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Evaluating the Short Run and Long Run Impacts of Unconditional Cash Transfers on Food-Seeking Behaviour: New Insights from BISP, Pakistan

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We examine the impact of the cash transfer programme on food-seeking behaviour among ultra-poor segments of society. Food-seeking behaviour includes per adult's daily calorie intakes, food diversity, stable availability of food, and a composite index of food security. The empirical analysis is based on three rounds of panel household surveys (2011, 2013, and 2016) using the regression discontinuity design (RDD). The results have shown that BISP beneficiaries, relative to non-beneficiaries, have a higher level of calorie intakes. The cash transfer helps them diversify their food basket with stable food availability and improved food security level in both short and long-run periods. Moreover, BISP cash transfer increases access to quality food groups such as meat, fish, and fruits in the long run. These beneficial influences of the cash transfer reveal much stronger long-run impacts as compared to short-run effects. The findings of this paper provide helpful policy insights related to the importance of the cash transfer programme. The BISP cash transfer appears to be an effective social assistance programme that holds sustainable long-run effects on ensuring household food and dietary requirements through incomeand substitution effects.

Keywords: Food-seeking Behaviour, BISP Cash Transfer, Regression Discontinuity Design (RDD)

1. INTRODUCTION

We explore the impacts of the cash transfer programme, namely the Benazir Income Support Programme (BISP), on food-seeking behaviour among the ultra-poor in Pakistan. The standard microeconomic theory regarding consumer behaviour suggests that the positive income increases normal goods consumption. The Angel curve describes the positive relationship between income and consumption; specifically, households are more tending to spend a significant share of their income on food items (Almas, et al. 2019; Ibok, et al. 2019; Ren, et al. 2018; Gupta, 2009; Deaton, 1980). The low-income households are confined to demonstrating a low consumption pattern due to their budget

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constraints. Financial constraint impedes them from meeting their dietary requirements, especially when they are exposed to the idiosyncratic and covariate shocks. Given the limited resilience of the vulnerable households, their consumption pattern is contracted, enhancing the probability of becoming chronic food insecure (Khan and Shah, 2011; Arif and Bilquees, 2007). Therefore, any assistance in the form of additional income would be expected to impact the consumption pattern of the poor households positively, ultimately supporting them to increase their food consumption to meet their dietary requirements. Such food security improvement comes across due to a positive income effect (Hameed, et al. 2021; Akbar, et al. 2020; Almas, et al. 2019).

The implementation of cash transfers (CTs) is considered the most prominent form of additional income, primarily provided to address the prevalence of hunger and poverty among ultra-poor households in developing countries (Bhala, et al. 2018; Handa, et al. 2018). The world has experienced a rapid increase in the provisions of cash transfer programmes (CTPs) as a policy option to achieve sustainable development goals (SDGs) because CTPs are found significantly contributing to poverty reduction (World Bank, 2017). In line with the global cash transfer trend, Pakistan launched the Benazir Income Support Programme (BISP) as its flagship programme to achieve consumption smoothening among the ultra-poor against negative economic shocks. Impact assessment reports and available literature regarding BISP have documented the positive and significant impact of the programme on food consumption due to the positive income effect, helping the beneficiaries improve their food security (Iqbal, et al. 2020; Mustafa, et al. 2019; GoP, 2014).

Like BISP, evidence from other social protection programmes for developing countries demonstrates that cash transfers have shown positive and significant impacts on poverty reduction and food security through consumption smoothing due to a positive income effect (Almas, et al. 2019; Masino and Nino-Zarazua, 2019; Cirrilo and Giovannetti, 2018; Asfaw, et al. 2017; Bazzi, et al. 2015; Attansio and Lechene, 2014; Angelucci and Giorgi, 2009). Various studies have used calorie intake, food consumption, and food diversity score as the food security indicators (Burgh, et al. 2018; Ahmed, et al. 2016; Ahmed and Farooq, 2010; Swindale and Blinsky, 2006). The results suggest that CTs are causing an increase in daily kilocalorie intakes among the beneficiaries (Bhalla, et al. 2018; Todd and Gregory, 2018; Hidrobo, et al. 2018; Whiteman, et al. 2018; Tiwari, et al. 2016; Miller, et al. 2011).

Most of the available studies focus on the influences of cash transfers on overall food security or food expenditures. Still, little attention is paid to the behavioural change of the beneficiaries as they receive additional income in the form of cash transfers. The question arises how do cash recipients substitute low-quality food items for nutritious food items? What food items are beneficiaries purchasing due to the positive income effect that emerges through cash transfer. The aforesaid questions lead to understanding the nature of the food-seeking behaviour of the beneficiaries.

The answer to such questions is partially missing in the literature. Likewise, most of the literature has ignored what happens with food-seeking behaviour over a relatively long period because poor households are highly exposed to covariate shocks, which may leave the impacts of CTs susceptible. Therefore, this study focuses on weaving up these mentioned questions, which are expected to contribute to cash transfers and food security

literature. We explore the short-run and long-run impacts of BISP cash transfers on households' food-seeking behaviour in Pakistan. The programme's design and coverage make it a considerably important case study to achieve the said objectives of the study.

For empirical analysis, fuzzy regression discontinuity design (RDD) has been implemented using three household panel data rounds (2011, 2013, and 2016). Estimated results suggest the positive and significant impacts of cash transfer on beneficiaries' food seeking behaviour—positive income effect encourages beneficiaries to diversify the basket of food items from low quality to higher quality food items, which brings about an increase in overall food security of the beneficiaries in both short-run and long-run periods.

The subsequent part of this paper is given as follows. Section 2 offers a discussion on the theoretical framework, while Section 3 entails programme design, description of data, and methodological framework. Section 4 is furnished with results and discussion. Finally, Section 5 concludes the whole study.

2. THEORETICAL FRAMEWORK

The theory of change supports the two objectives of the BISP cash transfer: short-term and long-term. The short-term objective is to support the poorest people against the adverse effects of food inflation. Nonetheless, long-term disbursement of the BISP-cash amount would allow cash recipients to plan desirable investments in food consumption, nutrition, health, and education. In return, such potential investment would help households to improve human and physical capital, which may graduate them out of chronic poverty (GoP, 2014). The available literature regarding cash transfers has shown the positive and significant impacts of unconditional cash transfers on household wellbeing (i.e., Villa & Nino-Zarazua, 2019; Ribas, 2019; Angelucci, et al**.** 2015; Fiszbein & Scady, 2009; Nawaz & Iqbal, 2020, 2021).

In the short run, the BISP theory of change suggests that cash transfers affect household expenditure: food and non-food expenditures. The medium-term impacts are expected to increase calorie intake and food diversification, ultimately improving the beneficiaries' nutritional status in the long run (Appendix Figure 1). Likewise, non-food expenditure enhances health utilisation and educational attainment in the medium-term; however, it may lead to morbidity and school progression in the long run.

Moreover, the linkages of the BISP cash transfer and household expenditure can be explored in consumer behaviour by Stone Gary's utility function as employed by Kamakura and Mazzon (2015). They proposed that the cash transfer disbursement could affect the budget constraint because additional income enables households to expand their budgetary allocation on food and non-food consumption. Specifically, a cash transfer programme is launched to target extremely poor households. It is also possible that targeted households splurge on more food and non-food goods. There may be an unanticipated shift in consumption preferences due to a budget change.

Kamakura and Mazzon (2015) suggest that the budget allocation model helps understand two different aspects of the consumption patterns of the beneficiaries of the programme compared to the non-beneficiaries. First, this model helps to understand how households spend discretionary income (cash transfer) on consuming food items to increase their calorie intake and nutritional status. Second, this model also helps

understand how poor households prioritise their discretionary income to multiple items, specifically food items. Moreover, this model allows us to compare the behaviour of beneficiaries and non-beneficiaries of cash transfers.

Following Du and Kamakura (2008) and Kamakura and Mazzon (2015), the underlying study transforms their model to the food expenditure to explore the linkage between BISP cash transfer and food outcomes among the beneficiaries. The household maximises direct utility function $G(c_i)$ over a set of j non-negative quantities $c_i\ (c_{1i}, c_{2i}, c_{3i}, \dots c_{ji})$ for all food consumption categories which are subject to budget constraint $p_c c_i = m_i$, where $p_c\ (p_1, p_2, p_3, \dots p_i) > 0$ is the taken for the prices of competing-categories of the food items, while m_i is total income. We use the following Stone Gary utility function:

$$G(c_i) = \sum_{j=i}^{j} \alpha_{ji} \ln(c_{ji} - \beta_j) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

In Equation (1), $\alpha_{ji} > 0$ is indicating the household-specific taste parameter, which reflects the food consumption priorities for different categories with $(c_{ji} - \beta_j)$>0. This allocation household spends more on that category, which produces the maximum marginal utility per unit (rupee) such as $\frac{(\frac{\partial c_i}{\partial c_{ji}}) = \alpha_{ji}}{(c_{ji} - \beta_j)}$, while giving their current food consumption levels c_i and while until budget limit approaches to $\sum_{j=i}^{j} c_{ji} = m_i$. Likewise, Kamakura and Mazzon (2015), the study has specified this model directly on the value splurged on each consumption category by ignoring the prices. Originally this model explains that households' preferences are reflected through expenditure supported by the BISP theory of change. It is also assumed that poor households spend more on food items to meet their dietary requirements. Such dietary requirements increase the food security level of poor households through calorie intake and expansion of the food basket or food diversity.

3. THE PROGRAMME, DATA DESCRIPTION, AND METHODOLOGICAL FRAMEWORK

3.1. Programme Design

BISP is one of the most extensive social protection programmes in South Asia (Watson, et al. 2017). The government of Pakistan launched BISP to cushion the adverse impacts of food inflation in 2008. The BISP was designed to maintain the consumption smoothing of the ultra-poor households. Moreover, the programme's broader objectives were to fulfill the country's redistributive goals by disbursing the minimum level of cash transfer to the ultra-poor households, which is extended to over 5 million beneficiaries (GoP, 2016; Iqbal & Nawaz, 2019, 2021).

In the beginning, beneficiaries were selected through parliamentarians due to the unavailability of data and proper criterion about eligible people, which raises doubts about the transparency and effectiveness of BISP. In the second phase, the "Poverty Scorecard" survey, which is known as National Socioeconomic Registry (NSER), was conducted in 2009-10, which enables BISP administration to calculate

the poverty scorecard using Proxy Mean Testing (PMT) based on 23 socioeconomic predictors of poverty. To identify the eligible for BISP, a threshold of 16.17 was specified. Below this cut-off, those households are considered eligible, which have married women, with some exceptions.[1] These ever-married women must hold Computerized National Identity Card (CNIC). They must register themselves in local offices of BISP to be considered BISP beneficiaries (Ambler and Brauw, 2019; GoP, 2016). Initially, eligible households enrolled under BISP were given Rs. 3000 quarterly. However, the benefit level gets increases steadily. Currently, the BISP transfers are Rs. 6000 quarterly per family.

3.2. Data Description

Three rounds of household panel data, collected by Oxford Policy Management (OPM), to document the BISP impact assessment reports: baseline survey 2011, follow-up survey 2013, and follow-up survey 2016. A baseline survey is conducted from 488 clusters from 90 districts of four provinces, such as Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan. The baseline survey covers 8,675, while follow-up 2013 covers 8,221 same households available in the baseline survey. Some households were dropped during data cleaning due to missing and incomplete information from surveyed households, and we selected data for the base year 2011 is also 8221 households (GoP, 2014). In the follow-up survey in 2016, 11,395 households were surveyed, and out of these, 3,713 households were panel households with a baseline survey. These household surveys contain detailed information on the socioeconomic characteristics of the beneficiary and non-beneficiary (Ambler and de Brauw, 2019; Mustafa, et al. 2019). The sample distribution of the beneficiary and non-beneficiary households available in all three surveys is given in Table 1.

Table 1

Distribution of Sample Size

	Baseline Survey (2011)		1-Follow-up Survey (2013)		3-Follow-up Survey (2016)	
	Beneficiary	Control	Beneficiary	Control	Beneficiary	Control
Punjab	819	2198	802	2215	2397	1982
Sindh	1346	981	1303	1024	2235	1355
KPK	833	1075	820	1088	1635	1096
Balochistan	251	718	251	718	367	328
Pakistan	*4972*	*3249*	*5045*	*3176*	*6634*	*4761*
Total	8221		8221		11395	
Panel Households	–		8221		3713	

[1]These exceptions include households could receive cash transfer which have PMT score between 16.17 and 21.17 conditional on: (1) family containing at least one disable member, (2) presence of at least one senior citizen, and fewer than three members, and (3) households which have four or more children below 12 years.

The key limitation of the above-mentioned dataset is the attrition rate of households. The attrition of households is estimated at 10 percent in follow-up 2013, while almost 50 percent attrition rate in a follow-up survey of 2016 is observed compared to baseline survey 2011. Such a high attrition rate in 2016 has raised the question of the quality of the panel setting of these household surveys (Ambler and de Brauw, 2019).[2]

Due to the high rate of attrition in 2016, the study has utilized the following three settings of survey datasets as Ambler, and de Brauw (2019) have adopted in their study to estimate the impacts of BISP on labour supply in the long-run and short-run: (i) cross-sectional setting of the follow-up survey 2013 of the panel sample with respect to baseline 2011. This helps to investigate the short-run impacts of cash transfer, (ii) the cross-sectional setting of 3700 panel households with respect to the baseline survey, and (iii) the overall cross-sectional sample of the 2016 household survey. Ambler and de Brauw (2019) have used the 2016 survey to estimate the relatively long-run impacts of BISP on labour supply.

3.2.1. *Measuring Food Security*

A composite Food Security Index (FSI) is generated to capture food security's continuous availability and accessibility dimensions. Three indicators are combined to generate FSI: per adult Kilocalorie intake, food diversification, and the number of days food is available during a week. These three indicators are normalised to make indicators unit-free. Then, normalised variables are combined by adopting an equal weighting method. The resultant FSI ranges between 0 and 1. Values ing closer to 1 indicate more food secure a household is, and vice versa.

Kilocalorie intakes are computed using the food consumption module of surveys 2011, 2013, and 2016. Consumption of food commodities is converted to kilograms and liters. Then, the respective commodity is multiplied by the calories recommended in that food commodity. Per adult equivalent is measured by specifying weight 0.8 for less than 15 years and 1 for above 15 years old family members (Peng and Berry, 2019; Carletto, et al. 2013). This approach is widely used in Pakistan to measure per adult equivalent consumption (GoP, 2016; Iqbal and Awan, 2015).

These surveys capture the weekly consumption of 13 food groups. These include wheat, rice, maize, cereal, vegetables, fruits, meat (sheep & goat), beef, poultry, fish, milk and dairy products, eggs, and sugar. Consumption of these food groups determines food diversity. It helps to understand the consumption of quality food items. Food diversification is also measured by counting the 13 groups of food items (Kenny, et al. 2018; Drescher, et al. 2007).

Moreover, food stability is measured by the number of days food groups are available during a week, and the inclusion of this indicator determines the stability dimension of food security (Pangaribowo, et al. 2013). A detailed description of the variable construction is given in Table 2, while descriptive analyses of the variables are given Table 2. In sum, all these food security indicators determine thefood-seeking behaviour of BISP beneficiaries. The descriptive analysis is presented in Table 3 (see Appendix).

[2]See Appendix-B given the study conducted by Ambler and de Brauw (2019). They have tested the how attrition rate affect the results for same data and years of surveys.

Table 2

Brief Description of Variables

Variable Name	Brief Description of Variables	Unit
Treatment Variable	It takes a value of 1 for beneficiaries of BISP, and 0 for non-beneficiaries	Binary
	Outcome Variables	
Food Security Index (FSI)	An index is generated by combining weekly food stability, kilocalorie intake, and food diversity score. Values of index range between 0 and 1. FSI indicates a higher level of food security if values are closer to 1, and vice versa.	Index
Food Diversification	Counting 13 food groups gives a food diversity score for a household. The higher value of the score, the more food diversification.	Number
Kilocalorie Intakes	Kilocalories of consumed food commodities are multiplied by consumption of respective food items and divided by per adult equivalent score.	Kilogram
Food Stability	Food stability is measured by the average number of days access to all food groups in a week.	Days
	Control Variables	
Dependency Ratio	The ratio of non-working age groups (less<15+above 64 years) to working age group (15-64 years)	Ratio
Female Ratio	The ratio of total female members to total male members in a household	Ratio
Head's Education	Completed years of schooling	Years
Gender of Head	The binary variable takes 1 for male, 0 otherwise	Binary
Age of Head	Age of household head up to survey is being conducted	Years
Household Income	Total monthly income earned by all family members	PKR

3.3. Methodological Framework

3.3.1. *Identification Strategy and Relevant Issues*

As we have discussed earlier, the eligibility criterion of BISP cash transfer is based on the cut-off point of the PMT score, which makes BISP receipt non-random. To evaluate programme impacts, a simple comparison between treatment and control groups is not practical because it could confound the programme's effects with other systematic differences between beneficiaries and non-beneficiaries. The design of the programme is congruent with the implementation of RDD,[3] which provides a comparison between marginally ineligible and eligible households (above and below 16.17 PMT score). This design estimates the local average treatment effect (ATE) owing to its local nature,

[3]Regression discontinuity design (RDD) is a widely used method to quantify the impact of intervention. In RDD, probability of assigning treatment is conditional on observed covariate jumps discontinuously at the threshold, which induces variation in treatment assignment that assumed to be uncorrelated with potential confounders. It was firstly introduced by Thistlewaite and Campbell (1960). However, during last decades, a growing body of literature has implemented RDD to evaluate impacts of some public programmes (Imbens and Lemieux, 2008; Lee and Lemieux, 2010; Imbens and Kalyanaraman, 2012; Calonico, et al. 2016; Ambler and de Brauw, 2019).

covering households closer to both sides of the eligibility criterion (Ambler and de Brauw, 2019). Furthermore, it can be sharp and fuzzy RDD.[4] Nonetheless, as far as BISP is concerned, a fuzzy RDD seems more intuitive compared to sharp discontinuity because there are some households lying below 16.17 cut-off, but they are not receiving a transfer. Similarly, few households are lying above the eligibility threshold; however, they are receiving cash transfers. Such eligibility of households is because of some exceptions of eligibility of BISP. In this case, BISP poverty score is taken as instrument, which allows implementing fuzzy RDD empirical strategy. In line with other studies, this paper implements fuzzy RDD to evaluate the impacts of cash transfer (GoP, 2016; Ambler and de Brauw, 2019; Nawaz and Iqbal, 2020, 2021). The fuzzy RDD estimator employs a local linear regression, and it includes data-driven bias correction.[5] The estimator applies a triangular kernel for data included in regression analysis (Lee and Lemieux, 2010). The specification of the RDD is given as follows.

$$Y_i = \beta_0 + \lambda BISP_i + \beta_1(X - c) + \beta_2 BISP * (X - c) + \mu_i \quad \ldots \quad \ldots \quad (2)$$

Equation (2) suggests that Y_i represents the outcome variable such as per adult equivalent calorie intakes, food diversity score, stable availability of food, and composite food security index, while c represents the poverty score cut-off for BISP 16.17, and X is the continuous poverty score variable, and while BISP is a binary variable which takes value 1 if X ≥c, which also indicates the BISP cash transfer binary variable (treatment variable). Let h be the bandwidth of the data which indicates c-h≤ X ≤ c + h, which indicates the range of h, just above and below the cut-off of the BISP poverty score. For the empirical purpose, the underlying study has implemented fixed bandwidths 5 & 3, and optimal bandwidth is also used to estimate the robustness of the results. Due to bandwidths at threshold, RDD provides a local average treatment effect e.g. $BISP(for1) - BISP(for\ 0) = \lim_{\varepsilon \downarrow 0} E[Y_i | X_i = c + \varepsilon] - \lim_{\varepsilon \uparrow 0} E[Y_i | X_i = c + \varepsilon]$. In simple words average local treatment effect compares the average outcomes of treatment group with the control group at the threshold e.g. $E[Y_i(\text{beneficiries}) - Y_i(\text{controle group}) | X = c]$. The specification indicates that the RDD approach holds internal validity, but it may fail to hold external validity regarding the programme's impact on outcome variables (Calonico, et al. 2018).

There are some assumptions regarding RDD: First, the identification assumption to implement RDD validates the differences between the outcome of beneficiaries and non-beneficiaries only reveal through BISP impacts. It demonstrates that the presence of systematic differences between these two groups do not vary discontinuously at 16.17, an eligibility poverty score cut-off. Ambler and de Brauw (2019) and GoP (2014) have found that this problem is not attached to BISP, because no other social safety net in the country uses the same eligibility threshold level. The second important task is to demonstrate discontinuity, which means that it should be confirmed whether BISP targeting is intended or not. If targeting is not intended, then applying RDD by using eligibility cut-off is invalid. The design of BISP targeting is intended due to the

[4] To see difference between sharp and fuzzy RDD can be reviewed from Lee and Lemieux (2010).

[5] To estimate fuzzy RDD, we implement "rdrobust" command using the STATA software. This implementation provides bias-corrected confidence intervals (CIs) for local ATE at specified threshold for both sharp and fuzzy RD as described by Calonico, et al. (2016).

specification of the cut-off (16.17). Thirdly, the manipulation of the forcing variable will invalidate the implementation of RDD. Logically, it seems very difficult because the PMT score is constructed based on 23 indicators which makes households unable to manipulate it. Individuals can only show themselves as poor, but it may take them very far from the cut-off point. Ambler and de Brauw (2019) have suggested that no evidence of manipulation around cut-off is found through the implementation of statistical tests. This study also estimated the impact of the probability of being a BISP beneficiary on socioeconomic characteristics in the base year 2011. The results indicate that the RDD implementation endorses this assumption's validation. A detail description of the application of this test is given in Table 4 (see appendix).

4. RESULTS AND DISCUSSION

4.1. BISP Cash Transfer and Households' Food-seeking Behaviour— Food Security Analysis

Table 5 comprises the short run (from baseline survey 2011 to follow-up survey 2013) impacts of BISP cash transfer on households' food outcomes, which are pursued by households' food consumption behaviour. The estimated results from robust RDD have suggested that BISP cash transfer has a positive impact on the food security index (FSI) for those households which are lying around the eligibility with a fixed bandwidth of 5 during the years of baseline 2011 to the follow-up 2013. It implies that recipients of BISP cash transfer tend to more consuming on food items, which ultimately improves, on average, the food security index of beneficiaries by 0.34 points as compared to non-beneficiaries of the programme in the short run.

To check the sensitivity of the findings, we have changed the fixed bandwidth from 5 to 3, which would further reduce the sample. The findings remain positive and statistically significant in the case of fixed bandwidth of 3, which demonstrates that those beneficiaries who are lying around fixed bandwidths of 3 are found to have much-improved level of food security index by 0.98 points as compared to the control group during 2013. These findings further imply that those beneficiaries who nearer to the threshold point are found to enjoy relatively higher level of food security. Nonetheless, in the case of optimal bandwidth, effects are not significant (Table 5).

Moreover, the study used a follow-up survey in 2016 as a relatively long period. It is discussed in section 3.2 that the follow-up survey will be used for only panel households and the whole sample separately. Table 6 suggests that BISP recipients are experiencing a higher level of food security at fixed and optimal bandwidths. In the case of both panel sub-sample of follow-up 2016 and its full sample, the impacts of BISP cash transfer are estimated to be positive and significant. And these impacts remain consistent in all fixed bandwidth (5&3) and optimal bandwidth around the cut-off point of the BISP poverty score, although the estimates are relatively smaller than the estimates of 2013.

The results demonstrate that RDD estimates of food diversity score (FDS) are found statistically insignificant at both fixed and optimal bandwidths. These results reveal that BISP transfer does not have impact on the food diversity of beneficiaries during baseline 2011 to the follow-up 2013 (see Table 5), while in the long run (follow-up 2016), the BISP cash transfer has positive and significant impacts on food diversity score

Table 5

BISP and Households' Food Outcomes: Cross Section 2013 (Panel Households)

	(1) Food Diversity Score (FDS)	(2) Daily Kilocalorie Intake	(3) Food Stability (FS)	(4) Food Security Index (FSI)
		Bandwidth (h)=3		
Bias-corrected RD estimate	–1.604	9.637*	1.259*	0.984**
	(1.077)	*(5.660)*	*(0.718)*	*(0.321)*
Sample size left of the cut-off		1936		
Sample size right of the cut-off		2134		
		Bandwidth (h)=5		
Bias-corrected RD estimate	–0.631	4.484**	0.589*	0.340**
	(0.441)	*(1.855)*	*0.3531)*	*(0.1730)*
Sample size left of the cut-off		2932		
Sample size right of the cut-off		2256		
	One common MSE-optimal bandwidth			
Bias-corrected RD estimate	–0.09519	–0.63105	.33623	.05918
	(3.2164)	(*2.3687)*	*1.0969)*	*(0.5309)*
Sample size left of the cut-off	938	896	937	944
Sample size right of the cut-off	906	843	865	912
Bandwidth (h)	1.337	1.240	1.318	1.368
Bandwidth bias (b)	2.195	2.092	2.171	2.171
Overall sample size		8159		
Sample size left of cut-off		5484		
Sample size right of cut-off		2666		

Source: Author's own calculations. Significance level *** p<0.01, ** p<0.05, * p<0.1.

Note: Standard errors are in parentheses. These standard errors are obtained by clustering PSUs. Baseline (year-2011) variables are controlled, which include log of monthly household income, female ratio, dependency ratio, gender of head, age and education of head, and baseline respective outcome variable.

by 17 percent to 20 percent among the beneficiaries as compared to the non-beneficiaries which are lying around 5 & 3 fixed bandwidths and optimal bandwidth as well (Table 6). It implies that no significant difference exists between treatment and control groups in seeking the food diversity score in the short run (during 2013), but strong statistically significant differences between both groups in seeking a food diversity score are found in the long run (follow-up 2016).

Another indicator of the composite food security index (FSI) is daily per adult equivalent kilocalorie intakes. RDD estimates for the short run indicate that BISP transfer contains positive and significant impacts on daily kilocalorie intakes at fixed bandwidths of 5 & 3, while insignificant at optimal bandwidth around poverty score cut-off (Table 5). Likewise, follow-up 2013, BISP cash transfer demonstrates the positive and significant impacts on daily kilocalorie intakes, which are estimated for both panel sample and a full sample of 2016. These positive and significant impacts are observed at both fixed and optimal bandwidths. The findings for long run imply that BISP cash transfer helps the beneficiary households increase their calorie intakes by 13 percent to 30 percent compared to non-beneficiary households (Table 6).

Food stability (FS), estimated by average days in a week availability of all food groups, is also used as an indicator of composite FSI. BISP positive and significant effects on determining food stability among beneficiaries compared to non-beneficiaries who are around fixed bandwidth at the poverty score cut-off (see Table 5). RDD results for the long run (see Table 6) indicate that BISP transfer has positive and significant impacts on the food stability of panel beneficiaries at fixed and optimal bandwidths around the poverty cut-off.

Table 6

RDD Estimation for BISP Cash Transfer and Households' Food Outcomes: Follow-up 2016

	Cross section follow-up 2016 (only panel sample)				Cross section follow-up 2016 (full sample size)			
	(1) Food Diversity Score (FDS)	(2) Daily Kilocalorie intake	(3) Food Stability (FS)	(4) Food Security Index (FSI)	(5) Food Diversity Score (FDS)	(6) Daily kilocalorie Intake	(7) Food Stability (FS)	(8) Food Security Index (FSI)
	Bandwidth (h)=3				**Bandwidth (h)=3**			
Bias-corrected RD estimate	0.176*** *(0.059)*	0.134** *(0.054)*	0.094* *(0.055)*	0.112*** *(0.016)*	0.061*** *(0.020)*	0.052*** *(.020)*	0.211*** *(0 .017)*	0.205*** *(0.006)*
Sample size left of the cut-off		781				3231		
Sample size right of the cut-off		651				3080		
	Bandwidth (h)=5				**Bandwidth (h)=5**			
Bias-corrected RD estimate	0.165*** *(0.049)*	0.301*** *(0.044)*	0.126*** *(0.045)*	0.090*** *(0.013)*	0.041** *(0.017)*	0.039** *(0.018)*	0.624*** *(0.015)*	0.251*** *(0.005)*
Sample size left of the cut-off		1228				4575		
Sample size right of the cut-off		998				4972		
	One common MSE-optimal bandwidth				**One common MSE-optimal bandwidth**			
Bias-corrected RD estimate	0.201** *(0.09138)*	0.026 *(0.067)*	0.136** *(0.069)*	0.096*** *(0.023)*	0.066** *(0.0318)*	0.062* *(.03379)*	-0.008 *(0.0251)*	0.214** *(0 .00921)*
Sample size left of the cut-off	400	497	466	357	1322	1059	1425	1386
Sample size right of the cut-off	342	419	372	299	1093	850	1215	1161
Bandwidth (h)	1.704	2.067	1.861	1.445	1.149	0.872	1.264	1.214
Bandwidth bias (b)	2.950	3.619	3.290	2.758	2.168	1.741	2.271	2.081
Overall sample size (HH)		3427				11322		
Sample size left of cut-off (HH)		2429				6351		
Sample size right of cut-off (HH)		998				4971		

Significance: *** p<0.01, ** p<0.05, * p<0.1

Note: Standard errors are in parentheses. These standard errors are obtained by clustering PSUs. Baseline (year-2011) variables are controlled, which include log of monthly household income, female ratio, dependency ratio, gender of head, age and education of head, and baseline respective outcome variable.

4.2. BISP Cash Transfer and Households' Food-seeking Behaviour— Choice of Food Items

The previous discussion has revealed the positive and significant influences of cash transfer on household food security, which is measured by calorie intakes, food

diversity score, stable availability of food, and composite food security index on the basis of aforesaid three indicators. But, this analysis does not explain how households' behaviour changes when they have to make choices regarding different food items due to BISP cash transfer. RDD implementation with a fixed bandwidth of 5 around the cut-off of poverty score indicates that, in the short run, BISP cash transfer significantly affects the weekly availability of rice, vegetables, meat, poultry, fish, milk, eggs, and sugar product. These findings substantiate that beneficiaries tend to consume more rice, vegetables, poultry, fish, eggs and sugar products compared to the non-beneficiaries during the periods of baseline 2011 and follow-up 2013, while a reduction has been observed in the consumption of meat and milk products in short run. Furthermore, RDD estimation indicates that wheat, maize, cereal, fruits, and beef products are statistically insignificant, which demonstrate that beneficiaries and non-beneficiaries of the programme contain insignificant difference in aforesaid food items in short run (Table 7).

While relatively long-run analysis demonstrates that beneficiaries of BISP cash transfer are showing tendency to increase the consumption of wheat, rice, maize, vegetables, meat, eggs, fruits, and poultry related products during baseline 2011 to the follow-up 2016, as compared to the non-beneficiaries. BISP cash transfer helps the beneficiaries to increase the fruits and meat products in the follow-up survey 2016 as compared to 2013. In contrast, cereal and milk products tend to be decreased by the beneficiaries even in the long run (Table 7). A similar trend in households' food consumption behaviour is estimated in the full sample of follow-up 2016 with additional households.

Table 7

RDD Application on the Availability of Different Major Food Group

	(1) Wheat	(2) Rice	(3) Maize	(4) Cereal	(5) Vegetable	(6) Fruits	(7) Meat	(8) Beef	(9) Poultry	(10) Fish	(11) Milk	(12) Eggs	(13) Sugar
Bandwidth=5	**Cross section of follow-up 2013 (panel sample)**												
RD estimate	–0.0429	3.865	0.5316	1.6785	5.5387	–1.680	-1.279	-0.112	1.135	1.665	–0.220	3.700	1.8886
	(0.821)	*(2.385)*	*(1.580)*	*(1.303)*	*(2.315)*	*(1.266)*	*(0.311)*	*(0.640)*	*(0.687)*	*(1.691)*	*(1.793)*	*(1.691)*	*(0.911)*
p-values	0.601	0.105	0.359	0.198	0.017	0.185	0.000	0.860	0.099	0.010	0.029	0.072	0.038
Left of cut-off	2918	2918	2918	2918	2918	2918	2918	2918	2918	2918	2918	2918	2918
Right of cut-off	2251	2251	2251	2251	2251	2251	2251	2251	2251	2251	2251	2251	2251
Full sample size	Total sample size=8120, Total sample left of cut-off=5467, Total sample right of cut-off=2623												
Bandwidth=5	**Cross section of follow-up 2016 (panel sample)**												
RD estimate	0.8603	1.2934	0.4583	–0.3818	1.1661	0.8307	0.0930	0.0793	0.2962	0.0631	–1.2131	0.7521	0.0424
	(0.265)	*(0.449)*	*(0.214)*	*(0.128)*	*(0.407)*	*(0.256)*	*(0.043)*	*(0.126)*	*(0.169)*	*(0.095)*	*(0.445)*	*(0.417)*	*(0.224)*
p-values	0.001	0.004	0.033	0.003	0.004	0.001	0.032	0.531	0.081	0.509	0.006	0.072	0.850
Left of cut-off	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227	1227
Right of cut-off	998	998	998	998	998	998	998	998	998	998	998	998	998
Full sample size	Total sample size=3426, Total sample left of cut-off=2428, Total sample right of cut-off=998												
Bandwidth=5	**Cross section of follow-up 2016 (total sample size)**												
RD estimate	0.2016	0.3143	0.2412	0.0107	.0189	0.1311	0.0503	0.1339	0.1394	0.0773	-0.3933	0.4544	-0.0607
	(0.089)	*(0.194)*	*(0.090)*	*(0.054)*	*(0.163)*	*(0.099)*	*(0.018)*	*(0.042)*	*(0.062)*	*(0.041)*	*(0.153)*	*(0.145)*	*(0.054)*
p-values	0.024	0.107	0.008	0.842	0.908	0.186	0.007	0.002	0.025	0.060	0.010	0.002	0.266
Left of cut-off	4573	4573	4573	4573	4573	4573	4573	4573	4573	4573	4573	4573	4573
Right of cut-off	4972	4972	4972	4972	4972	4972	4972	4972	4972	4972	4972	4972	4972
Full sample size	Total sample size=11325, Total sample left of cut-off=6353, Total sample right of cut-off=4972												

Note: Standard errors are given in parentheses, which are adjusted for clusters in PSUs. Baseline household characteristics are used as covariates such as *gender of head, age of head, education of head, log of monthly household income in the baseline survey, female ratio, and dependency ratio*

Aforesaid results conclude that: (i) beneficiaries of BISP cash transfer have experienced the increase in diversification of food items, (ii) the positive income effect due to BISP cash transfer helps households to shift their food intakes from standard food items to more nutritious food items such as fish, meat, beef, and fruits, and (iii) long-run impacts are much stronger and significant as compared to the short run impacts of the BISP cash transfer because in short run programme beneficiaries are not showing the higher level of fruit and meat consumption. Finally, a decrease in milk products is continuously observed amongst the BISP cash-receiving households in both the short and long run.

5. CONCLUDING REMARKS

Cash transfers are among the important policy tools to combat poverty and food insecurity in developing countries, including Pakistan. Pakistan launched the BISP as a national cash transfers programme to address poverty and food insecurity. This study investigated the short-run and long-run impacts of unconditional cash transfer programme on food-seeking behaviour as measured in food diversity, quality, and access among the deprived segments of the society in Pakistan. The empirical analysis is based on three rounds of panel household surveys using the Regression Discontinuity Design (RDD). Three rounds were conducted in 2011, 2013, and 2016. The RDD with data-driven biased correction in CIs is implemented by specifying fixed and optimal bandwidths at the eligibility cut-off.

The estimated results show that BISP cash transfer has positive and significant impact on the level of food security among recipients of cash transfers in both short- and long-run periods. Similarly, results obtained by RDD reveal positive impacts of cash transfer on food stability and daily kilocalorie intakes in both periods; nonetheless, long-run effects are found much stronger among beneficiaries. Findings regarding impacts on food diversity score showcase insignificant impacts in the short run; but significant effects in the long run (follow-up 2016) are estimated. Further results highlight that BISP beneficiaries are increasing consumption of quality food products such as meat, fish, and fruits along with vegetables and rice products in the long run. Results obtained from comparing the mean difference of food outcomes validate results obtained through implementation of RDD empirical strategy except findings regarding food diversity score for the short run. A simple mean comparison without using regression analysis indicates a significant difference in food diversity score between both follow-up 2013 and baseline survey 2011.

Findings of this paper provide useful policy insights related to the importance of the cash transfers programme. The BISP cash transfer appears to be an effective social assistance programme that holds sustainable long-run effects on ensuring household food and dietary requirements through income and substitution effects. Therefore, it is suggested that government should continue this programme and extend it up to the nutrition-specific outcomes for ultra-poor households to meet their dietary requirements.

APPENDIX

Table 3

Summary Statistics: Base Year (2010-11)

	(1) Beneficiaries	(2) Non-beneficiaries	(1)-(2) Mean difference	p-value
Daily per adult Kilo calorie intakes	1972.304	1985.122	-12.818	0.525
Food diversity score	5.510907	5.586911	-0.076004	0.109
Food security index	0.383569	0.391563	0.007994	0.568
Household size	7.587253	7.093875	0.493378	0.000
Dependency ratio	1.207877	1.382223	-0.174346	0.000
Female ratio	1.190612	1.192214	-0.001602	0.938
Unemployed ratio	1.762281	2.003495	-0.241214	0.000
Head age	45.0531	46.40717	-1.35407	0.000
Head education	2.007157	2.468231	-0.461074	0.000

Table 4

Household's Demographic Variables in Baseline 2011

	Head gender	Marital status of head	Head education	Dependency ratio	Family size
		Fixed Bandwidth 5			
RDD Estimate	-0.465	-0.0872	-0.279	-0.073	0.565
S.E	(0.621)	(0.216)	(0.309)	(0.065)	(0.723)
Sample size right of poverty score	985	985	985	985	985
Sample size left of poverty score	1220	1220	1220	1220	1220
Household asset variables in baseline-2011					
	Own house	Has Mud-house	No. of rooms	Has toilet	Livestock ownership
		Fixed Bandwidth 5			
RDD Estimate	0.074	0.014	0.034	0.078	0.089
S.E	(0.079)	(0.065)	(0.027)	(0.073)	(0.087)
Sample size right of poverty score	985	987	983	981	984
Sample size left of poverty score	1218	1218	1220	1216	1218

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