IJEEP
INTERNATIONAL JOURNAL OF ENERGY ECONOMICS AND POLICY
EJ EconJournals
ISSN: 2146-4553

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2022, 12(3), 41-49.

EJ EconJournals

Welfare Impacts of Policy Reforms: A Case of Electricity Subsidies in Pakistan

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Received: 02 January 2022 **Accepted:** 04 April 2022 **DOI:** https://doi.org/10.32479/ijeep.12891

ABSTRACT

Pakistan has been paying more than 2% of its GDP as electricity subsidies. However, these subsidies continue to be poorly targeted benefiting the rich household's disproportionately. This study aims to assess the efficiency of the power policy reform 2013 by conducting a benefit incidence analysis for the year 2012 and 2015. It also analyzes the impact of a uniform and non-uniform increase in the tariff structure on the subsidy distribution and household welfare. The study reveals that though the power policy reform (2013) have improved the tariff structure for the poor, there is still significant leakage to the richest HHs. Analyzing the impact of a uniform and non-uniform increase in tariffs across the consumption slabs shows that despite targeting the higher slabs, the benefit incidence does improve for poor but it remains limited. While it does decrease for the rich however they still benefit from the subsidies. In such a situation the benefit incidence can be improved by charging higher tariff rates for consumers having higher consumption of electricity. For example, the tariff structure can be revised for consumers using more than 300kWh by charging them a rate at least equal to the cost of supply for slabs below 300 kWh.

Keywords: Electricity, Subsidy, Benefit Incidence, Consumer Welfare, Households
JEL Classifications: B55, O50, Q32

1. INTRODUCTION

Energy subsidies are considered as an important part of macroeconomic policy by governments especially of the developing countries to attain economic and social targets. Subsidies are a means of poverty alleviation and economic development as they enable access to affordable energy services and improve living standards of the poor. The International Energy Agency (IEA, 1999) and Organization for Economic Co-operation and Development (OECD, 1998) have defined subsidies as "any government action that raises the price received by energy producers, lowers the cost of energy production or lowers the price paid by energy consumers". The global energy subsidies reached US$5.3 trillion i.e. 6.5% of global GDP during 2015 (Coady et al. 2015).

The main purpose of providing subsidies is to give social protection to poor House Holds (HHs). However, recently the momentum of phasing out energy subsidies has gained pace due to their failure of meeting the intended objective of protecting the poor from the high cost of energy (IEA and OECD, 2010). There is extensive literature revealing that energy subsidies are the most regressive and costly policies, especially in case of developing countries (The World Bank, OECD & OPEC 2010. Pakistan spent more than 2 % of its GDP on electricity subsidies in the past decade, which not only increased national debt but also weakened the country's external position. In 2015-16 the electricity subsidies were 0.8% of the GDP (World Bank, 2017), which was the same as total expenditure on public health. Different reforms were initiated by Pakistan where electricity tariffs for the residential consumers were increased and eliminated subsidies for commercial and industrial consumers in October 2013. The main targets of the power policy 2013 were:

1. Target the power subsidies directly for the poor
2. Increase the cost of electricity for the consumers utilizing generators and confined power
3. Phase out subsidies over a period of 3 years.

As Pakistan is facing greater challenges from energy scarcity, energy subsidies particularly electricity subsidies have become a serious issue. Moreover, the targeting mechanism of the tariff structure based on the proposition that electricity brings prosperity, but this proposition does not hold true in Pakistan where proportion is different between rich and poor. Due to the strong seasonality present in electricity consumption the poor HHs are pushed into the higher-tariff slabs during summers whereas, many rich HHs, in winter season are subsidized. Deletion of subsidies on electricity, in such specific circumstances, will helps in narrowing the fiscal deficit but on the other hand will push the process of electricity higher. These higher prices will affect poor families. Therefore, to understand the outcomes of subsidized electricity for poor families one has to consider the distribution of subsidies that how different income groups are benefited are effected from it. Current paper look at this phenomenon while analyzing the distribution of subsidies in different income groups of the domestic sector before and after the 2013 policy reform. Following Trimble et al. (2011), the benefit incidence analysis is carried out for the year 2012 and 2015 in order to determine how successful the policy reform has been in targeting the poor HHs. This analysis will not only determine the effects of the nature of subsidies but it will also provide information about the leakage from the intended beneficiaries to others. The welfare impact of residential electricity subsidies has not been paid much attention in Pakistan. There are only a few studies that have investigated this issue in case of Pakistan (Walker et al., 2016, 2017; Khalid and Salman, 2019; Awan et al., 2019). All of these studies have concluded that a targeted tariff structure has to be implemented in order to protect the poor. However the impact of a targeted tariff structure on household welfare (electricity consumption) and on the subsidy received by different income quintiles has not been analyzed so far. In order to do so this study examines the impact of two scenarios i.e. a uniform and a non-uniform increase in the tariff structure on the subsidy distribution and household welfare. The impact of both policy changes have been analyzed in order to understand the effectiveness of such policy reforms for providing protection to the poor.

The rest of the study is organized as follows: Section 2 discusses the literature review, Section 3 analyzes the tariff structure before and after the policy reform, Section 4 discusses the methodology and data used and Section 5 and delves into the results and conclusion respectively.

2. LITERATURE REVIEW

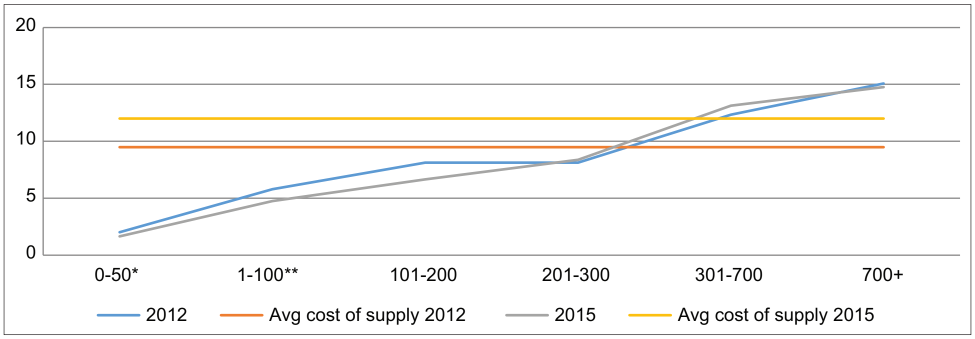
Previous studies on energy subsidy reforms impacts on household's welfare show that the impact of energy subsidy removal is reverting (Clements et al., 2014; Coady et al., 2017). For example, Saboohi (2001), in case of Iran, found that plummeting subsidies on energy will rise the cost of living for poor HHs (28.7% for urban HHs and 33.7% for rural HHs). Similar results were also found by Coady et al. Another study by Vecchi and Andriamihaja (2007) analyzed the impact of petroleum price increase on the living standard of HHs in Madagascar. Their results clearly showed that subsidies benefit the rich more as compared to the low income HHs. Similarly Leigh and El Said (2006) found that most of the subsidies in Gabon helped the HHs of higher income groups more as compared to the HHs in lower income groups. A study by the World Bank (2008) conducted for developing countries shows that the lowest income groups receive only 15% to 20% of the fuel subsidies. Another study by the International Monetary Fund gave evidence that 80% of gasoline, 65% of diesel and 70% of LPG subsidies goes to the richest 40 % of HHs. Lin and Jiang (2009) found that low income HHs of China received only 10 % of the total electricity subsidies while the higher income groups of HHs received 5 % of the total electricity subsidies.

Kebede (2006) showed that subsidies on electricity tariff and kerosene oil did not change the household expenditure significantly in case of urban HHs of Ethiopia.

The literature related to impact of electricity subsidy removal can be classified into two groups (a) studies related to the distribution of electricity subsidies and (b) studies analyzing the welfare impact of electricity policy reform. Evidence from the developing country suggest that the higher income groups benefit more from the distribution of electricity subsidies than the lower income groups. Though, the estimate of impact varies across countries. For example Banerjee et al. (2008) gave evidence that only 0.5% of the total electricity subsidy reach the poor HHs in Rwanda whereas, this estimate was 9% in case of Ghana and 3 % in case of Burkina Faso. Komives et al., 2009, showed that the richest HHs receive 4 times more electricity subsidies as compared to the bottom 10% of the HHs. Bangladesh and Pakistan also showed similar results with 6 and 3 times more subsides going to the richest HHs respectively (Ahmed et al., 2013; Trimble et al., 2011). Similarly Wang and Zhang, 2016, found it to be 5 times higher than the bottom 10% of HHs. In case of Zambia the electricity subsidies were also found to be regressive with only 2% of subsidies going to the bottom 50% of HHs (De La Fuente et al., 2017).

Most of the literature related to electricity price reforms conclude that removal of subsidies has a negative impact on real household welfare. Lin et al. (2009) analyzed the effect of welfare impact of removing subsidy on electricity in China. They found that the welfare loss of subsidy removal was more for poor HHs as compared to rich HHs. In 2015 the percentage loss in real income of the poor HHs was estimated to 2 times larger than the richest HHs (Jiang et al., 2015). Zhang, 2015 showed that a 50% increase in electricity prices of Turkey brought about 3 times more percentage reduction in incomes of the poor HHs relative to the higher income HHs. Similar results were also observed in 8 out of 10 countries in Latin American and the Caribbean by Feng et al. (2018) where the income loses of the poor were larger in comparison to the rich. Very few studies have evaluated the welfare impact of subsidy reform in case of Pakistan. Walker et al. (2016) estimated the likely impact of policy reform on household welfare by using poverty scores

Figure 1: Average tariff for varying levels of electricity consumption, in June 2012 Prices



Source: Authors own calculation

measure and stimulated the effects of various compensating methods like direct cash transfers. Their results suggest that the electricity subsidies benefit the rich more as compared to the poor. Using a national proxy means test (PMT) they concluded that targeted subsidies can be a better means to ensure assistance to the needy HHs. Khalid and Salman (2019) determined the optimal level of electricity by computing the dead weight loss of consumer welfare due to a uniform and non-uniform price increase of electricity. They also concluded that targeted subsidy approach improves the welfare of the HHs.

Awan et al. (2019) used Social Accounting Matrix (SAM) 2010-11 and IFPRI to develop Computable General Equilibrium (CGE) Model in order to assess the welfare impact of direct transfer mechanism of Tariff Differential subsidy (TDS). Their study revealed that TDS does not provide relief to the poor instead it benefits the rich segments of the society. They suggested that the Tariff Differential Subsidy has to be phased out or be made more targeted. Their study also suggested that reducing TDS will ease out financial hardships of the government by reducing fiscal deficit.

3. TARIFF STRUCTURE AND POLICY REFORM 2013

The tariff structure for the residential users is based on incremental block tariff (IBT) structure. The unit cost of electricity increases from one slab to the next as it is shown in Table 1 for the residential use[1]. Households (HHs) which consume less than 50 kWh per month are provided with a Lifeline tariff so a minimum amount of electricity is delivered to the poor HHs. In 2013 the government switched from "all slab benefit" structure to "previous slab benefit" increased the tariff rates for slabs above 200 kWh per month by splitting the second slab (101-300 kWh) into two slabs (i.e. 101-200 kWh and 201-300 kWh). According to the new tariff the top two slabs are no longer subsidized, however the tariff rate for the lower slabs is still less than the cost of supply.

Bills calculation were changed once the reforms were brought in action in 2013 and now 200 kWh per month over head slabs were taxed more, Table 2 for detail.

1 This the standard tariff notified by the government. There are flat peak and off peak charges for users with electronic meters (implemented from June, 2015).

Table 1: Tariff configuration for residential electric usage

Monthly consumption (kWh)	Tariff rate
0–50*	2
1–100**	5.79
101–200	8.11
201–300	10.20
301–700	16
700+	18

*Indicate a rate for those consumer that are below 50kWh/month **initially consumed electricity rates

Table 2: Electricity tariff structure for residential users

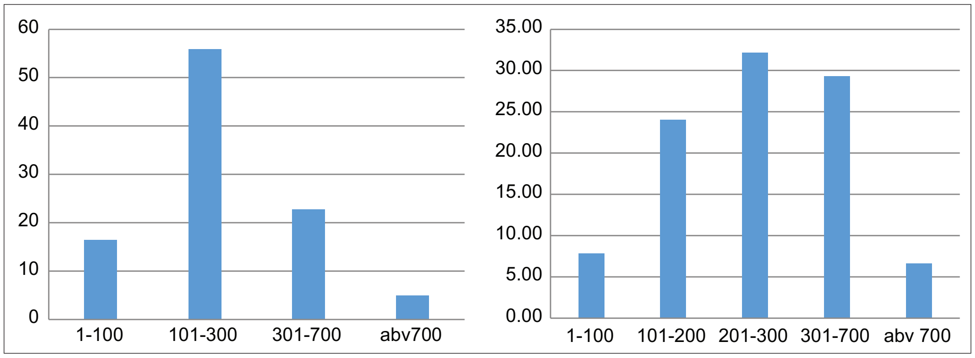
Monthly consumption (kWh)	Tariff rate (June 2012)	Tariff rate (June 2015)	Increase in Tariff (%)
0–50*	2	2.00	0
1–100**	5.79	5.79	0
101–200	8.11	8.11	0
201–300		10.20	26
301–700	12.33	16.00	30
700+	15.07	18.00	19.44
Avg. Cost of Elect. Supply	9.47	12	27

Source: Pakistan Electric Power Company (PEPCO)

Figure 1 shows that tariff rates increased for only the last 3 slabs in nominal terms and decreased for the lower slabs in real terms with a slight increase for third and fourth slab (201–300 kWh/month and 301–700 kWh/month). This means that the policy reform 2013 has targeted those 32% consumers which consume electricity up to 200kWh/month as shown in Figure 1 (8% consumed in the 1–100 kWh/month block, 24% consumed in the 101–200 kWh/month block, 32% consumed in the 201–300 kWh/month block, 29% consumed in the 301–700 kWh/month block and 7% consumed above 700 kWh/month). However, there has been no real increase in the electricity tariff for the highest slab.

It is clear that between low and high volume customers there were cross subsidization and the cost on per unit supply were less than what was charged on per unit consumption. However the extent of cross subsidization is dependent on the volume of consumption at the higher slabs. In 2012 the volume of consumption by the upper two slabs is 28% of the total electricity consumption and for 2015 its 36% (Figure 2). This shows that the extent of cross subsidization among the high and low volume customers is limited in both of the years.

Figure 2: Electricity consumption by block 2012, 2015



Source: Authors own calculation

4. METHODOLOGY AND DATA USED

4.1. Methodology

In most of the studies on impact of subsidies on HH welfare the household welfare has been related to the quantity of electricity consumed by the HH. However, in case of Pakistan it has been seen that household welfare is weakly related to the electricity use, as the subsidies continue to benefit the HHs belonging to rich income groups. We have therefore estimated the impact of electricity subsidy on household welfare by first comparing the benefit incidence of electricity before and after the electricity reform 2013. The PSLM survey data for the year 2011–2012 and 2015–2016 has been used. The survey for the year 2011–2012 includes 11276 HHs (HHs). Few samples (215) were removed from the total as these were shown with no response on electricity relevant expenditures. Further, 94 other households were also removed for whom because of the new tariffs imposition expenditures on electricity were not possible. Unless a HH consumes under 50 kWh/month, it is also not possible to spend less than Rs. 295, because of the cost structure of second slab (51kWh×5.79=Rs.295). These observations (962) have also been removed from the sample by assuming that they are either due to reporting error or might be illegal users. For the remaining 10,005 HHs, following Trimble et al. (2011) the subsidy (benefit incidence) received by each income group has been calculated as under:

$$S = C - E \tag{1}$$

$$C = U \times Q \tag{2}$$

$$Q = \frac{E}{T} \tag{3}$$

Where S is the amount of subsidy, C is the cost of electricity supply that is calculated as the average cost of supply by all the power stations[2], E is the electricity expenditure, U is the unit cost of supply, Q is the quantity of electricity consumed and T is the tariff rate. The quantity of electricity consumption has been calculated from the expenditure data. First the HHs were divided among different slabs using the tariff structure of 2012, for example if the expenditure of a HH is Rs. 150, their electricity consumption belongs to the first slab with a tariff rate of Rs.2. Once the slabs are identified to which the HHs belong to, the quantity of electricity consumed is calculated using the variable tariff rate i.e. {(total expenditure- expenditure on the previous slab)/tariff rate of the current slab} + quantity consumed in the previous slab. For example if the expenditure of a HH is Rs.2500 then it belongs to the fourth slab and its consumption is computed as (2500-2201)/12.33 +300. Applying the GST of 17% the net subsidy is calculated as:

$$N = S - GST \tag{4}$$

Where N is the set subsidy. We assume that HHs do not change their electricity expenditure in response to any revisions in the tariff structure during 2012. Similarly, the IBT structure and average cost of electricity supply were used to estimate the quantity consumed by HH in 2015.

4.2. Data

The data for tariff structure is taken for the energy year book 2012 and 2015. The household expenditure on electricity data is taken from the PSLM survey 2012 and 2015. The cost of supply of electricity by different power stations is taken from the State of Industry Report by National Electric Power regulatory Authority (NEPRA) 2012 and 2015. The total HHs in the PSLM survey 2015 are 24238, out of which 5980 HHs have not reported their electricity expenditures. Further 37 HHs whose reported electricity expenditure was not possible given the June 2015 tariff structure i.e. less than the minimum charge rule of Rs.75 were removed from the sample. Unless a HH consumes under 50 kWh/month, it is also not possible to spend less than Rs. 295, because of the cost structure of second slab (51kWh × 5.79 = Rs.295). These observations (1527) have also been removed from the sample by assuming that they are either due to reporting error or might be illegal users. For the remaining 16,694 HHs the subsidy (benefit incidence) received by each income group has been calculated by the same method discussed above. However, the IBT, average cost of supply and the expenditure on electricity by HHs have been adjusted for inflation to enable comparability with 2012. By applying monthly inflation rate the nominal to real price reduction has been estimated to be 18% using monthly price statistics data given by Federal Bureau of Statistics (FBS).

5. RESULTS

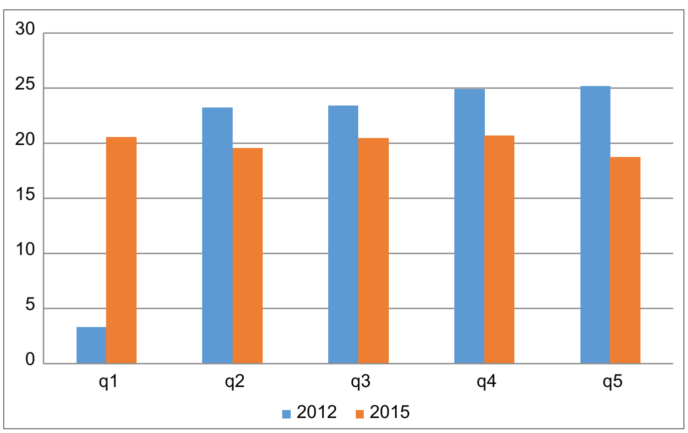
Figure 3 present the extracted results which shows that in 2012 the low income group took less benefits from the subsidization policy

2 The average cost of supply for 2012 is Rs. 9.47 and for 2015 is Rs.12. State of Industry Report 2015, Nepra.

while households falling in 4th and 5th quantiles are most benefited ones. Out of total volume of subsidies, the rich households received 25% subsidies while poor got just 5%. Later, once the changes were brought in the 2013 tariff structure, it shows great impacts. Now the poor households were benefited by 21%. This increase in the benefit to the poorest 20% of the HHs has reduced the benefits to the HHs in the higher income quintiles, with a reduction of 3–5% in the share of subsidies for each group. For example, the benefit incidence for the HHs in second income quintile (q2) was 23% in 2012 which has reduced to 20% in 2015. Similarly for HHs falling in the third income quintile (q3) it has reduced from 23% to 20% while for fourth income quintile it has reduced from 25% to 21% and for fifth quintile it has reduced from 25% to 19%, (Table 3). These results show that the electricity incremental block tariff (IBT) structure has improved significantly after the 2013 policy reform. Although this has given some degree of protection for the poor HHs but the richest 40% of the HHs are still receiving 40% of the total electricity subsidies which is same as that received by the poorest 40%.

The share of subsidy of the richest 40% HHs has declined (which was 48% in 201) but still there is significant leakage of resources to the richest HHs that do not require the same degree of protection as the poor. This means that even by increasing the tariff rates for the higher slabs and keeping the rate same for the lower slabs, the poor are still getting limited benefit. There are several reasons why the benefit incidence is limited for the poor, e.g. firstly, lifeline remains to be ineffective. Since the minimum

Figure 3: Benefit incidence for electricity subsidy 2012 and 2015



charge set for electricity usage is Rs.75, a household consuming 10 kWh/month is expected to be charged Rs.20 but end up being charged Rs. 75 because of the minimum charge rule. Using June 2015 tariff, it is only at consumption of 38 kWh when the charge becomes greater than Rs.75, which means that only those HHs will benefit from the lifeline tariff that consume between 38 and 50 kWh. Second, the consumption behavior of poor HHs does not match the tariff structure.

As it can be seen in Figure 4 that only 1% of the poorest HHs consume <50 kWh/month in both of the years. While 50% of the poorest HHs consume between 101 and 300 kWh/month in 2012 which has increased to 60% in 2015 (Figure 5). This shows that having a lifeline tariff for less than 50kWh consumption is not an effective method to give protection to the poor. Third, the slab benefit structure is for all of the HHs, which means that the rich HHs receive the same level of subsidies as the poor HHs for the first 300kWh of electricity consumption. As long as the tariff rate for electricity units below 300kWh remains less than the cost of supply, there will be a significant leakage of subsidies towards the

Figure 4: Electricity consumption b quintiles, 2012

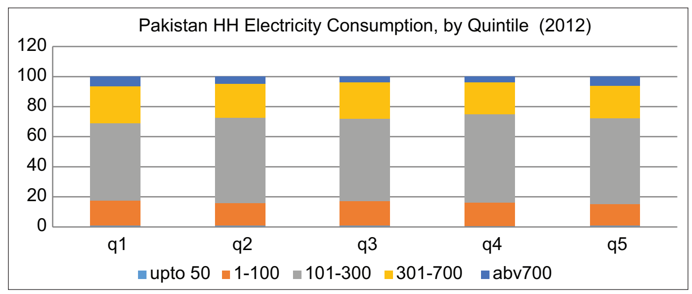


Figure 5: Electricity consumption b quintiles, 2015

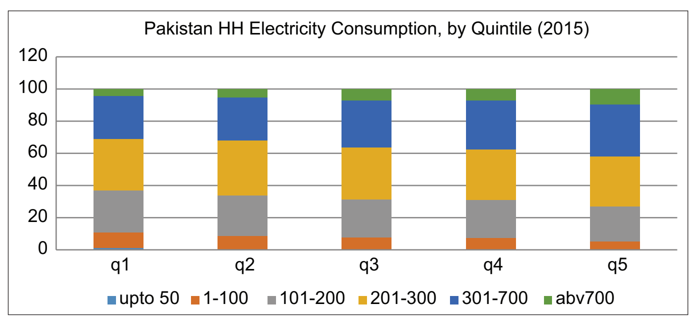


Table 3: Benefit Incidence (subsidy received by each slab)

2012	**Upto 50**	**1–100**	**101–300**	**301–700**	**Above 700**
Q1	22223.25	10034.51	48064.81	63698.31	–46940.8
Q2	23194.35	167267.3	473791	56875.11	–42972
Q3	19978.52	194373.9	482897.6	68346.78	–30891.5
Q4	15694.47	176462.7	494058.4	69310.08	–29164.2
Q5	16777.62	164147.3	483862.3	58544.3	–40418

2015	**Upto 50**	**1–100**	**101–200**	**201–300**	**301–700**	**Above 700**
Q1	57724.6	343938.8	853799	899367.4	444525.5	–28045
Q2	13830.6	288381.2	822123	947867.5	431025.4	–54271.7
Q3	13459.4	289540.2	851527.2	1003237	496371.1	–92834.3
Q4	8314.1	281183.3	845134.6	994293.4	537169.5	–80696.7
Q5	8398	194212.4	754345.7	922873.2	541543.7	–75352.4

Table 4: Impact of 20% increase in tariff rates

	Upto 50	1–100	101–200	201–300	301–700	Above 700
Q1						
Initial consumption	5772.46	55384.66	147202	181871	150574	24256
Final consumption	5375.329	51574.33	137074.9	169358.7	140214.9	22587.25
Decrease in subsidy	3812.46	19249.79	22968.35271	negative subsidy	negative subsidy	negative subsidy
Q2						
Initial consumption	1383	46438	141384	191484	152156	27995
Final consumption	1287.853	43243.18	131657.1	178310.4	141688	26069.01
Decrease in subsidy	913.4116	16140.24	22060.55339	Negative subsidy	Negative subsidy	Negative subsidy
Q2						
Initial consumption	1346	46625	148761	203826	183620	45161
Final consumption	1253.398	43417.31	138526.6	189803.3	170987.4	42054.03
Decrease in subsidy	888.9747	16205.23	23211.60798	Negative subsidy	Negative subsidy	Negative subsidy
Q4						
Initial consumption	831	45279	152768	201024	195528	45033
Final consumption	782.955	42163.91	142257.9	187194	182076.1	41934.84
Decrease in subsidy	548.8395	15737.41	23836.83175	Negative subsidy	Negative subsidy	Negative subsidy
Q5						
Initial Consumption	840.8	31274	130224	186624	197422	56775
Final consumption	773.8292	29122.42	121264.9	173784.7	183839.8	52869.02
Decrease in subsidy	555.312	10869.76	20319.22639	Negative subsidy	Negative subsidy	Negative subsidy

rich HHs. In order to remove such inefficiencies a pricing policy that targets the subsidy level will be beneficial. In this regard the impact of three pricing policies is explored: (1) Increasing the tariff for all the slabs by 20%. In this case the subsidies received by HHs under all slabs will decline. (2) Increasing the tariffs by 20% for only the slabs above 100kWh. In this case the users consuming electricity below 50kWh and between 1 and 100 kWh will not be effected. While the subsidies of users falling under the higher slabs will be reduced. (3) Increasing the tariffs by 20% for only the slabs above 200kWh. In this case the users consuming electricity below 50kWh, between 1 and 100 kWh and between 101 and 200 kWh will not be effected (Table 4).

While the subsidies of users falling under the higher slabs will be reduced. The impact on the quantity consumed (a measure of welfare) by each quintile and the subsidy received is calculated by the constant elasticity inverse demand function using household data for the year 2015. The results are given in Table 5. These results show that the impact of increasing tariffs on all of the slabs by 20% reduces the subsidy benefit for the poorest 20% more than the richest 20%. As increasing the tariff on all the slabs would raise the price of electricity for all of the slabs reducing the benefit received by HHs of all income groups. The benefit of subsidy received by the poorest quintile reduces by 24% while for the richest income group it reduces by only 16% (Figure 6). Under the second policy reform i.e. by raising tariffs for slabs that are greater than 100 kWh the share of subsidy loss by the poorest 20% has declined (reduced from 23% to 20%) while it has increased for the rest of the HHs in higher income quintiles, yet the difference between the richest 20% and the poorest 20% is very nominal. As 89% of HHs in lowest income quintile consume more than 100 kWh/month (Figure 7), such a tariff policy will reduce the welfare of the poor HHs by increasing the cost of electricity for majority of the HHs in the poorest income group. Therefore, such an increase in tariff would be ineffective in targeting the poor. However, under the third policy reform i.e. increasing the tariff rate for the slabs above 200 kWh not only reduces the share of subsidy loss (18%) for the poorest 40% of HHs but also the welfare loss is the greatest for the richest 20%. About 75% of the richest HHs consume more than 200 kWh/month therefore such a policy reform would affect majority of the HHs in the richest income group bringing a decline in the subsidy received by 20%. These results show that a targeted tariff structure proves to be more effective in providing protection to the poor than a uniform increase in tariff across all of the slabs.

6. CONCLUSION

Although electricity subsidies are provided as a source of protection and social safety net for the poor, the analysis of tariff structure and household expenditure data in this chapter demonstrates that residential electricity subsidies are still regressively targeted. Many poor HHs are still exposed to high cost of electricity. The benefit incidence analysis reveals that the power policy reform (2013) has improved the IBT structure significantly. It has reduced the cost of electricity for consumers using up to 200 kWh/month which amounts to 32% of HHs, increasing the subsidies received by the poorest 20% by 18%. However, the results show that the subsidies received by the higher income groups have not reduced substantially and there is still significant leakage of resources to the richest HHs.

These results suggest that by a nominal increase in the tariff rates for the higher slabs (above 200 kWh) and no change in the highest slab (above 700 kWh), the poor are still getting a limited benefit from the electricity subsidies. These results also suggest that that the minimum charge of Rs.75 proves to be inefficient. Minimum cost policy hit the poor households badly and therefore, the removal of this minimum cost policy has to be abandon to safeguard the poor households or should be align with consumption of electricity. It is clear from the above stated discussion in the paper that just 1% poor household's electricity consumption is 50 kWh/month. By enlarging lifeline tariff to a high slab with higher taxation will bring a certain relief to poor households. In order to evaluate how a more aggressive increase

Table 5: Effects of policy reform on subsidy and quantity consumed of electricity

Income Group	No of HHs	Reduction in Consumption (kWH)	Decline in welfare (% of total)	Reduction In Subsidy Received (Rs.)	Decline in the Benefit (%)
20% Increase in tariff of all slabs					
Income Group	**No of HHs**	**Reduction in Consumption (kWH)**	**Decline in welfare (% of total)**	**Reduction In Subsidy Received (Rs.)**	**Decline in the Benefit (%)**
Q1	3642	38,874.76	18.84	2,553,325	20.17
Q2	3636	38,584.43	18.70	2,467,275	19.49
Q3	3701	43,296.99	20.99	2,617,194	20.67
Q4	3600	44,062.3	21.36	2,629,291	20.77
Q5	3680	41,495.93	20.11	2,392,710	18.90
Total	18,259	206,314.4		12,659,795	
20% increase in tariff of slabs whose consumption volume is greater than 100 kwh					
Income Group	**No of HHs**	**Reduction in Consumption (kWH)**	**Decline in welfare (% of total)**	**Reduction In Subsidy Received (Rs.)**	**Decline in the Benefit (%)**
Q1	3642	34,667.3	18.23	2,174,724	19.36
Q2	3636	35,294.46	18.56	2,178,955	19.40
Q3	3701	39,996.7	21.04	2,327,923	20.72
Q4	3600	40,890.04	21.51	2,352,761	20.95
Q5	3680	39,286.51	20.66	2,198,443	19.57
Total	18,259	190,135		11,232,806	
20% Increase in tariff of slabs whose consumption volume is greater than 200kwh					
Income Group	**No of HHs**	**Reduction in Consumption (kWH)**	**Decline in welfare (% of total)**	**Reduction In Subsidy Received (Rs.)**	**Decline in the Benefit (%)**
Q1	3642	24,540.16	17.33	1,343,892.95	18.29
Q2	3636	25,567.58	18.06	1,378,892.96	18.76
Q3	3701	29,762.31	21.02	1,499,607.65	20.41
Q4	3600	30,379.97	21.46	1,531,462.85	20.84
Q5	3680	31,327.41	22.13	1,594,416.9	21.70
Total	18,259	141,577.4		7,348,273	
20% Increase in tariff of all slabs					
Income Group	**No of HHs**	**Reduction in Consumption (kWH)**	**Decline in welfare (% of total)**	**Reduction In Subsidy Received (Rs.)**	**Decline in the Benefit (%)**
Q1	3642	38,874.76	18.84	2,553,325	20.17
Q2	3636	38,584.43	18.70	2,467,275	19.49
Q3	3701	43,296.99	20.99	2,617,194	20.67
Q4	3600	44,062.3	21.36	2,629,291	20.77
Q5	3680	41,495.93	20.11	2,392,710	18.90
Total	18,259	206,314.4		12,659,795	
20% increase in tariff of slabs whose consumption volume is greater than 100kwh					
Income Group	**No of HHs**	**Reduction in Consumption (kWH)**	**Decline in welfare (% of total)**	**Reduction In Subsidy Received (Rs.)**	**Decline in the Benefit (%)**
Q1	3642	34,667.3	18.23	2,174,724	19.36
Q2	3636	35,294.46	18.56	2,178,955	19.40
Q3	3701	39,996.7	21.04	2,327,923	20.72
Q4	3600	40,890.04	21.51	2,352,761	20.95
Q5	3680	39,286.51	20.66	2,198,443	19.57
Total	18,259	190,135		11,232,806	
20% Increase in tariff of slabs whose consumption volume is greater than 200kwh					
Income Group	**No of HHs**	**Reduction in Consumption (kWH)**	**Decline in welfare (% of total)**	**Reduction In Subsidy Received (Rs.)**	**Decline in the Benefit (%)**
Q1	3642	24,540.16	17.33	1,343,892.95	18.29
Q2	3636	25,567.58	18.06	1,378,892.96	18.76
Q3	3701	29,762.31	21.02	1,499,607.65	20.41
Q4	3600	30,379.97	21.46	1,531,462.85	20.84
Q5	3680	31,327.41	22.13	1,594,416.9	21.70
Total	18,259	141,577.4		7,348,273	

in the tariff rates would help in bringing significant gains for the poor a comparison has been made among 3 scenarios i.e. a uniform increase of 20% across all slabs a non-uniform increase of 20% only for slabs greater than 100 kWh and a non-uniform increase of 20% only for slabs greater than 200kWh. The results of this scenario analysis show that targeting higher slabs with no change in the tariff for lower slabs proves to be more effective in providing protection to the poor.

By increasing the cost of electricity the consumption of electricity can be reduced through price signals among the richer HHs that are able to cut their consumption which could in turn reduce the

Figure 6: Reduction in benefit incidence under uniform and non-uniform tariff increase

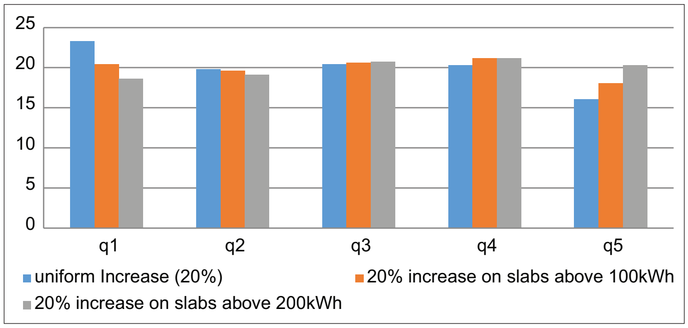
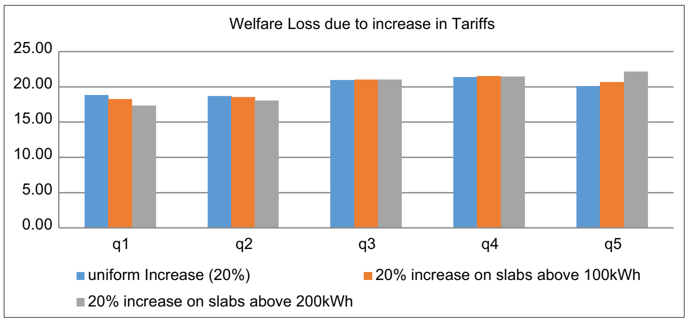


Figure 7: Reduction in electricity consumption (welfare) due to increase in tariffs



electricity demand as the budget share of electricity is higher in case of rich HHs as compared to the poor. However it has been observed that even if the tariffs are increased for the higher volume slabs, still the improvement in the benefit incidence is limited for the poor. The richest 40% of the HHs who do not require any support through subsidy will still receive around 40% of the total electricity subsidies. In such a situation the benefit incidence can be improved by charging higher tariff rates for consumers having a high consumption of electricity. For example, the tariff structure can be revised for consumers using more than 300kWh by raising the tariffs for 100–200 kWh and 201–300 kWh slabs to the cost of supply. This will reduce the leakage to the rich and it will be possible to improve the benefit incidence for the poor who will suffer if the price of electricity is raised uniformly for all the users.

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