reach the markets. There should be regulatory interventions to remove sub-standard products from the market (68%); awareness programmes should be conducted to educate the customers (60%); warranty should be made mandatory for electrical goods (48%); quality standards should be imposed on all electrical products (38%) and the seller should be made liable for all accidents caused by faulty electrical equipment sold by them (19%).
- Only 14% of the institutions have installed lightning arrestors. However, only 3 institutions (1%) reported being struck by lightning. One institution reported only minor damage. The other two reported damage to equipment.

6 Conclusions and Recommendations

6.1 Conclusions (Household Survey)

The majority of the respondents were males, mostly the HH heads, while 20% of the respondents were female. The poorer low consuming households had more female headed households and were less educated than their counterparts. However, nearly half of both male and female HH heads had completed or passed GCE (O/L) classes. About 20% of the HH heads were widows or widowers.

Over 95% of the HH heads had only a primary occupation, the major occupation being private sector employment, followed by government or semi-government employment. The majority of the employers were from the higher consuming groups. The major secondary occupation was crop farming. Lower incomes were reported from lower consuming groups with average incomes ranging between Rs. 30,000 to Rs. 70,000. Wages provided more than half the income of HH.

The highest expenditure was on food, with lower consumption groups spending the highest proportion (45%). The proportion spent on electricity was low for the lower consuming groups and high for higher consuming groups. The proportion spent on electricity increased from 1.6% for the lowest consuming group to 8.7% for the highest consuming group. In terms of the bill paid for electricity, the highest consuming group spent twenty times more than lowest consuming group for electricity.

In comparison, expenditure on communication ranged from 3.8%-4.9%, water from 0.8% to 1.5%, transport from 5.2% to 6.9% and gas from 2.1% to 2.4% with the higher consuming groups spending a higher proportion. The variation between the groups was not very large for these expenditures except for electricity where the variation was very large between the different consumption groups.

Almost 80% of the HH indicated that they could afford to pay the electricity bill. The highest affordability was reported by the lowest consuming group (90%) and it declined gradually with increased consumption of electricity to (53%) which was reported by the highest consuming group. This suggests that the pricing of electricity is biased against the high consuming groups. It appears that the lower consuming groups are subsidised by the higher consuming groups. Income may not be high enough among the high consuming groups to afford the bill and that they may be foregoing other essentials in order to pay the bill.

Nearly half of the households reported that electricity consumption was less than their basic needs and this proportion was more or less the same for all consumer groups (40%- 46%). Basic needs more than quadrupled between the lowest and highest consuming groups starting from 49 units per month in the < 60 unit category to 92 units per month (60-120 unit category), to 140 units per month (120-180 unit category) to 231 units per month (>180 units). Thus a considerable proportion of the HH in all groups are consuming less than their basic needs as they cannot afford it.

Only 20% of the HH are not willing to pay the current bill. A greater proportion of consumers at a higher level of consumption are not willing to pay bill compared to the consumers at the lower level

of consumption. About two thirds of the HH are using less electricity than their actual requirements as they cannot afford it and about 80% plan to keep consumption for the future at the current level. About 13% want to increase consumption and 4% plan to reduce it. Thus most consumers are willing to pay the bill as they are consuming less than what they actually need and they can then afford to pay the bill. Thus if tariffs are reduced they would increase consumption to fulfil their needs. According to the survey, those who want to increase electricity use will also take measures such as installing solar power, use energy saving devices, change to LED bulbs, etc. Similar actions will be taken by consumers if there is a tariff increase.

A majority of HH (70%) feel that the tariffs are equitable, particularly the low consumption groups. One of the opinions of the HH is that the CEB should give medium users a subsidy and increase the rates for high level users in order to make tariffs more equitable. Additionally, they should also reduce their inefficiencies and build low cost power plants or find optional energy sources to reduce costs of electricity.

High cost of connection was the major complaint of all HH (60%). The other complaints reported by less than a third of the HH and mostly high end consumers were, long time taken to obtain a connection and for repair of breakdowns, meters not working properly and meter readers coming late.

Overall, the quality of CEB services was good with 78% of the HH reporting it to be very good or good and 19% reporting it to be satisfactory. Less than 3% reported that the quality was poor or very poor. The major complaints by this group were, regular breakdown of services, voltage fluctuations causing dim lights, damage to equipment, and long delays in restoring power.

About 77% of the equipment owned by HH is working well, 19% working satisfactorily and 4% not working well. Main items not working well were ovens, dish washers, clothes dryers, hair dryers, shavers and air conditioners.

The numbers getting shocks was small with only 3.7% of total number of HH reporting (62). Nearly 40% of those receiving shocks did not take any treatment, about a third received outdoor treatment, 8% were hospitalized and 16% died (10 persons). The incidence and impact of shocks appear to be not alarming. Electric shocks received were mostly from handling of bulbs, followed by irons, cookers, refrigerators, plugs and bases, electric kettles, blenders and ceiling fans. The most reported part causing the shocks was the handle, followed by knobs, metal body and power cable

Other safety factors such as fixing of earth for the wiring and installing trip switches were reported by 80%-90% of the HH. Thus safety precautions taken by HH appear to be adequate. However, only about half of the HH tested the trip switches once a month or once in six months. About 25% of the HH had never tested the trip switches or do not know how to test it, suggesting that more efforts are needed to improve this situation.

About 75% of the HH were aware of the new policies on promoting square type of plug outlets. A majority (84%) of the HH still use the round type of outlet, both types of outlets or use adapters. More

incentives and efforts are needed to promote the conversion to the square type of outlet in order to improve safety.

Only about 22% of the HH have installed lightning arrestors and 10% do not know whether such arrestors have been installed or not. The rest have not installed arrestors. A total of 53 members of HH reported being struck by lightning. The impacts have been mainly minor with some damages to equipment and structures. Deaths were reported by 3 HH. Therefore promoting the use of lightning arrestors may be viable only in high risk areas.

Regarding measures needed to ensure quality, most HH were of the view that sub-standard products should be removed from the market. A fair proportion the HH indicated that customers should be given awareness about quality, warranty should be made mandatory, standards should be imposed for all electrical products and the seller of electrical goods should be made liable for all accidents.

6.2 Conclusions (Institution Survey)

An analysis of the proportions of employees and visitors show that visitors make up over 90% of the users of electricity in institutions. It varied from 93% to 98% among the institutes, with the highest being hotels, followed by general purpose, religious places and the lowest was the industry sector. Thus one could conclude that a large proportion of the electricity use may be attributed to the use of the premises by visitors, particularly in hotels and general purpose institutions.

The breakup of expenditures of institutions shows that the major expenditure was for material inputs and wages. Overall expenditure on electricity was 3.6%. However, Water and Telecom bills were less than 1% for all institutions. Expenditure on transport was 3%. Thus overall electricity cost can be considered to be not too excessive.

The highest electricity consumption was reported by the hotel sector, followed by industry sector, general purpose sector and religious places. A majority (76%) of the institutions stated that electricity was affordable. The highest affordability was reported by religious places, followed by general purpose, industry and least affordability by hotels. The main reasons for non-affordability were; low income; high tariffs; income fluctuations and having to forego essentials.

The most reported equipment used institutions were mobile phones, fans, machinery, equipment, computers and laptops, TV, refrigerator, internet, CCTV, radio, CD players and other entertainment equipment and air conditioners.

Overall, 35% of the institutions reported consuming less than their basic needs of electricity. The highest average requirement for basic needs was for hotels, followed by industry, general purpose and religious places. As expected the basic needs of the hotel sector was the highest followed by the industry sector as both these sectors are high users of electricity.

A majority of the institutions are willing to pay the current electricity bill. Over half of the institutions reported that they were using less electricity than actually needed. Alternatives adopted by them

include; energy saving equipment, use of electricity only when needed, changing production methods, use of alternate fuel and use of capacitor banks/ variable compensation. Thus most institutions are willing to pay as they are using less electricity than what is needed.

Regarding future plans, 80% will continue with the current level of consumption, 5% plan to increase use and 15% plan to reduce use. In case they want to increase use of electricity, the following steps will be taken to counter the costs; increase own incomes, request CEB to reduce tariffs, manage equipment usage and install solar power.

In case the CEB imposes higher tariffs, the following would be adopted by the institutions; adopt energy saving devices, cut down usage, switch off some equipment and install solar power.

About two thirds of the institutions felt that the tariffs were fair and equitable. Suggestions to improve fairness and equality of tariffs suggested by those who felt that tariffs were not equitable include; giving small and medium institutions a subsidy; give all institutions a further subsidy; reducing the inefficiencies and losses of the CEB; building more low cost power plants and increasing the tariffs for the higher income earning institutions .

In case the CEB imposes higher tariffs, the following would be adopted by the institutions; adopt energy saving devices, cut down usage, switch off some equipment and install solar power. About two thirds of the institutions felt that the tariffs were fair and equitable.

Some major constraints that institutions faced in obtaining services were the high cost of connection as well as that of increasing capacity and the long period taken to complete repairs after an interruption to the services or breakdown. Other constraints faced were the high charges levied for meter testing and for miscellaneous services. Customers also had difficulties in obtaining net metering services.

A large proportion of the institutions were very satisfied with the services provided by the CEB, with only less than 3% reporting either poor or very poor services. The impacts of poor services as indicated by this group were delays in restoring power, regular or frequent breakdowns and high cost of interruptions to consumers due to spoilage of food etc.

It appears that the institutions had not suffered much due to shocks. Only a few instances of shocks with no deaths were reported. None of the persons receiving shocks were given any treatment except one person who received treatment at a local clinic. Most of the items that had given shocks were purchased after 2015 and these items were either discarded or replaced.

Safety precautions such as installing earths for premises and trip switches were undertaken by the majority (80%-90%) of the institutions. However, less than half the institutions tested the trip switches monthly. A further 40% tested it every six months or once a year and about 10% never tested it or do not know how to test it. Thus precautionary measures taken appear to be inadequate and needs to be improved.

A high majority of institutions were aware of the new policies on conversion to square pin outlets. However, only 25% use square pin outlets while about 60% of the institutions use both types of outlets or use adapters. Thus more efforts are needed to promote this safe practice.

The majority of the institutions feel that regulatory interventions are needed to ensure sub-standard products do not reach the markets. Mandatory warranty, awareness campaigns, establishment of quality standards and sellers liability for accidents caused by faulty electrical appliances should be implemented by the authorities.

Lightning damage was reported by less than 1% of the institutions. Less than 15% of the institutions have installed lightning arrestors. It is necessary to evaluate whether promoting lightning arrestors is cost effective with the reported low level of incidence of lightning strikes.

6.3 Recommendations (Household and Institutional Surveys)

- On the issue of affordability, the lowest consuming group had reported the highest proportion of affordability. This is because they spend only 1.6% of their expenditure on electricity. For an income of say Rs 25,000 per month this works out to Rs 400 per month. The average bill of this group as estimated from the survey was Rs 396. Thus a 10% increase in the tariff will result in an increase of Rs 40 or a total of Rs 440. Thus the lower income groups could easily bear an increase in tariffs by a small percentage. In the case of the higher consumer groups such an increase may increase the proportion of HH not able to afford the bill. The low consuming HH also spend a higher proportion of their expenditure on communications, transport and gas compared to electricity. Since the largest number of consumers are from the lower consumer groups, for example for the < 60 units group (49% of total no. of HH or 2.7 million HH) and for the group 60-120 units (40% of total no of HH or 2.2 million HH), the impact on revenue will be very high for say a 10% increase in tariff for these groups as against a similar percentage increase in the higher income groups (>120 units – 11% of the total number of HH or 0.6 million HH). It is therefore recommended that the tariffs be reviewed on the lines recommended above, if the revenue of the CEB is to be increased and losses reduced.
- Other measures such as reducing the inefficiencies of the CEB, building of low cost power plants and finding other low cost energy sources are recommended to reduce the losses of the CEB
- A tariff reduction could also be linked to the use of energy efficient equipment and other ways of reducing the consumption. For example, a points system could be developed to estimate the number of LED bulbs, energy efficient equipment used or other measures taken and based on achieving a certain number of points, a percentage reduction in tariff could be given to the consumer. This will also provide an incentive for the customer to reduce the use of electricity. This reduction could also be extended to the institutions, particularly, the industries and hotel sectors and to some extent to the general purpose sector.
- A tariff reduction could be considered for the hotel sector, which is a high user of electricity. This could be temporary in order reduce the impact of COVID on the hotel sector. Similarly, small and medium sized industries and general purpose organizations could also be included for similar subsidies.
- The CEB should review the charges levied for various purposes such as connections, increasing of capacity, meter testing and replacement, moving of electricity pole and for obtaining net metering services.

- One of the major complaints of the HHs was that of the delay in restoring power after a breakdown of services. Other complaints include delays in obtaining connection, non-working or defective meters and delays in meter reading. It is recommended that the CEB find ways and means to resolve this issue satisfactorily. One solution is to provide temporary connections, when repairs take too long. Another way is to divide the interruption over short periods throughout the repair period, if this is feasible. The CEB could use small independent or mobile power plants to provide temporary power during breakdowns, particularly in susceptible areas.
- To reduce the incidence of shocks, the PUCSL or the CEB should conduct awareness programmes to educate the customers on handling of electrical equipment or wiring, testing and use of trip switches and installing earths for the premises.
- Awareness programmes should also be conducted to educate the public on the use of square pin outlets to improve safety in the use of electricity. Customers should be made aware that square outlets are safer due to the improved fitting of square pin plugs and outlets.
- Promoting the use of lightning arrestors may be initially restricted to high risk areas. The possibility of subsidizing the cost of lightning arrestors could be studied in order to promote this.
- Improving the quality of electrical equipment could be undertaken through legal means such as mandatory warranties and implementing quality standards. Ensuring liability of the seller for accidents resulting from the poor quality of electrical product may be difficult proposition locally, although it is common practice in other countries. It will be good if this is introduced to this country. However, for the present it is recommended that this issue be studied carefully before being implemented.