

Targeted Public Distribution System in Food Grains: An Effective Method for the Tribal's of Rural Karnataka (India)

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Abstract

Targeted PDS is a part of structural adjustment programme in Government of India, which was introduced in 1997. PDS is a rationing mechanism that entitles households to specified quantities of selected commodities at affordable prices to BPL and APL families. According to world health organisation's survey report stated that in Karnataka state, incidence of anaemia is high, 70 percent children are suffering and 51 percent of women and 59 percent of pregnant women are affected by anaemia and other health problems in the rural areas. The NSSO report says that consumption of rice, wheat, sugar and kerosene form PDS in rural Karnataka is 59 percent and 29 percent in urban areas. But this study examines whether Targeted PDS is reaching the poor people in rural areas without any hurdles. This present study finds out the effectiveness of targeted public distribution system in rural areas, particularly in tribal families in selected rural districts in the state. The data covered 600 households (multi-stage random samples), socio-economic and demographic characteristics. Ordered (Ordinal) Logistic Regression Model is used in this study, the results using this model shows that the Targeted PDS has not reached the poor people in tribal areas. The study suggests methods to make improvement in Targeted PDS particular in rural and hills areas.

Key words: Food sufficiency, Food insecurity, Low income, Effective, Tribal's, OLR Model.

Introduction

Despite abundant supplies of food worldwide, nearly 800 million people suffer from malnutrition and undernourished today (FAO). Most of the undernourished live in low-income countries and low-income households. India is home to have more than 230 million undernourished people, which constitutes 21 percent of the national population (2010). A well-functioning Universal PDS can be the means to *ensure adequate physical access to food* at the local and household levels (Madhura S 1997). But in 1997, the Universal PDS was abolished and a Targeted PDS introduced in the state of Karnataka. The state of Karnataka is the 6th largest state in India.

Under Targeted PDS, the entire population is divided into two groups, one is the below-poverty line (BPL) and the other is above-poverty line (APL) categories, based on the poverty line defined by the planning commission and the policy of targeted households is on the basis of an income criterion. The price discrimination is that for the APL segment, prices were 80 percent of the economic cost whereas for the BPL population, prices were half the economic cost.

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The Global Hunger Index, a compilation of population undernourishment, child malnutrition, and child mortality shows wide regional difference in hunger and food insecurity across the different states in India, main reasons food grain prices are high (**Menon 2008**).

Nearly half of the pre-school age children were described as being malnourished (**B Sen2012**). India will be truly food secure only when it is able to provide adequate food to all its citizens as matter or right, without inflicting any humiliation on the poor. (**Parikh K S 1994**). **Jha S** and (**Srinivasan P.V 2010**) found that 71 percent of government expenditure on the food grain subsidy was either stolen or lost due to waste and has not reached the poor.

Other important indicators such as maternal anaemia levels are also increasing as per the World Health Organisation (2008) and its report showed that 52 percent of non-pregnant women of reproductive age are anaemic due to the low quality food grains given to them. BPL families are suffering from several health problems in rural India (**Lalita Singh 2012**). In the meanwhile, the rural population has also increased by as high as 60 to 70 percent particular among the Scheduled Castes and Scheduled **Tribes** according to 2011 census.

The main goal of the Targeted PDS is food grains to poorest families in rural and remote areas. The present study focus on livelihood of the tribal population being under threat due to increasing degradation of the resources, *the targeting system ought to be effective among the tribal's and rural*, but some factors affecting proper utility were considered as the research problem in this study. The study mainly covered the tribal families and some other community in rural Karnataka.

PDS in India

In India Public Distribution System (PDS) was introduced during the Second World War to address food security concerns and the scheme was initially heavily dependent on imported food.

In the 1960s the coverage of the PDS was expanded owing to a food crisis. The Green Revolution, coupled with favourable weather, led to the growth of comfortable buffer stocks in the 1980s, through the procurement operation of the Food Corporation of India (FCI), which in turn expanded the volume of food grain provided through the PDS. But this system faced various systemic problems and to tackle these problems, in 1992 the government introduced a Revamped Public Distribution System (RPDS) to reach poorer households with more varieties and quantities of foodstuff at cheaper prices but it's not effective.

Finally In June 1997, a Targeted Public Distribution System (TPDS) was introduced. Targeted PDS was introduced as part of different schemes for the poor, Antyodaya Anna Yojana (AAY) Mid-day meals, ICDS in children and food-for work scheme etc. Under this schemes the poor was further classified as the '*Poorest among the Poor*' and others as living '*BPL families*'. Since 1997 Targeted PDS is intended to target the poor people, the subsidy spent by the government for the scheme should be beneficial to the poor people and naturally they should utilise the benefits by purchasing the food grains allotted under the Targeted scheme.

Targeted PDS in Karnataka

Karnataka food and civil supplies corporation limited is(KFCSC) a Government of Karnataka undertaking established of procurement, lifting and distributing food grains under the Targeted PDS aid implementing various other schemes of the government. KFCSC and Co-operatives sector is involved in the distribution of food grains. Of the 257 wholesale point licensed dealers, 130 belong to KSFC and 127 to the Karnataka Cooperative Marketing Federation (KCMF).

Fair Price Shops & Schemes

In 2012, there were 20,372 fair price shops in the serving 9.83 million households, among them, 5174 fair price shops were in urban and 13,950 in rural areas. No of cards per fair price shops are covered in 661 as on 31.3.2013.

In the state government populist scheme “**Anna Bhagya**” has been launched as on 10th July 2013. A BPL family will get two square meals a day it will provide nourishment to the family and motivate people to work and attack malnutrition through this scheme. The state food subsidy is cost of the government Rs460 crore in a financial year.

It’s providing 30kg rice at per kg one rupee to the poor families and also the main agency for food grains under the special programmes like Food for Work, SCRY , Mid-day-Meals, ICDS and all other schemes also running in the state.

Targeted PDS Net work

The Food Corporation of India (FCI) is responsible for making food grains available to the state governments in terms of the allocations fixed by the central government. The Karnataka Food and Civil Supplies Corporation Limited (KFCSC) and KCMF are acting as agents of the Food Corporation of India (FCI) as primary objective of procurement, lifting and distributing food grains under the Targeted PDS and also implementing other schemes.

Review of Literature

Anjini Kochar (2005) can Targeted food grains improve nutrition? an empirical analysis of India’s Public Distribution System. This article used household data collected by the government of India’s National Sample Survey (NSSO) for the years 1973 and 1999-2000 and used descriptive statistics. This Study suggested that targeted PDS received wider spread support because of their potential for improving the welfare of the poor with fewer budgetary resources, targeted programs that provide benefits to the poor by reducing or eliminating benefits to the non-poor results in lower take-up rates.

C Gundersen (2007) measuring the depth and severity of food insecurity and the application of American Indians. This study addresses both concepts with data from 2001 to 2004 Core Food Security module of the current population survey. To measure food insecurity and the worse economic conditions facing American Indians, their food security levels are generally higher than non-American Indians. However, the magnitude and significance of these differences differ depending on the choice of food insecurity measure.

C Gopalan (1995) towards food and nutrition security related to both the production and distribution of food inequitable distribution. The present research paper will examine the current status with respect to their levels of “Nutritional Status” and “Social Development” using data derived from NNMB and NFMS. Attention is drawn to the problems posed by ongoing urbanisation and the emergence of an expanding middle class. The prospect of the country having to bear a double burden of problems of urbanisation at one end of the income spectrum and under nutrition at the other end is examined.

C G Davis (1983) this study on the impact of selected socioeconomic characteristics on aggregate and group food expenditure patterns of racially different low-income households. A double logarithmic functional form used to explain responses in household food expenditures to socioeconomic factors. Household income, family size, and food stamp program participation was found to exert a stronger positive impact on food expenditures. The general educational level of the homemaker registered no significant impact on household food expenditures. However, the nutritional knowledge of the home maker increased the efficiency of food purchasing activities.

Planning commission (2005) PDS found that about 58 percent of the subsidized food grains issued from the central pool do not reach the BPL families because of identification errors, non-transparent operation and unethical practices in the implementation of Targeted PDS.

R Khera (2008) study also finds substantial diversion of food grains and for the rural population have been benefited in the system of Targeted PDS.

Radhakrishna R & S Indrakant (1987) undertook a study on PDS in India – with reference to Andhra Pradesh. The major findings of the study was urban people were getting more benefits through PDS than rural people.

Most of the studies have found that the allocations of food grains to the status are based on the influence of state and the central. But this study found that the effectiveness and implementation of Targeted PDS in Tribal's population in rural Karnataka.

Objectives of this Study

- To identify the impact of Targeted PDS food grains among tribal people in rural using Ordered Logistic Regression Model.
- To find out the problems in Targeted PDS in rural Karnataka.
- To suggest innovative ideas for effective Targeted PDS

Data and Sampling

A comprehensive assessment of food grains should be able to identify the number of poor households, the reasons for effective of Targeted PDS benefits and problems, only possible by focusing on household respondents (**De Hane 2011**). The present study conducted a household-level empirical analysis of the links between a household's food security, their socio- economic characteristics and their access to subsidised food grains through the Targeted PDS.

The study used on primary data was collected from 600 household's multi-stage random samples in selected rural districts in Karnataka (India). The specific districts are Bangalore rural, Davanagere and Chikmagalur. In each districts 200 randomly selected households were surveyed. The study is specifically designed to provide contrasting examples of food assessment and food security conditions in tribal populations in rural.

Socio-Economic Variables in Karnataka

The state of Karnataka is the 6th largest state in India. Karnataka is the 9th largest state population wise and comprises of 30 districts. Karnataka is located within 11°30' North and 18°30' North latitudes and 74° East and 78°30' East longitude. It is situated on a tableland where the western and Eastern Ghats ranges converge into the Nilgiri hill complex, in the western part of the Deccan Peninsular region of India.

According to the 2011 census of India, the total population of Karnataka is 6.25 crores. Of this, 50.9 percent are male and 49.1percent are female. Population density is 275.6 per km², the sex ratio is 964 females to 1000 males and 34.0percent of the people in urban 66 percent in rural areas. The literacy rate is 66.6percent with (76percent of males and 57percent of females being literate). The joint family system is prevalent in the rural areas. Total land area is 1, 91,791 sq.km, it account for 5.96 percent of the total area of the country 32 lakh sq.km. Agricultural, industry, IT, forest, transport, business activities are its major back bone of the state economy.

Selected Districts in the Study

Bangalore Rural district is one of the 30 districts in Karnataka. It was formed in 1986, when Bangalore district was divided into Bangalore Rural and Bangalore Urban. Presently in Bangalore Rural district, there are 2 divisions, 4 Talukas, 35 Hoblis (cluster of villages), 1,713 inhabited and 177 uninhabited villages, 9 towns, and 229 Gram Panchayats. According to the 2011 census Bangalore Rural district has 22.5percent of its population belonging to the Scheduled Caste and Scheduled Tribe. The Bangalore Rural district is essentially an agriculture district but it has sufficient scope for industrialisation, dairy development and sericulture.

In Bangalore rural, active ration cards under AAY 14696, APL 45192, BPL 175426, census households 224745, Total 235314 cards circulation in the district.

Davanagere is new district formed in 15th August 1997. The district spans over a total geographical area of 5975.99 square kilometres. The population of the district according to 2011 Census is 17,90,952 comprising 9,17,705 males and 8,73,247 females. The overall density of population in the district is 333 per sq km.

The rural population is dispersed amongst 918 inhabited villages belonging to five talukas and the urban population on the other hand is shared by 6 towns. According to the 2011 census Davanagere district has 11.5 percent of its population belonging to the Scheduled Caste and Scheduled Tribe. The predominantly an agriculture district is the backbone of its district economy. In the district, active ration cards circulation for AAY 50855, APL 68839, BPL 333984, Census of households 404840 and total 453678 cards.

Chikmagaluru district is the mountains with a part of the Western Ghats. The highest point in Mullavanagiri 1926 mts above sea level which is also the highest point in the state, 30 percent (2108.62km) is covered with forests. According to the 2011 census this district has a population of 1,137,753. The population density is 158 inhabitants per square kilometre (410sq mi). A sex ratio is 1005 females for every 1000 males. A literacy rate is 79.24 percent. In 81 percent of the population resides in rural areas with the remaining 19 percent in urban areas. According to the 2011 census chikmagaluru district has 3.6 percent of its population belonging to the Scheduled Caste and Scheduled Tribe. In this district, active ration cards census of households 272173, AAY 22828, APL75144, and BPL 198702 Total 296674 cards. Plantation and coffee cultivation are major forming part of it. Unfortunately this district has not made good progress in terms of industrial development because for its hills areas.

Methodology

In this study, analysis was done using Ordered Logit Model (also called Ordinal Logistic Regression or Proportional Odds Model) is a simple regression model for ordinal dependent variables. It can be thought of as an extension of the logistic regression techniques that applies to dichotomous dependent variables. It is usually estimated using maximum likelihood method.

This present study fit this model for multiple ordered response categories of the effectiveness (or impact) of Targeted PDS in Tribal's populations. The study covered opinion survey with rural households the ranging from 'strongly agree' to 'strongly disagree' as well as scaling parameters and fit for heteroscedastic method.

Ordered Logit Model has the form of

$$\text{Logit}(p_1) = \text{Log} p_1/1-p_1 = \alpha_1 + \beta'x \quad (1)$$

$$\text{Logit}(p_1 + p_2) = \text{Log} p_1+p_2/1-p_1-p_2 = \alpha_2 + \beta'x \quad (2)$$

$$\text{Logit}(p_1+p_2+\dots+p_k) = \text{Log} p_1+p_2+\dots+p_k/1-p_1-p_2-\dots-p_k = \alpha_k + \beta'k \quad (3)$$

$$\text{and } p_1+p_2+\dots+p_k = 1$$

This model is known as the proportional-odds model because the odds ratio of the event is independent of the category 'j'. The odds ratio is assumed to be constant for all categories. The quantity to the left of the equal sign is called a logit (and its effectiveness of TPDS as dependent variables). It is the log of the odds that an event occurs and the co-efficient is predictor variables (as independent variables).

Dependent variables

Following previous research by **Mallick & Rafi (2010)** on Bangladesh this study referred to characterise a household's food security status using the respondent's own perception of their food security status.

This study also follows same perception of dependent variables used for the effectiveness of Targeted PDS by Tribal's populations. The impact of this scheme whether the benefits of Targeted PDS have reached to the right poor people of tribal's without any hurdles.

Explanatory Variables

The main explanatory variables in this study are the socio-economic and demographic characters of the households and group discussion about the Targeted PDS (as gender, education, caste, family occupation, types of ration cards, family income, food was not available in ration shops, problems in PDS, food consumption and family health status etc) are covered.

Hypothesis Testing

Ho: Targeted PDS is not effective among Tribal's population in rural areas.

H1: Targeted PDS is effective among Tribal's population in rural areas.

Analysis of Ordered Logit Regression

PLUM - Ordinal Regression

The SPSS Ordinal Regression procedure PLUM it means **P**olytomous **U**niversal **M**odel is an extension of the general linear model to ordinal categorical data.

Case Processing Summary

Food Grains Effectiveness	N	Marginal Percentage
Excellent	18	3.0%
Very good	43	7.2%
Good	63	10.5%
Fair	186	31.0%
Very poor	290	48.3%
Valid	600	100.0%
Missing	0	
Total	600	

The present study showed that a total number of households are 600 around 3 rural districts in Karnataka. The relative frequency distribution of all households to impact of Targeted PDS was prepared. Of the overall respondents only 10.5 felt that the TPDS was effective percent and 48.3% felt that it has not reached the poor. This result shows accurately that Targeted PDS was not effective in poor by tribal's in rural areas.

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	596.822	651	.937
Deviance	537.972	651	1.000

Link function: Logit.

The additional model fitting statistic the Pearson's chi square = 596.822 with df of 651 and p value is .937 for the complete model with the goodness-of-fit in ordered logit regression. However, logit link indicated that the observed data were consistent with the estimated values in the fitted model. Hence, the complete model with better fit based upon the chi-square test results.

Pseudo R-Square

Cox and Snell	.051
Nagelkerke	.062
McFadden	.073

Link function: Logit.

The model-fitting statistic, namely the pseudo R-square, measured the success of the model in explaining the variations in the data. The Pseudo R-square was calculated depending upon the likelihood ratio. The interpretation of Pseudo R-Square in the ordinal logit regression model was indicated that the proportion of variations in the outcome variables was accounted by the explanatory variables. The larger the Pseudo R-Square was the better results for McFadden (.73), Cox and Snell (.51) and Nagelkerke (.62) in the complete results with better fitted to Logit link method of present study.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	f	Sig.
Null Hypothesis	978.498			
General	941.106	37.392	18	.005

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories. a. Link function : Logit

The test of parallel line was designed to make judgment concerning the model adequacy. The null hypothesis stated that the corresponding regression coefficients were equal to all levels of the outcome variables. The alternative hypothesis stated that the corresponding regression coefficients were different across all levels of the outcome variable. The Chi-Square test result 37.392 with df 18 and p value .005 indicated that there was no significant difference for the corresponding regression coefficient across the response categories, suggesting that the assumption of parallel lines was not violated in the complete model with logit link function.

Parameter Estimates

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[Effective = 1.00]	-4.326	.519	69.454	1	.000	-5.344	-3.309
	[Effective = 2.00]	-3.015	.478	39.715	1	.000	-3.953	-2.077
	[Effective = 3.00]	-2.160	.468	21.313	1	.000	-3.077	-1.243
	[Effective = 4.00]	-.692	.459	2.274	1	.132	-1.592	.208
Location	Food was not available	-.076	.163	.221	1	.638	-.395	.242
	Family Income	-.083	.093	.794	1	.373	-.266	.100
	Problems in PDS	-.400	.117	11.783	1	.001	-.629	-.172
	Only afford PDS	.441	.140	9.891	1	.002	.166	.717
	Food Consumption	-.190	.071	7.129	1	.008	-.330	-.051
	Family Health Status	-.429	.089	.108	1	.743	-.505	.146

Link function: Logit.

Parameter Estimates

The estimated co-efficient for the present study the effectiveness of the Targeted PDS is α_j 's the intercept equivalent terms. The estimates labelled variables are ration food was not available, family income, problems in Targeted PDS, only afford TPDS food grains, food consumption, and family health status, they are coefficients for the predictor variables. The co-efficient for code is (1=low,2=middle and 3=high), one of the independent variable is Tribal's people depend on only afford PDS food grains is .441 as always in the variable with categorical predictors in the positive result in the study and the other co-efficient displayed is one less than the number of categories of the variables. These co-efficient independent variables are negative that means it's associated with poorer scores on ranking in impact of Targeted PDS.

The present study rural and tribal population depends on only PDS food grains is $0.441 = 1.66$ as lower bound values its positive factors. But the same time food was not available in ration shops as co-efficient is $0.76 = 3.95$ as lower bound negative values, it's not reached to food grains to tribal's people and rural areas. The negative factors in the study household's family income as co-efficient are $0.083 = 2.66$ as a lower bound values and family food consumption co-efficient is $0.019 = 3.30$ as lower bound values its two values are negative factors. Because in the rural areas family income and poor people food consumption is very low ranking scores. This is one of the major reasons is affecting family health status as co-efficient is $0.429 = 5.05$ as lb values.

The main reasons that this study finds is that not reachable to poor co-efficient is $0.400 = 6.29$ lower bound its negative as highest values; still there are problems in Targeted PDS. This is the major reasons are food grains are not reached to poor in hills and rural Karnataka. The Wald statistic is the square of the ratio of the coefficient to its standard error. Based on the small observed significance level, the study accepts the null hypothesis that it is 0.

Frequency Table

Variables	Frequency	Percent	Valid Percent	Cumulative%
Gender				
Male	225	37.5	37.5	37.5
Female	375	62.5	62.5	100
Education				
Below 5 th std	240	40.0	40.0	40.0
5 to 10 th std	254	42.3	42.3	82.3
Hsc	84	14.0	14.0	96.3
Degree	22	3.7	3.7	100
Occupation				
Farmer	144	24.0	24.0	24.0
Non-farmer	140	23.3	23.3	47.3
Business	40	6.7	6.7	54.0
Daily wages	265	44.2	44.2	98.2
Government	11	1.8	1.8	100
Caste				
SC	144	24.0	24.0	24.0
ST	381	63.8	63.8	87.8
OBC	57	10.2	10.2	97.2
Others	18	3.0	3.0	100
Types of cards				
AAV	167	27.8	27.8	27.8
APL	100	16.7	16.7	44.5
BPL	333	55.5	55.5	100

The demographic variables such as gender, education qualification, family occupation, household's caste and types of ration cards are described below. With regard to gender, male 37.5percent and female 62.5percent and the female are more in this study because they are home makers. With regard to education qualification is highest in very poor education below 5th std (40percent) and educated with a degree is 3.7percent only covered in this study. Rural education status is very low in Karnataka. With regard to family occupation farmers are 24percent, non-farmer is 23.3percent, business 6.7percent, and highest population are labourers on daily wages who are 44.2 percent of the population and those in government services is 1.8percent. With regard to mainly focused on this study caste are SC families 24percent, ST families 63.8percent, OBC families 11.2percent and other families are 3.0percent covered in the present study. With regard to types of ration cards is AAV is 27.8percent, APL cards 16.7 percent, BPL cards is 55.5percent and this study highly covered to AAV and BPL cards.

Gender * District Cross Tabulation

Districts	Males	Female	Total
Bangalore Rural	76(38)	124(62)	200
Davanagere	68(34)	132(66)	200
Chickmagalur	81(40.5)	119(59.5)	200
Total	225	375	600

With regard to Bangalore rural district covered 38percent male and 62percent female, Davanagere district covered male is 34percent and female is 66percent and Chickmagalur district covered male is 40.5percent and 59.5percent female respondents all three district female responses are high.

Districts * Caste Cross Tabulation

Districts	Caste				Total
	SC	ST	OBC	Others	
Bangalore rural	37	132(66)	25	6	200
Davanagere	50	121(60.5)	23	6	200
Chickmagalur	57	108(54)	29	6	200
Total	144	361(60.5)*	77	18	600

With regard to this study focused on Scheduled Tribal's in rural districts in Karnataka state to cover in present study Bangalore rural district is 66percent, Davanagere district is 60.5percent and Chickmagalure district is 54percent are highly covered. Over all this study covered 60.5percent tribal's families in rural districts.

Major Findings

- Targeted PDS is not covering all rural and hill areas. In certain areas, the ration shops are not opening, if opened also, none of the food products was not available. There is no information notice board in most of the ration shops.
- Low quantity and quality of food grains are distributed to poor people, Old and unreliable weighing machines are used and no prepared scale of food grains.
- Very old stocks of food are distributed to rural and hills areas.
- Lot of administrative weakness in Fair Price Shops.
- Corruption in ration shop is based on ration employees and black marketers. No vigilance committees are present in rural, particular hills areas.
- Ration shops are at long distance in hills and the populations here need more mobile shops in hills areas.
- Rural people and tribal people are depending on affordable PDS food grains.
- Low quality and quantity of food consumption in rural and tribal's people will decrease the health status.
- Rural family income and family food consumption are very low level and family health problems are more particular among the vulnerable group.

Major Suggestion

- Need strong administrative movement in ration shops.
- Need computerised ration shops and electronic labelled ration cards to poor people particular remote areas.
- Need strong law and action on ration food corruption and more vigilance committees in rural areas.
- Need electronic weighting machines and correct measurements of food grains scales.
- Need good and quality of ration products to poor people because controlled the health status in future.
- Need Effective mechanism for handling complaints.

Conclusion

Targeted PDS is by far the largest food entitlement programme in India. It is accessed by more than a third of the total population of India and families living BPL remain the single most important constituency that the PDS. But despite its political significance, the PDS remains mired in systemic problems that are very deep-rooted.

It is mired in corruption, food inefficiencies, lack of transparency and poor ill health people, become dysfunctional in many parts of in the state and to suggest in this study.

This study on Targeted PDS has demonstrated that this scheme has not reached the rural and poor people in tribals. This study finds that out all households with poor education, each family has at least 2 adult members and one child who are sick (during group discussion). The major reasons are poor family income and consumption of food grains is very low. This study also suggests methods to improve the Targeted PDS in rural and urban areas particular poor families. Those improvements are policy oriented implications which are needed for the success of Targeted PDS in rural India.

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