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## Impact of the agriculture debt waiver debt relief scheme on the consumption expenditure of smallholder farmers

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**Abstract** The frequent announcements of loan waivers have drawn attention to their impact on various aspects of rural livelihoods. Using a difference-in-difference approach, this paper investigates the impact of the agriculture debt waiver debt relief scheme (2008) on the consumption expenditure of smallholder farmers on food and non-food items. We do not find any significant difference in the consumption expenditure on food or non-food items, both categories showed increased consumption expenditure over time without the loan waiver.

**Keywords** Agricultural credit, loan repayment, consumption expenditure

**JEL classification** Q14, G21, D12

### 1 Introduction

The effectiveness of loan waivers has been an important issue in policy debates for several years. Economic arguments in favour of stimulus programmes operating through credit markets rest on the premise that such policies will prevent excessive deadweight losses from foreclosure if households are unable to insure themselves against macroeconomic shocks (Bolton & Rosenthal 2002). However, it is often argued that debt waiver programmes are counterproductive and offer minimal gains. Gupta and Chakraborty (2013) assert that repeated loan waivers distort households' incentive structure away from productive investments and towards unproductive consumption and wilful defaults. Arguably, the impact of relief schemes depends on the extent to which the implementation is group-focused. The proper execution of the schemes can pave the way for rural development and financial inclusion. Frequent loan waivers, often politically motivated, have hastened the process of the erosion of the rural credit delivery system (Pande et al. 2005).

The Indian rural credit system is characterized by the coexistence of formal and informal lenders. These two

sources of credit differ in terms of ensuring repayments of loans. Screening and monitoring are vital in ensuring repayments. Due to asymmetric information on potential borrowers and the high cost of acquiring information, formal lenders discriminate against small borrowers (Wenner 1995). In contrast, the social proximity of informal lenders ensures better screening and monitoring mechanisms. This paper uses the difference in loan sources of small farmers as the premise for analysing the treatment effects of the Agriculture Debt Waiver Debt Relief Scheme (ADWDRS).

Earlier studies examining the impact of the ADWDRS have had mixed results. Kanz (2012) finds that 'despite the substantial benefit to individual households, the bailout did not attenuate the problems of debt overhang or increase the productive investment among recipient households'. On studying the impact of the ADWDRS on well-being, Robert (2012) finds that debt relief had a 'lasting effect on life satisfaction'. However, there is no detectable effect on happiness. The literature lacks empirical evidence on the impact of the ADWDRS on the daily consumption and expenditure of farmers on food and non-food items. An important contribution to the literature of loan waivers in India by Gupta and

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**Table 1. Extent of debt relief by classification and location**

	Regular districts	Special districts <sup>2</sup>
Small/marginal farmers	100% waiver	100% waiver
Other farmers	25% relief (only if remainder paid)	25% or Rs 20,000 relief (whichever is greater; only if remainder paid)

Source: Robert (2012)

Chakraborty (2013) relates to the Uttar Pradesh Rin Maafi Yojna, which shows a 28% increment in annual consumption after controlling for covariates like interest rate, yearly income of households and the amount of loan received.

Smallholder farmers<sup>1</sup> have always been at a disadvantage because of their small land size, low income and resource constraints. The consumption expenditure of marginal and small farmers exceeds their income by a substantial margin; presumably, the deficit is plugged through borrowings or other means (NCEUS 2008). In addition, the absence of credit markets and the asymmetry of information lead farmers to make sub-optimal credit decisions. Therefore, government assistance in reducing the credit constraints and indebtedness of farmers affects their consumption and expenditure patterns. The ADWDRS provides the scope for studying the impact of such assistance on such households.

This paper focuses on the full loan waiver component of the ADWDRS for smallholder farmers. I employ a difference-in-difference (DID) approach in studying the impact of this scheme on food and non-food categories consumed over a span of one year. One of the advantages of using this approach is that it assumes confounders varying across the groups do not change over time and time-varying confounders are group-invariant (Gomez et al. 2018). Our findings indicate significant variation in village and year fixed effects. This has potentially reduced the impact of the ADWDRS. No significant impact of the scheme was found on the consumption of or expenditure on food or non-food items. This is not consistent with the findings of Gupta and Chakraborty (2013), probably

because they studied a state-specific loan waiver scheme and not the national-level ADWDRS.

## 2 Context and data

The fall in agriculture prices, increasing input costs, declining profitability of agriculture and reduction in the public provision of credit led to agrarian distress during 2004-06. To address it, the Government of India announced the ADWDRS in 2008 upon the recommendation of the R Radhakrishna Committee. The ADWDRS comprised debt waiver and debt relief. Small and marginal farmers were covered under the debt waiver, and a 100% debt waiver was given to them on the eligible amount. The eligible amount to be waived was the overdue amount as on 31 December 2007. Debt relief was given to farmers who owned more than 2 hectares of land (termed 'other farmers' in the scheme). Under this one-time settlement scheme, farmers were given Rs. 20,000 or a 25% rebate on the eligible amount (whichever was higher) on the condition that they would pay the remainder 75% in no more than three instalments. The initial deadline was 30 June 2009. The small and marginal farmers were allowed to take fresh loans after the loan was waived, and other farmers were held eligible to take fresh loans only after they paid one-third of the remainder amount (Table 1).

The small farmers and marginal farmers were allowed to take fresh loans after the loan was waived off. In case of other farmers, they were eligible to take fresh loans only after paying one-third of the remainder amount.

In this paper, I analyse only the full loan waiver component of the scheme given to small and marginal farmers in the regular districts in the states of Andhra

<sup>1</sup> Farmers with landholdings of up to 1 hectare of cultivable land are called marginal farmers; farmers with landholdings of 1-2 hectares of cultivable land are called marginal farmers.

<sup>2</sup> Special districts are revenue districts covering the Drought Prone Area Programs (DPAP), Desert Development Programs (DDP) and PM's special relief package districts

Pradesh and Maharashtra using panel data from second-generation village-level surveys conducted by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).<sup>3</sup> The primary group analysed comprises smallholder farm households in six villages: Aurepalle and Dokur in Andhra Pradesh (now in Telangana) and Kalman, Kinkheda, Kanzara and Shirapur in Maharashtra. The reason for selecting only these two states is that ICRISAT provides extensive panel data on these states from 2005 to 2014, and it reports information on other states only after 2009. Since total debt waivers were given to only small and marginal farmers, we had to drop all large and medium farmer households. Thus, the total subsample was reduced to 1,542 small farmers from six villages. Within this sample, the treatment group is farmers who took loans from formal institutions. The comparison or the control group is farmers who availed loans from informal sources.

The ADWDRS was implemented by 30 June 2008. Therefore, the pre-reform period for the study is 2005–2008. The post-reform period is 2009–2014. Table 2 shows the total observations in the treatment and control groups in both periods. It is evident that the number of observations differs in both treatment and control groups.

**Table 2. Number of observations in treatment and control group in pre- and post-reform periods**

Group	Pre-ADWDRS	Post-ADWDRS	Total
Control	608	732	1,340
Treatment	91	111	202
<b>Total</b>	<b>699</b>	<b>843</b>	<b>1,542</b>

Source: Author's compilation

Table 3 shows the distribution of observations at the village level. We cluster standard errors at the village level. The villages in both the states have a combination of formal and informal sources of credit. The number of formal sources of lending, like banks and cooperative credit societies, is associated with the institutional development of a village. The number of informal sources of credit like moneylenders, input dealers and shopkeepers exceeds the number of sources of formal

**Table 3. Distribution of households in control and treatment group at the village level**

Village	Control	Treatment	Total
Aurepalle	106	31	137
Dokur	115	26	141
Kalman	371	29	400
Kanzara	161	32	193
Kinkheda	202	24	226
Shirapur	385	60	445
<b>Total</b>	<b>1,340</b>	<b>202</b>	<b>1,542</b>

Source: Author's compilation

credit in all the six villages, but formal sources have a larger share of the credit provided, because the popularity of the Primary Agricultural Credit Co-operative Society and microfinance institutions is growing in the villages.

The dataset has certain limitations. First, due to the bi-annual survey conducted in 2007, the modules for data collection were modified. Details on the transaction module for the consumption of food and non-food items were not recorded for the year 2007. Consumption of food and non-food is one the main dependent variables in this paper. Therefore, the panel structure of the data set is unbalanced. Second, the master list linking the households across 2005–2014 had a number of households that could not be interviewed after 2008. Third, in 2014, Andhra Pradesh was bifurcated to form Telangana. The two sample villages in Andhra Pradesh, Aurepalle and Dokur, were, therefore, coded differently for 2014. This led to a change in the household identifiers for the villages. Finally, the dataset suffers from the problem of missing data. This is attributed to the data not provided to researchers, or possibly due to attrition. Keeping in mind these limitations several assumptions were made so that the estimates are not biased.

### 3 Econometric specification

The regression formulation of the difference-in-difference (DID) model offers a convenient way to construct difference-in-difference estimates and standard errors. It is also easy to add additional states or periods to the regression (Angrist and Pischke 2008).

<sup>3</sup> The second-generation village-level are described in detail at [http://vdsa.icrisat.ac.in/Include/document/Documentation-VLS\(2005-06%20to%202008-09\).pdf](http://vdsa.icrisat.ac.in/Include/document/Documentation-VLS(2005-06%20to%202008-09).pdf)

The ADWDRS had both a 25% conditional relief and a full-waiver component. It identified a clear-cut strategy for giving waivers or debt relief based on the amount of land possessed by the farmers. A sharp regression discontinuity design with the forcing variable being the ‘hectares from cut-off’ could have been a possible empirical strategy to study the causal effects of the ADWDRS. Kanz (2012) studies the impact of the ADWDRS on the investment and productivity using a sharp regression discontinuity design. For the purpose of this paper, a DID approach is more suitable.

We estimate the impact of ADWDRS on the consumption expenditure of food and non-food items using the following specification:

$$y_{it} = \alpha_{it} + \beta_{it} + \gamma post_i + \delta treat_i + \theta post_i * treat_i + \varepsilon_i \quad (1)$$

Where observations is  $i=1, 2, \dots, N$  and  $t=2005, 2006, \dots, 2014$

$y_i$  is the continuous outcome variable described as follows:

Total quantity of food purchased (kg) for consumption monthly<sup>4</sup>

Total value of non-food items purchase (Rs) for consumption by item-wise in a month at market price.

$\alpha_{it}$  and  $\beta_{it}$  are the village fixed effects and year fixed effects, respectively

$post_i$  is a dummy variable for time-  $post_i=1$  if for years before the implementation of ADWDRS (2005-2008) and  $post_i=0$  for years after the reform (2009-2014); and

$treat_i$  is a treatment dummy-  $treat_i=1$  for farmers who availed loans from formal sources and received full loan waivers and  $treat_i=0$  for farmers availing loans from informal sources and did not receive loan waivers.

The parameter  $\theta$  is an interaction between the time dummy and the treatment dummy.

$\varepsilon_i$  is the error term clustered at the village level. It is done so that observations within the village do not understate the standard deviation of the DID estimator (Bertrand et al. 2004).

The DID estimator in equation 1 is  $\theta$ . It measures the causal effect of the ADWDRS on the farmers who received loan waivers:

$$\theta = [E(y|treated = 1, post = 1) - E(y|treated = 1, post = 0)] - [E(y|treated = 0, [post = 1] - E(y|treated = 0, post = 0)]$$

The DID estimator, thus, captures the impact of the ADWRDS on the smallholder farmers who were given complete loan waivers. The proper implementation of the difference-in-difference required us to make a few assumptions about the data sample based on the limitations the dataset.

First, it is assumed that all small farmers who took loans from formal sources were granted immediate waivers and, as a corollary, no farmer who took a loan from an informal source was eligible for a debt waiver. This assumption is required to distinguish between the two groups.

Second, the dataset is an unbalanced panel; values for the year 2007 are not recorded. Thus, it is necessary to assume that the patterns of food and non-food consumption and expenditure did not change in 2007.

Third, on 2 June 2014, part of the state of Andhra Pradesh was separated and made the new state of Telangana. The two villages in the subsample, Aurepalle and Dokur, became part of the Telangana state. It is assumed that this bifurcation did not immediately impact the consumption and expenditure patterns of farmer households.

Fourth, it is assumed that the any additional income from caste occupations and off-farm activities does not change household consumption of or expenditure on food or non-food items. These ancillary assumptions are necessary so that the observations in the sample data can be tested for treatment effects. However, the parallel trends assumption is the main assumption needed for the internal validity of the DID estimates. This assumption is tested in the next section.

## 4 Results

### 4.1 Validity of assumptions

The great appeal of the DID estimation is in its simplicity and potential to circumvent many of the endogeneity problems that typically arise when comparing between heterogeneous individuals (Meyer 1995). The approach is based on certain assumptions.

<sup>4</sup> Table A1 in the appendix lists all the food and non-food items as compiled by ICRISAT



The validity of the assumptions should hold so that the estimates are not biased.

**Assumption 1** *Counterfactual levels for treated and non-treated observations can be different, but their time variation is similar.*

The non-treatment potential outcomes share the same trend for treated and non-treated observations. Therefore, any deviation of the trend of the observed outcomes of the treated observations from the trend of the observed outcomes of the non-treated will be directly attributed to the effect of the treatment and not to differences in other characteristics of the treatment and control group (Lechner 2010). Therefore, the DID approach posits parallel trends in the outcome performance prior to the intervention between treatment and comparison groups (Ryan et al. 2015).

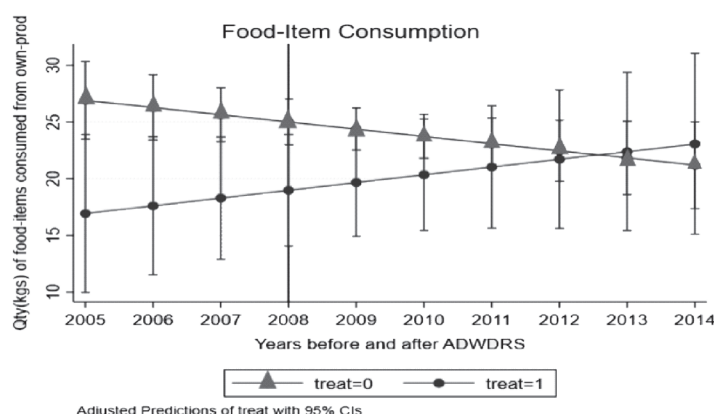
Figure 1 shows that the “consumption of food items” at the baseline violates this assumption. The treatment and control groups differ at the baseline period. The full-waiver beneficiaries show an increasing consumption of food items from own production prior to the reform. The non-beneficiaries, on the other hand, show a decreasing trend. Note that the control group, or the non-beneficiaries, consume 25–30 kg of food a month, and full-waiver beneficiaries consume 10–25 kg of food a month. Because the parallel trend assumption is violated, the changes of food item consumption in the two groups cannot be attributed to the implementation of the ADWDRS. The DID estimate in this case is, thus, biased. A testable strategy for this

violation would have been to match the outcome variable of treatment and comparison groups, if multiple comparison groups were available (Ryan et al. 2015). However, the study uses data only for small farmers; therefore, the violation cannot be tested further. The parallel trends assumption in the case of non-food items is upheld (Figure 2).

**Assumption 2** *(Strict exogeneity) Events or factors other than treatment, occurring at the time of treatment, do not differently affect outcomes for treated and comparison groups.*

For the differencing technique at the core of the method to work, the timing of treatment exposures in the DID design must be statistically independent of the potential outcome distributions, conditional on the group- and time-fixed effects (Wing et al. 2018). The idea is that, after having controlled the group and time effects, the outcome should not be anticipated to have been caused by events in past periods. The assumption is, however, not directly testable.

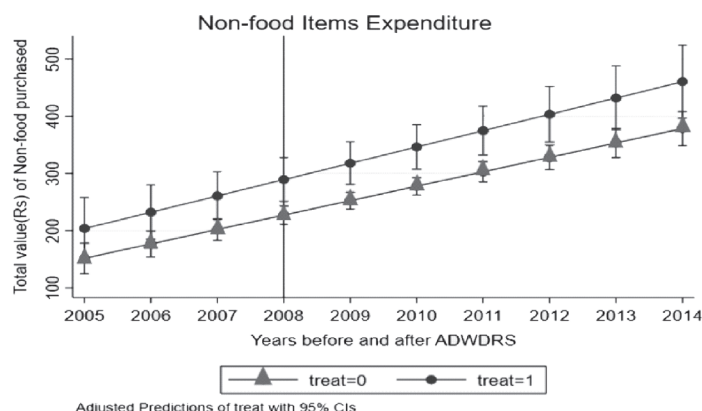
The ADWDRS implemented in 2008 was a major initiative for all states in India. The loan waiver of small farmers was completed within a span of one month, ending on 30 June 2008. However, the debt relief was extended up to 30 June 2010. The study tests only for the impact of loan waivers on small farmers. On further investigation, it is found that the scheme was one of the largest household debt relief programmes in history (Kanz 2012). Confounding schemes or programmes of this magnitude, which could directly affect the loan



**Figure 1.** Pre- and post-reform period difference in food item consumption expenditure between treatment and control groups

Source: Estimates based on ICRISAT data

Note: treat=0 is the control group –households that take loans from informal sources, treat=1 is the treatment group–households that avail loan from formal sources.



**Figure 2. Pre-reform and post-reform difference in non-food consumption expenditure between treatment and control groups**

Source: Estimates based on ICRISAT data

Note: treat=0 is the control group –households that take loans from informal sources, treat=1 is the treatment group-households that avail loan from formal sources.

sources of farmers or their consumption and expenditure patterns, were not implemented in 2008.

## 4.2 Key findings

We identify the causal impact of the ADWDRS on the consumption expenditure of smallholder farmers and

run the DID regression as specified in equation 1 for food and non-food categories (Tables 4 and 5). The validity of the parallel trends assumption is not upheld in the consumption expenditure of food items. This is in accordance with the pre-intervention difference in Figure 1. Because of the discrepancy between the

**Table 4. Difference-in-difference estimates on food consumption expenditure**

Food item expenditure	Coef.	St. Error	t-value	p-value	Sig.
treat	-2.391	0.993	-2.41	0.061	*
post	-0.042	4.344	-0.01	0.993	
post*treat (DID)	4.854	5.334	0.91	0.405	
1.village	0.000	0.000	0.000	0.000	***
2.village	-6.167	0.438	-14.09	0.000	***
3.village	-0.183	0.824	0.22	0.833	
4.village	-5.958	0.473	-12.59	0.000	***
5.village	-13.600	0.700	-19.43	0.000	***
6.village	4.481	0.580	7.73	0.001	***
1.year	0.000	0.000	0.000	0.000	***
2.year	-6.415	1.413	-4.54	0.006	***
4.year	34.958	5.340	6.55	0.001	***
5.year	1.711	6.715	0.26	0.809	
6.year	-2.498	5.694	-0.44	0.679	
7.year	1.491	5.636	0.26	0.802	
8.year	7.570	7.281	1.04	0.346	
9.year	-4934	2.031	-2.43	0.059	*
10.year	0.000	0.000	0.00	0.000	***
cons	20.505	1.649	12.44	0.000	***
Mean dependent var	23.664		SD dependent var	32.531	
R-squared	0.201		Number of obs	1366.000	
F-test			Prob>F		
Akaike crit. (AIC)	13091.968		Bayesian crit. (BIC)	13118.067	

\*\*\* P<0.001, \*\*P<0.05, \*P<0.1

Source: Authors' calculation based on ICRISAT data

**Table 5. Difference-in-difference estimates on non-food consumption expenditure**

Non-food expenditure	Coef.	St.Error	t-value	p-value	Sig.
treat	25.695	35.119	0.73	0.497	
post	164.505	26.050	6.32	0.001	***
post*treat (DID)	30.211	44.977	0.67	0.532	
1.village	0.000	0.000	0.00	0.000	***
2.village	-90.408	1.150	-78.59	0.000	***
3.village	-67.967	6.424	10.58	0.000	***
4.village	-50.535	5.738	-8.81	0.000	***
5.village	-27.786	7.659	-3.63	0.015	**
6.village	-3.537	4.682	-0.76	0.484	
1.year	0.000	0.000	0.00	0.000	***
2.year	4.021	16.951	0.24	0.822	
4.year	-44.505	15.742	-2.83	0.037	**
5.year	-42.963	21.373	-2.01	0.101	*
6.year	-10.554	38.479	-0.27	0.795	
7.year	-25.183	20.225	-1.25	0.268	
8.year	30.025	34.610	0.87	0.425	
9.year	6.276	15.999	0.39	0.711	
10.year	0.000	0.000	0.00	0.000	***
cons	214.131	19.845	10.79	0.000	***
Mean dependent var	264.493		SD dependent var	279.513	
R-squared	0.117		Number of obs	1498.000	
F-test			Prob>F		
Akaike crit. (AIC)	20950.642		Bayesian crit. (BIC)	20977.201	

\*\*\* P<0.001, \*\*P<0.05, \*P<0.1

Source: Author's calculation based on ICRISAT data

groups in the pre-intervention period, the results are not entirely reliable and the impact of the ADWDRS cannot be truly ascertained. Table 4 shows the DID estimates of food items. Note the treatment dummy is negative but significant at 1%. This indicates in the absence of the loan waiver, the households that took loans from formal sources of credit incurred lower consumption expenditure than households that borrowed from informal sources.

The non-food expenditure is the rupee value of all non-food items purchased for consumption. The parallel trends and strict exogeneity assumption hold for this category. Table 5 shows the results of equation 1 on non-food consumption expenditure. The DID estimate is insignificant, indicating that the ADWDRS did not affect the treatment group in terms of non-food consumption expenditure. However, the time dummy is significant at 1%, indicating that the expenditure on non-food items like utilities and social ceremonies was increasing over time.

## 5 Conclusion

This paper used panel data from ICRISAT to examine the impact of the ADWDRS of 2008 on small farmer households. It addressed the issue of loan waivers on the consumption of and expenditure on food and non-food items. Unlike previous studies on the ADWDRS, which focus on both the full loan waiver and the 25% conditional relief component of the scheme, this paper estimates the impact of only full-waiver beneficiaries. The estimations are applied with the help of the DID approach, including year and village fixed effects, which captured all the observed and unobserved heterogeneity. The study did not find that the ADWDRS significantly impacted the consumption of or expenditure on food and non-food items. This suggests that simply waiving loans to reduce the indebtedness of farmers does not lead them to increase their consumption of or expenditure on daily utilities, although a large part of the loan is used for



unforeseeable events like unexpected medical expenses and other utilities of daily use.

Earlier studies that examine the impact of consumption consider the aggregate of household consumption. However, this paper bifurcates the consumption of and expenditure on food and non-food items while studying the impact, thereby adding an additional dimension to the existing literature on centralized agricultural loan waivers. Access to rich data on food and non-food items furthered this approach. The study used an unbalanced panel data set, wherein data for 2007 was not available; this was a considerable challenge. A probable implication of the missing data is that the covariates at the baseline could not be tested appropriately. Another potential limitation was that the treatment and control groups for the 'consumption of food items' category violated the parallel trends assumption. This perhaps did not allow for an appropriate comparison between the two groups.

Better data would have allowed more questions to be addressed on the endogeneity and unobserved heterogeneity of time trends. Although the paper controlled for time trends and heterogeneity of village characteristics, the DID estimates for all four categories of consumption and expenditure were insignificant. The paper assumes that the loan waivers were given to all households availing loans from formal sources. Data on non-beneficiaries of formal source borrowers would have made for a better control group and allowed us to absorb variations in consumptions of food items between the two groups. Also, multiple comparison groups would have allowed us to make probable tests if baseline outcome levels are unrelated to expectations for change in outcomes (Ryan et al. 2015).

The ADWDRS is a landmark in the history of debt relief schemes, and it provides scope for further research, especially in assessing the changing expenditure patterns of small households. Several questions need to be addressed to enrich the literature on the ADWDRS: does the impact of loan waivers spill over from formal source borrowers to informal credit borrowers? What are the reasons for the variations in the consumption of small farmer households? These can be taken up in future research on the topic.

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**Appendix A1: Classification of all food and non-food items and their measurement units**

Food Items	Unit	Non-Food Item	Unit
1. Cereals:		1. Toddy& Alcohol	Rs
PDS Rice	Kg		
Sorghum	Kg	2. Charcoal, LPG,	Rs
Wheat	Kg	firewood, kerosene	
PDS Wheat	Kg	& dung cakes	
Pear/finger millet	Kg		
		3. Household articles	Rs
2. Pulses:		& small durables	
Pigeonpea dal	Kg		
Chickpea dal	Kg	4. Electricity & Water	Rs
Green gram dal	Kg		
Black gram dal	Kg	5. All cosmetics	Rs
Matki/Cowpea	Kg		
Masur dal	Kg	6. Cigarettes, Pan, Ganja	Rs
Greenpea	Kg		
		7. Clothes, Shoes, socks	Rs
3. Oils:			
Groundnut Oil	Lt	8. Medical (domestic &	Rs
Palm oil	Lt	hospital)	
Sunflower Oil	Lt		
Cotton oil	Lt	9. Taxes (house, land,	Rs
Mustered Oil	Lt	vehicle)	
4. Vegetables:		10. Education (fee, book,	Rs
All types of veg.	Rs	stationery, transport, etc.)	
All leafy veg.	Rs		
All types of fruits	Rs	11. Travel, petrol, diesel	Rs
Vehicle repair			
5. Milk products:			
Milk	Rs	12. Ceremonies, marriage	Rs
Ghee/Butter/Cheese	Rs	expenses excluding dowry	
6. Other Food Items:		13. Entertainment, TV,	Rs
All spices	Rs	cable expenses	
Sugar & Gur	Kg		
Tea/Coffee Powder	Kg	14. Cell and landline	Rs
Meat (goat, chicken.	Kg	Phone bill	
sheep)			
Meat (pig and beef)	Kg		
Fish	Kg	15. Others specify	Rs
Eggs	No.		
Meal/Tiffin	Rs		
Others (bread,	Rs		
Khara, sagu,			
sweets, biscuit)			