



Moving up the Energy Ladder: The Impact of BISP Cash Transfers on Fuel Choices¹

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Access to modern energy is essential for good health and well-being, inclusive communities, resilience against climate change, and poverty alleviation. Despite immense significance, around 86 percent of the population consumes traditional fuels (wood, animal dung, crop residues), while wood represents 54 percent of the total conventional fuel in Pakistan. More than 115 million people burn these fuels with open fire or traditional stoves for cooking. It poses enormous health and environmental risks (Iqbal & Nawaz, 2017). Estimates from Institute for Health Metric and Evaluation (IHME) show that the death rate from household air pollution is 56 people per 100,000 individuals in Pakistan in 2017. Exposure to household air pollution is high among women and girls, especially in poor households, who spend the most time in cooking (WHO, 2019). On average, low-income families spend 34 percent of the total fuel expenditure on wood, while the wealthy households spend only 9 percent of total fuel expenditure on wood. While the poor households spend 32 percent of total fuel expenditure on electricity, and the wealthy families spend 64 percent on electricity (GoP, 2017). This significant burden of disease accentuates the need for the use of modern fuels to improve health and the environment.

The economic empowerment of a household is considered a critical factor in facilitating energy transition from traditional to modern fuels. Pakistan launched the Benazir Income Support Program (BISP) in 2008 as a national cash transfer program to economically empower the ultra-poor segments of the society. BISP serves over 5 million families across Pakistan². Therefore, the BISP cash transfer program provides an ideal setting to explore how a persistent increase in economic well-being affects both the total fuel expenditures and inter-fuel substitution at national and provincial levels. Nawaz and Iqbal (2020) have examined the impact of economic empowerment through the BISP unconditional cash transfer program both on total fuel expenditures and its composition among ultra-poor in Pakistan.

FINDINGS

Impact on Overall Fuel Expenditures

The study shows that BISP cash transfer has a positive and statistically significant impact on monthly per capita fuel expenditures in the range of Rs. 50 to Rs. 67 (Table 1). The treatment group consumed Rs. 67 more

¹This brief is based on the findings of Nawaz and Iqbal's (2020) study titled "*The impact of unconditional cash transfer on fuel choices among ultra-poor in Pakistan: Quasi-experimental evidence from the Benazir Income Support Program*" published in the Energy Policy.

²For further details on BISP, see (Iqbal & Nawaz, 2019; Nayab & Farooq, 2020). For definition of ultra-poor, see (Iqbal, 2020).

on fuel than the control group. Furthermore, the results show that BISP cash transfer has a significant and positive impact on the ratio of fuel expenditures to total per capita monthly expenditures, indicating that the percentage of budgetary expenditure for fuel increases as total expenditure increases due to unconditional cash transfer. Estimates show that, on average, the BISP cash transfer increases the share of fuel expenditures by 2.57 percent in per capita monthly expenses among beneficiaries compared to non-beneficiaries.

Table 1
Impact of Cash Transfer on Overall Fuel Expenditures

Models	(1)	(2)	(3)	(4)
	Monthly Per Capita Fuel Exp.			Fuel Exp. % of Total Exp.
	Cross-section		Panel	Cross-section
RDD Estimates (bias-corrected)	67.44 (13.32)***	50.44 (12.89)***	136.70 (38.47)***	2.57 (0.38)***
Sample Size Left of Cutoff	4569	4569	1205	4570
Sample Size Right of the Cutoff	4966	4966	989	4967
Provincial Dummies	No	Yes	No	No

Source: Nawaz and Iqbal (2020).

Impact on Fuel Choices: Inter-fuel Substitution

The results show that the expenditure on modern fuel increase in the range of Rs. 46 to Rs. 115 (in per capital term) among BISP beneficiaries. BISP cash transfer has a significant impact on per capita traditional fuel expenditure in cross-section setting.

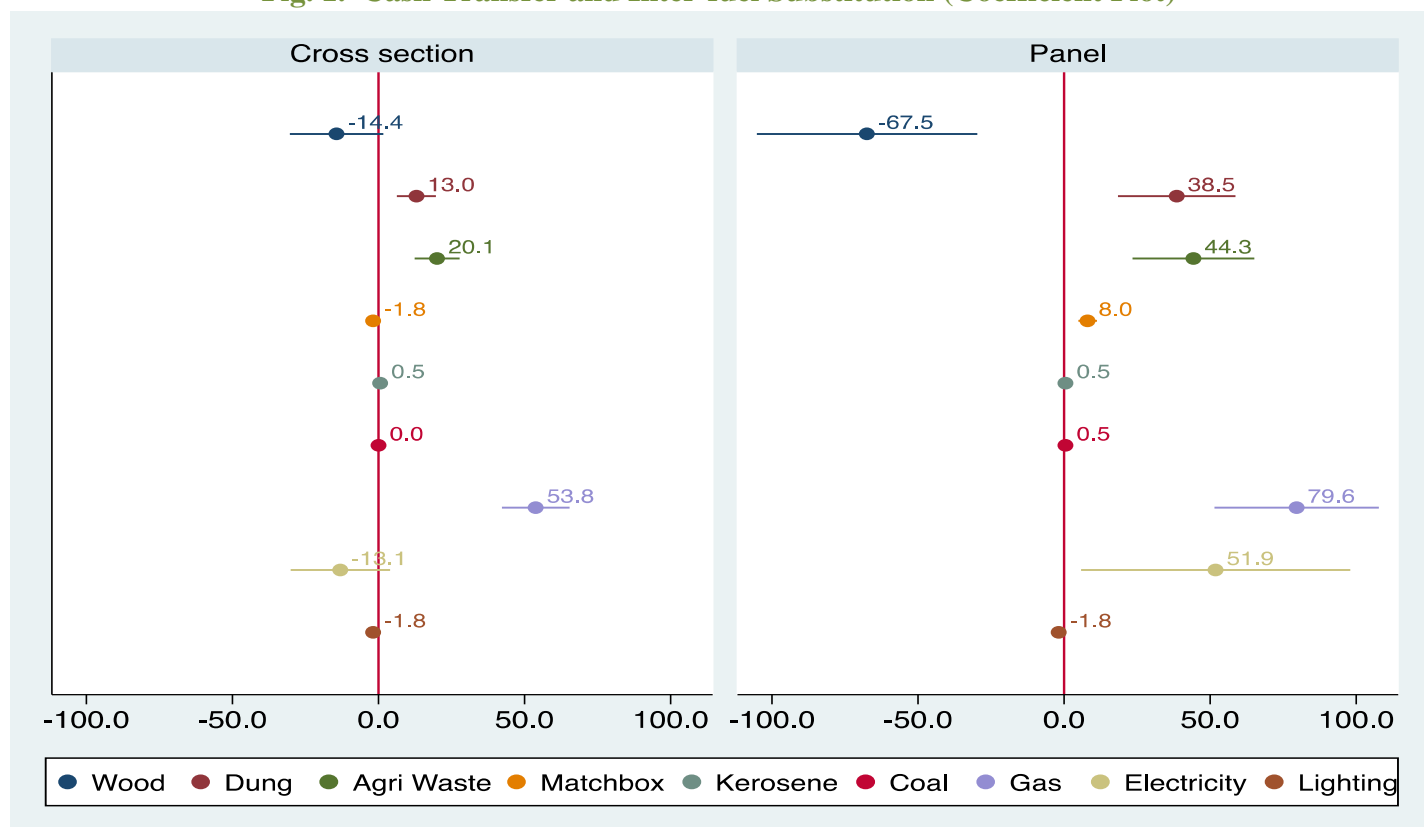
Table 2
Impact of Cash Transfer on Traditional, Intermediate and Modern Fuels

Model	(1)	(2)	(3)	(4)	(5)	(6)
	Cross-section			Panel		
	Traditional	Intermediate	Modern	Traditional	Intermediate	Modern
RDD Estimates (bias-corrected)	20.41 (10.61)*	0.50 (0.32)	46.60 (11.66)***	20.98 (27.32)	1.70 (1.02)*	115.25 (29.26)***
Sample Size Left of Cutoff	4570	4570	4570	1205	1205	1205
Sample Size Right of the Cutoff	4967	4967	4967	990	990	990

Source: Nawaz and Iqbal (2020).

Looking at the individual fuel components, we have found that BISP cash transfer has a positive and statistically significant impact on the use of gas, dung, kerosene oil, and matchbox and agriculture wastes for beneficiaries (Figure 1). BISP cash transfer has induced a monthly increase in the range of Rs. 53 to Rs. 79 per capita in expenditures of gas in the treatment group compared to the control group. Similarly, BISP cash transfer leads to an increase in spending on agricultural waste in the range of Rs. 20 to Rs. 44 (in per capita term) among beneficiaries than non-beneficiaries. BISP cash transfer has a negative and significant impact on the use of wood, one of the primary sources of fuel among the sample groups. BISP cash transfer has a positive and statistically significant effect on the use of electricity in the panel setting for beneficiaries (Figure 1).

Fig. 1. Cash Transfer and Inter-fuel Substitution (Coefficient Plot)



Source: Nawaz and Iqbal (2020).

Impact on Fuel: Provincial Analysis

The results show that BISP cash transfer has a positive and significant impact on overall fuel expenditures in Sindh and Balochistan. In contrast, it has a negative and significant effect on fuel expenditure in KPK and negative but nonsignificant impact on fuel expenditure in Punjab.

Table 3

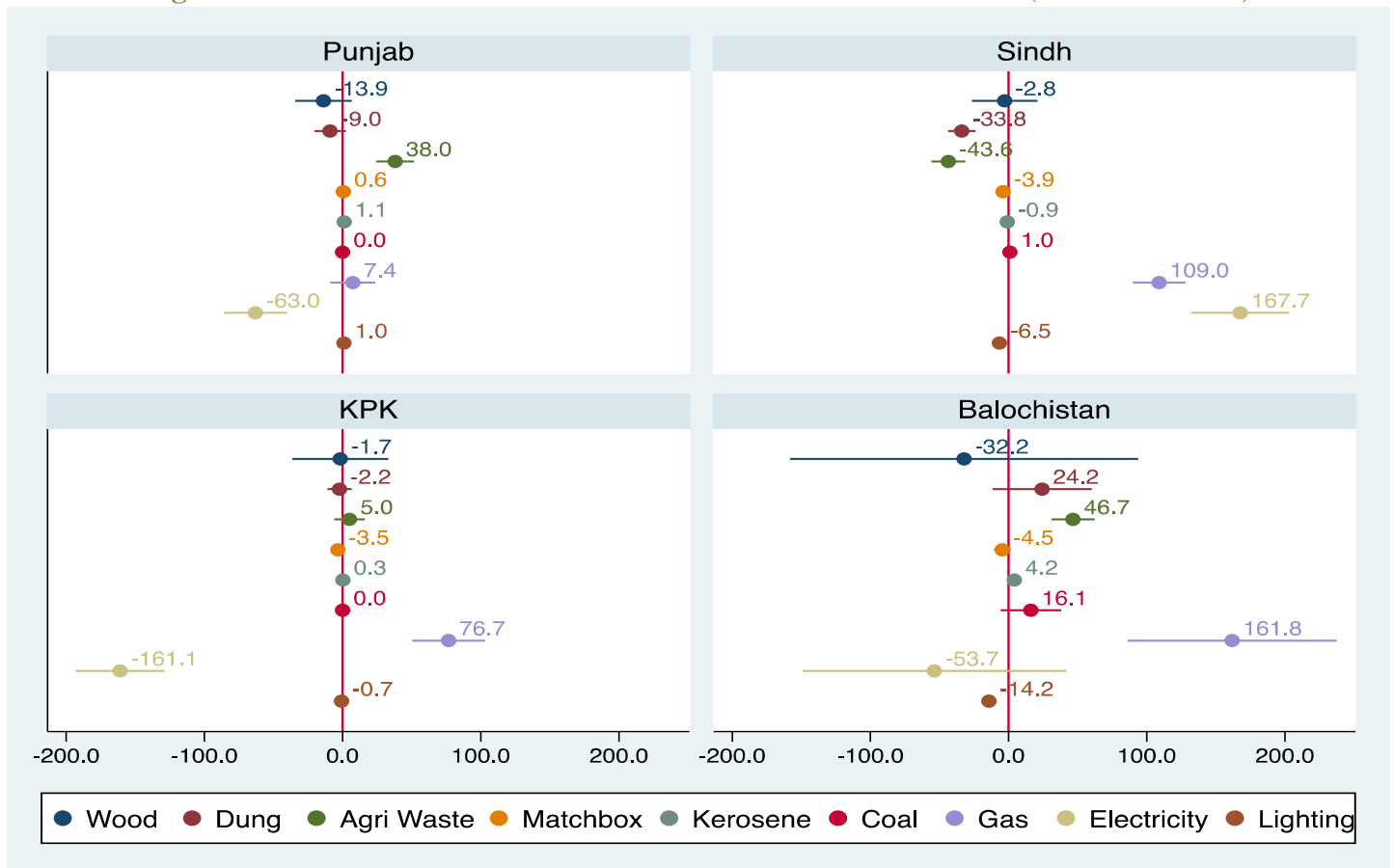
Impact of Cash Transfer on Overall Fuel Consumption: Provincial Analysis

Models	(1) Punjab	(2) Sindh	(3) KPK	(4) Balochistan
RDD Estimates (bias-corrected)	-13.72 (19.06)	181.29 (21.43)***	-68.13 (27.75)**	181.41 (84.07)**
Sample Size Left of Cutoff	1809	1417	1021	322
Sample Size Right of the Cutoff	2106	1336	1240	284

Source: Nawaz and Iqbal (2020).

To observe the income and substitution effects of BISP cash transfer, they conducted an empirical analysis of the various components of fuel at the provincial level. BISP cash transfer hurts wood (although nonsignificant) in all provinces. BISP cash transfer has a positive and significant impact on gas consumption in all provinces (except for Punjab, where it has positive but nonsignificant effects). BISP cash transfer has a positive and significant effect on electricity expenditure only in Sindh, while a negative and significant impact on electricity expenditure in Punjab. The use of agriculture wastes is increasing in all provinces, except for Sindh. The use of dung decreases (although weakly, it is significant) in all provinces, except Balochistan.

Fig. 2. Cash Transfer and Inter-fuel Substitution Across Provinces (Coefficient Plot)



Source: Nawaz and Iqbal (2020).

DISCUSSION

Per capita, fuel expenditures increased with a change in economic status. We expect these findings because cash transfer brings many benefits to the lives of the poor ranging from an increase in food consumption to diversification in livelihood strategies and improvement of overall social and economic status (Ambler & de Brauw, 2017; GoP, 2018). The beneficiaries increase fuel expenditures to meet the increasing fuel demand from food consumption. Total fuel expenditures may also increase due to the growing use of modern fuels such as electricity and gas. The estimation results supported this argument by showing that BISP cash transfers have significantly increased the expenditure of modern fuels, especially gas and the corresponding decreased in wood (Figure 1). Hanna and Oliva (2015) argued that the increase in fuel expenditure could have been due to switching to expensive fuels like electricity or from cooking more or using more light with traditional fuels, or some combination of both. The positive association between BISP cash transfer and share of fuel expenditure to total expenditure reflects a substitution between fuel and non-fuel products.

Provincial analysis signifies the importance of regional heterogeneities in shaping fuel choices. The accessibility of different fuels, along with the existing fuel mix, determines the level of substitutability between different fuels and total fuel expenditures. The results have shown that BISP cash transfers lead to higher per capita fuel expenditures in Sindh and Balochistan while reduces the expense in KPK. From these results, we cannot infer that fuel consumption has decreased in KPK while increased in Sindh and Balochistan. The net impact may depend on changing the fuel type from traditional fuel to modern fuel and from the use of each component. The results have shown that BISP cash transfer hurts wood consumption (although nonsignificant).

In contrast, it has a positive impact on gas consumption in all provinces (except for Punjab, where it has a positive but nonsignificant effect). This result shows that the BISP cash transfers induce the use of modern fuels due to economic empowerment. The apparent reason for the reduction in the use of wood could be the availability of alternative fuels, mainly gas and electricity. The last few years have shown a substantial increase in rural electrification and the supply of gas (GoP, 2019). However, the substitution between traditional fuel and modern fuel components varies across the provinces, which signifies the role of regional heterogeneities in shaping fuel choices.

POLICY IMPLICATIONS

The results have three policy implications for developing countries like Pakistan.

- (i) *Increasing demand for modern energy due to cash transfer requires continuous investment in the energy sector:* Improving economic condition through unconditional cash transfer would result in a substantial increase in energy demand, particularly gas and electricity. The expansion in the cash transfer program, as envisaged by the government, would require a reasonable investment in the energy sector to ensure an uninterrupted supply of sources of modern fuels such as gas and electricity. Various studies have shown that Pakistan is facing a severe electricity supply shortage, causing forced blackouts, especially in rural areas (Irfan, Zhao, Ahmad, & Mukeshimana, 2019; Nawaz, Iqbal, & Anwar, 2013, 2014; Valasai et al., 2017). Estimates show that the electricity shortage has reached 6000 megawatt and is aggravating due to rural electrification (Awan, Samad, & Faraz, 2019). One of the main reasons behind the widening gap between demand and supply is an increasing demand for electricity (Valasai et al., 2017). Increased electricity demand, particularly from the lower quintiles, would add further stress to already overloaded electricity systems. The government would pay special attention to develop more energy-efficient products to overcome future needs. More than 40 million people do not have access to electricity across the country (IEA, 2020). Among them, around 36 percent of poor people do not have access to power. Therefore, the government should focus on expanding and improving energy supply systems to meet the growing energy demand resulted from poor people. The significant association between economic well-being and fuel expenditures among the poorest segments of the society requires inclusive economic and energy policies for sustainable development.
- (ii) *Regional heterogeneities matter in shaping the interfuel substitution due to cash transfer:* Interfuel substitution varies across provinces, implying that the impact of BISP cash transfer on interfuel substitution may vary across regions due to contextual factors like availability of fuels and their prices. Therefore, any effort to increase the use of modern fuel should consider the role of regional *heterogeneities*.
- (iii) *Increasing the use of traditional fuel poses enormous health challenges:* The results confirm that the target group increases the use of traditional fuels owing to the flow of money from the cash transfer program. This increase raises severe implications for the health of the poor. On the other hand, studies show that household electrification can lead to a significant reduction in household air pollution (Barron & Torero, 2017). The use of modern fuels eventually leads to better health outcomes and a reduction in gas emission in developing countries (Barron & Torero, 2017; Hanna, Duflo, & Greenstone, 2016). Hence, the government should ensure the availability of modern fuel to overcome the rising demand for traditional fuel due to cash transfer. Hanna and Oliva (2015) propose that additional interventions (one may suggest awareness programs or subsidies on modern fuels) may facilitate the transition from traditional fuels to modern fuels.

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