

Introduction of Millets in PDS

Lessons from Karnataka

A REPORT

by

S.C. Rajshekar

S Raju

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**M S Swaminathan Research Foundation
Third Cross Street, Taramani Institutional Area,
Chennai**

www.mssrf.org

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About LANSAs

Leveraging Agriculture for Nutrition in South Asia (LANSA) is an international research partnership. LANSAs is finding out how agriculture and agri-food systems can be better designed to advance nutrition. LANSAs is focused on policies, interventions and strategies that can improve the nutritional status of women and children in South Asia. LANSAs is funded by UK aid from the UK government. The views expressed do not necessarily reflect the UK Government's official policies. For more information see www.lansasouthasia.org

List of Abbreviations

AAV	Antyodaya
APDAI	Andhra Pradesh Drought Adaptation Initiatives
APDS	Alternate Public Distribution System
APMC	Agriculture Produce Marketing Committee
BPL	Below Poverty Line
CAGR	Compounded Annual Growth Rate
CWC	Central Warehousing Corporation
DDS	Deccan Development Society
FCI	Food Corporation of India
FPS	Fair Price Shop
GoK	Government of Karnataka
Ha.	Hectare
KAPRICOM	Karnataka Agricultural Price Commission
KFCSC	Karnataka Food and Civil Supplies Corporation
KSCMF	Karnataka State Cooperative Marketing Federation
LANSA	Leverage Agriculture for Nutrition in South Asia
MSP	Minimum Support Price
MSSRF	M.S. Swaminathan Research Foundation
MT	Metric Ton
NFSA	National Food Security Act
PDS	Public Distribution System
qtl	Quintal
RTC	Right to cultivation
Rs.	Rupees
SHG	Self-help Group
SWC	State Warehousing Corporation
WASSAN	Watershed Support Services and Activities Network

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Introduction of Millets in PDS *Lessons from Karnataka*

1 Background

“How can South Asian agriculture and related food policies and interventions be designed and implemented to increase their impacts on nutrition, especially the nutritional status of children and adolescent girls?” is the core question addressed by the research programme on Leveraging Agriculture for Nutrition in South Asia (LANSA). A research theme under this is: How do policies and strategies influence poverty and the nutrition impact of agriculture?

South Asia including India houses a large population of malnourished people. Apart from hunger, micronutrient malnutrition, especially among pregnant and lactating women, children and adolescent girls is widespread in India, as reiterated by the latest report of the National Family Health Survey. The National Food Security Act, 2013 (NFSA)¹ seeks to: “provide for food and nutritional security in human life cycle approach, by ensuring access to adequate quantity of quality food at affordable prices....”p1. The Act sought to bring nearly 75 per cent of rural and 50 per cent of urban population under the public distribution system (PDS)². Public distribution of foodgrains began in India in 1942 and was institutionalized in the 1960’s with the establishment of the Food Corporation of India in 1965. Currently, India runs the world’s largest public food distribution system that delivers largely rice and wheat through designated Fair Price Shops (FPS) throughout the country. However, it is well established that rice³ and wheat alone are not adequate to meet the nutritional requirements of these segments. The NFSA provided for the distribution of millets, referred to as ‘coarse grains’ in the PDS.

Given that millet is a naturally nutrient dense agricultural produce, making it available through the PDS will enable poor and vulnerable populations access the cereal and could help address the problem of hidden hunger. Effective implementation and

¹ <http://indiacode.nic.in/acts-in-pdf/202013.pdf>

² Ibid page 3 Section 3(2)

³ Longvah, T., Ananthan,R., Bhaskarachary,K and Venkiah,K. 2017. Indian Food Composition Tables. National Institute of Nutrition, Indian Council of Medical Research, Department of Health Research, Ministry of Health and Family Welfare, Government of India

delivery of millets under the PDS can have far reaching implications for addressing the problem of malnutrition. Even though the NFSA provided for distributing millets through the PDS, only the state of Karnataka⁴ seems to have introduced this. Chhattisgarh has pioneered a model of local procurement and local distribution of pulses, also a nutritionally dense food, through the PDS while Tamil Nadu has been distributing pulses through the PDS for the last decade; but Karnataka is the first in millets.

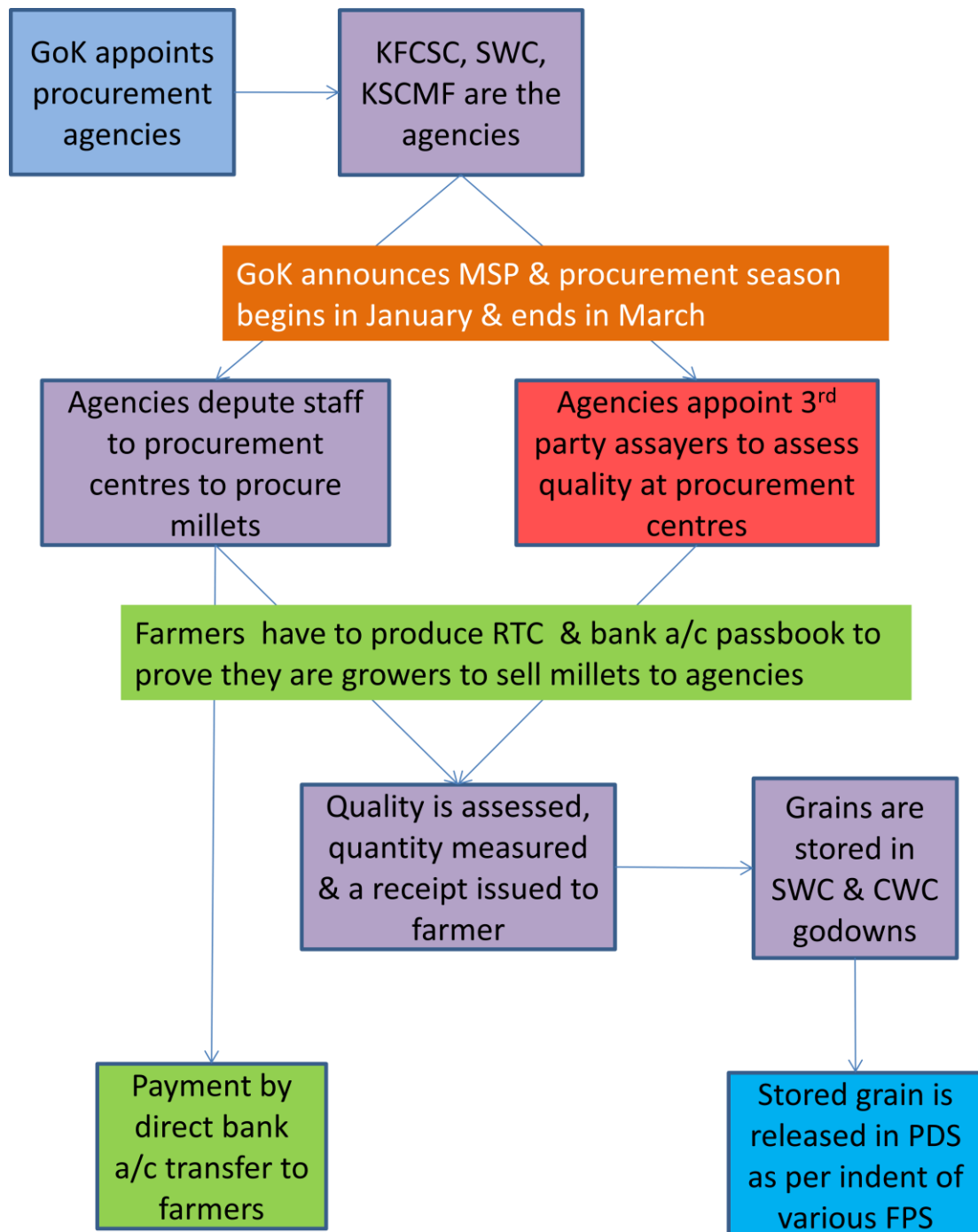
This study examines all aspects of introduction of millets in the PDS in Karnataka, from production, procurement, storage, pricing, supply-demand gap and consumer preference.

2 Millets in PDS: Karnataka's Approach

The Government of Karnataka (GoK) initiated procurement of millets from farmers and distribution (finger millet / ragi in south Karnataka and sorghum / jowar in north Karnataka) through PDS in 2013-14. The scheme was christened "*Anna bhagyadinda Krishi bhagya*" (Farmer welfare through food welfare) with the intention that by procuring these millets from farmers, substantial cash would flow to rural households while, PDS cardholders would get access to nutritious foodgrains at low prices. Figure 2.1 explains the process adopted by GoK to procure millets from farmers.

⁴ Karnataka has been distributing finger millet (ragi) in south Karnataka and sorghum (jowar) in north Karnataka through PDS since 2013-14.

Figure 2.1: Millets in PDS: GoK Approach



Procurement commenced in the year 2013-14 but there was limited success. During 2014-15, the GoK tasked the Karnataka Agricultural Price Commission (KAPRICOM) to study the issue and suggest remedial measures to increase procurement of millets. KAPRICOM found that over the last two decades, area under these crops were steadily declining and profitability vis-à-vis other competing crops had fallen sharply, leading to grower apathy towards these crops. To remedy the situation, the key recommended actions were:

- Increase minimum support price (MSP) to ragi and jowar to provide at least 20%-30% mark-up⁵ over cost of cultivation as estimated by KAPRICOM
- Reduce incentives being given to maize and cotton, which were the chief competitors to ragi and jowar
- Aggressively promote millets as an appropriate crop to adapt to changing climatic situation in the state
- Invest in carrying out research to produce new varieties that will provide high yields, thus making it attractive to farmers to grow the crops.

Accordingly, the GoK increased the MSP from Rs.1500/quintal for ragi and Rs.1800/quintal for jowar (maldandi⁶ variety) in 2013-14 to Rs.2000/ql and Rs.2300/ql for ragi and jowar respectively in 2014-15. Procurement of ragi increased to 1.36 lakh MT (metric tons) and 6839 MT for jowar in 2014-15. Encouraged by this, the MSP for ragi was further enhanced in 2015-16 to Rs.2250/ql and procurement increased to 1.5 lakh MT. However, following the failure of jowar crop, there was no procurement of jowar in 2015-16. The objectives of this study were framed against this background.

⁵ Prof. M.S. Swaminathan had recommended that farmers should be assured at least 50% margin over cost of cultivation to make a crop attractive for the farmer to continue cultivating it

⁶ Only maldandi, a traditional variety of jowar (called bili jola or white jowar) that is grown in north Karnataka during rabi is preferred as a foodgrain. The hybrid variety grown during kharif is not eaten in the area. Therefore, the GoK procures only this variety and announces a separate MSP for it.

3 Objective

Examine all aspects of introduction of millets in the PDS in Karnataka, covering issues related to production, procurement, storage, pricing, and consumer preference.

More specifically, the study addresses issues such as:

- Is there sufficient production of the millet being introduced to meet the requirements of PDS as per NFSA?
- What is the procurement mechanism in terms of timing of procurement and payment to supplying farmers? Does the agency have the required expertise?
- What is the role of the Food Corporation of India in procurement of millets?
- Is local production, procurement and supply through PDS a viable solution for supplying millets?
- What is an appropriate price to encourage farmers to grow and supply the millet?
- What are the key issues in storing the procured millet? Is it different from storing rice and wheat, in which the agency is usually experienced?
- Does the consumer and more specifically, the meal-maker (usually woman of the house) prefer millet over rice and wheat? If so, what is the preferred quantity per month for a household of five persons?

4 Approach and Methodology

The study was carried out in select districts of Karnataka where ragi and jowar are grown and are being distributed under PDS. Broadly, the study used the techniques of interviews/focus group discussions with key stakeholders, household interviews based on questionnaires covering consumers and producers in rural areas and consumers in urban areas (in both cases PDS beneficiaries only), field observation of procurement and storage of millets, etc.

4.1 Detailed Methodology

4.1.1 Desk review of available data and literature

A desk review of available information on the introduction of millets in PDS in Karnataka, alternative-PDS systems in Telangana and Andhra Pradesh was carried out.

4.1.2 Interviews with key stakeholders

Interviews were carried out with policy makers, implementers (government, NGOs), consumers, etc., to gain a good understanding of the issues relevant to the objectives of the study. Karnataka Food and Civil Supplies Corporation, Department of Food, Civil Supplies and Consumer Affairs, Government of Karnataka, Karnataka Agriculture Price Commission, Central Warehousing Corporation, Karnataka State Agricultural Marketing Cooperative Federation, third party assayers hired by grain procurement agencies and Food Corporation of India were the main agencies approached in this connection. Initiatives by two NGOs, Deccan Development Society (DDS) and WASSAN, who piloted efforts to promote millets under PDS in Telangana and Andhra Pradesh were also studied.

4.1.3 Field survey

A questionnaire based field survey was carried out in 2 districts each in south Karnataka (ragi area) and north Karnataka (jowar area). The survey schedules are in annexure 1. A sample of 400 rural and urban PDS consumers put together was covered in the survey such that 100 sample households were covered per district. In each district 50 urban samples from the district head quarters and 50 rural samples from a maximum of 5 Gram Panchayats from any one taluka was drawn. The field survey focused on consumer preferences for millets vis-à-vis rice and wheat and quantity of millets desired per month per family.

In addition, 200 farmers (50 farmers per district) were interviewed to gather information on issues related to production, pricing and procurement.

4.1.4 Selection of Districts and Sample Households

The Karnataka Government started procuring millets (ragi & jowar) and supplying through PDS from 2013-14. Data from the Karnataka Food and Civil supply

Corporation (KFSCS) dashboard was analyzed to understand the procurement and distribution of millets.

Districts that had the highest procurement⁷ of ragi/jowar and distribution⁸ of these grains through the PDS were selected for carrying out the study. Mandya and Tumkur were selected for ragi and Dharwad and Gadag for jowar. In each of these districts, the taluka with the highest procurement was selected and within the taluka, 35 farmers randomly chosen from a list of farmers who had supplied ragi / jowar under Minimum Support Price (MSP) based procurement were interviewed. In addition, 15 farmers who had not supplied under the MSP procurement were also interviewed.

The same 50 farming households (that were covered under the farmer survey) were also covered under the rural consumer survey after ensuring that they were either BPL (Below Poverty Line) / AAY (Antyodaya) PDS cardholders and thus eligible to receive grains under PDS. In the same district, 50 urban households were selected in the district headquarters to carry out the urban consumer survey. In order to choose either BPL or AAY consumers, the survey was conducted in urban slums.

4.1.5 Desk review of DDS and WASSAN

A report prepared by Glocal Research and Consultancy Services, Hyderabad gave information on the alternate PDS initiative of DDS in Telangana⁹.

WASSAN (Watershed Support Services and Activities Network) had piloted a SHG managed PDS that distributed ragi in a few villages in Anantapur district in Andhra Pradesh during 2009, under the World Bank supported Andhra Pradesh Drought Adaptive Initiatives (APDAI) project. This pilot has since been discontinued. Published reports were reviewed¹⁰.

⁷ http://www.kfscs.kar.nic.in/kfscscdd/pc_rep_dist.aspx?id=BAXI%2fIL7WX4%3d (provides data on procurement of ragi and jowar during 2015-16)

⁸ http://kfscs.kar.nic.in/kfscscdd/dist_ret_pt_lift_stat_t.aspx (provides data on distribution of ragi/jowar)

⁹ http://www.vikalpsangam.org/static/media/uploads/Resources/alternative_pds_at_dds_srinivas_thapa_2004.pdf

¹⁰ http://www.dhan.org/smallmillets/docs/report/Introducing_millets_into_Public_Distribution_System.pdf

4.2 Use of Remote Sensing (RS) to establish area and production of selected crops

One of the key issues in introducing millets into the PDS is often lack sufficient quantity of produce in the area. In Karnataka, as per a study carried out by the Karnataka Agriculture Prices Commission¹¹, area under ragi and jowar has been decreasing rapidly in the last two decades, ceding areas to maize and cotton. The study recommended urgent measures to increase area and productivity of ragi and jowar to ensure that it is available in sufficient quantities for procurement and distribution through the PDS.

As per the NSSO 68th round survey (2011-12) on household consumer expenditure¹², 40% of the population in Karnataka consumed jowar while nearly 45% consumed ragi. However, only 15% of jowar and 19% of all ragi consuming households produced these millets themselves; meaning the rest purchased it. Further, only 24% jowar and 34% ragi consuming rural households produced the millets themselves. Thus, even in rural areas as per the NSSO 68th round, nearly 60-70% households consuming the millets did not produce it themselves.

As per crop area statistics of the Government of Karnataka¹³, area and production of these two millets has been falling since early 2000s. If that is the case then, where is the 60-70% of the households buying these millets from for consumption?

In order to better understand the issue and address the first research question raised in Section 2 independently, the remote sensing and GIS lab in MSSRF carried out a study to provide the following details:

- For selected districts in Karnataka, trace the area under Ragi and Jowar over the period 2005, 2009 and 2015
- For the same geography and period, trace if area under ragi and jowar is being taken over by other crops such as cotton, maize, etc.

¹¹ http://kapricom.org/downloads/reports/KAPC_Report1_Oct2014.pdf (report is in Kannada only)

¹² <https://www.google.co.in/search?q=NSSO+68th+round+consumer+expenditure&oq=NSSO+68th+round+consumer+expenditure&ags=chrome..69i57j0.7887j0j4&sourceid=chrome&ie=UTF-8>

¹³ http://kapricom.org/crop_production_statistics.html

5 Key Findings from the Sample Surveys

5.1 Farmer Survey

Tables in Annexure 2 shows the distribution of the sample of farmers surveyed based on socio economic characteristics by districts and sector.

The focus of the farmer survey was to:

- assess importance of the millet crop in the portfolio of the farmer
- estimate cost/qtl of grain produced
- assess experience and level of satisfaction of the farmer with selling under MSP procurement vis-a-vis selling to the market

Majority of the farmers in Dharwad and Gadag district have medium and large operational land, while in Mandya and Tumkur districts, majority of farmers are small and semi-medium operational land holders (Table 10). Jowar is chiefly cultivated in rabi while ragi is cultivated in kharif under rain fed conditions in Tumkur and under irrigated conditions in Mandya.

5.1.1 Relative Importance of Millets for Farmers

District	Crop	Percentage of cultivated land under the crop	<25%	25% to <50%	50% to <75%	> 75 %	Total
Dharwad	Jowar	% of Respondents	26%	40%	21%	13%	100%
Gadag	Jowar		31%	55%	14%	0%	100%
Mandya	Ragi		9%	33%	33%	26%	100%
Tumkur	Ragi		0%	2%	4%	94%	100%

Source: Primary survey 2016-17

Table 5.1 shows that a substantial proportion of the land cultivated in rabi (jowar) and kharif (ragi) is devoted to these millets in the study districts. In Tumkur, 98% of the respondents reported that 50% or more of their land was under ragi during kharif indicating the lack of alternatives in the area. In contrast, only 60% of farmers in Mandya reported 50% or more area under ragi.

In Dharwad and Gadag, 34% and 14% of the respondents respectively reported 50% or more under jowar during rabi indicating the choices available to them. However, a whopping majority of the respondents reported that they devoted 25% or more area

to the crop, indicating its importance in their crop choices. Ragi and jowar are the key foodgrains consumed by the respondents and these crops also provide fodder for their cattle, which is why a substantial proportion of area is devoted to these crops in the study area.

5.1.2 Yield and cost of cultivation

Table 5.2 shows the reported yield and costs of cultivation for jowar and ragi in the study areas based on the primary survey of farmers. These figures represent an **unaided response** from the farmers to the question of yield and costs.

District	Crop	Mean yield qtls/acre	Mean cost of cultivation Rs./acre	Mean production cost of grain Rs./qtl
Dharwad	Jowar	7.6	3028	400
Gadag	Jowar	4.2	4916	1184
Mandya	Ragi	16.8	11600	689
Tumkur	Ragi	5.3	7560	1426

After the questionnaire based farmer survey was completed, a series of in-depth interviews were conducted with several farmers who had responded during the primary survey. In-depth interviews focused on making a **detailed assessment of cost of cultivation**, issues in selling under MSP based procurement, etc. **Table 5.3** presents the results of responses to questions on cost of cultivation and yield from farmers that are based on in-depth interviews. (See Annexure 4 for the detailed table)

District	Crop	Yield qtls/acre	Cost of Cultivation Rs./acre			Cost of Production Rs./qtl		
			A1 ¹⁴ Costs	A1 + FL Costs	C3 Costs	A1 Costs	A1 + FL Costs	C3 Costs
Dharwad	Jowar	8	10124	11804	19267	1265	1869	2408
Gadag	Jowar	5	6195	7575	11529	1239	1738	2306
Mandya	Ragi	18	23773	25154	37495	1321	1606	2083
Tumkur	Ragi	12	16356	18936	27470	1636	1615	2747

Source: In-depth farmer interviews 2016-17

As in most cost of cultivation assessments, the key reasons for differences between figures reported when asked without going into details (primary survey, which is mostly top of mind recall) and when asked for step-by-step with details (in-depth interviews, which is a more considered view of the respondent) are:

- Not accounting for own labour
- Considering only out of pocket cash expenses
- Not accounting for use of owned equipment, animal power and farm yard manure, own seeds, etc.
- Not accounting for labour for threshing, winnowing, drying, bagging, baling straw, transportation from farm to home and from home to market
- Not accounting for rental value of land and managerial time spent by the farmer in managing the farm enterprise.

Table 5.4 shows the cost/qtl of millets as estimated by various agencies¹⁵, which correlate well with the findings from the in-depth interviews. KAPRICOM estimates are higher since they are based on C3 costs and correlate well with figures in table 5.3. Therefore, for further analysis in this study, figures from the in-depth interviews are used.

¹⁴ A1 costs = All cash costs incurred by farmer; FL = Family labour at opportunity cost; C3 = Total cost including A1 + FL + Imputed cost of land rental and managerial costs of the farmer

¹⁵ Taken from http://kapricom.org/downloads/reports/KAPC_Report1_Oct2014.pdf page no.18 and KAPC report December 2015

Source	Crop	Cost of cultivation Rs./qtl
Department of Economics and Statistics, GoK	Jowar	1992
	Ragi	1556
Commissionerate of Agriculture, GoK	Jowar	1711
	Ragi	1228
UAS, Bengaluru	Jowar	1834
	Ragi	2306
KAPRICOM (C3 costs)	Jowar (Vijayapura)	2931
	Ragi (Tumkur)	2861

5.1.3 Experience of farmers in selling under MSP procurement

Farmers were asked to compare the experience of selling in the open market versus selling to the government under MSP procurement.

5.1.3.1 Price, payment duration and market distance

Table 5.5 shows a comparison of farmers' responses on the parameters of price, time taken to receive payment and distance to market/place of procurement.

Districts		Dharwad	Gadag	Mandya	Tumkur
Crop		Jowar		Ragi	
Price Rs. (per/qtl)	Open	2007	1900	1707	1785
	Govt.	2239	2258	2130	2052
Payment duration (days)	Open	1.33	1.11	1.46	1.21
	Govt.	64	22.33	47.36	39.65
Market distance (km)	Open	16.44	21.8	NA	13.21
	Govt	14.81	18.83	11.02	16.48

Source: Primary survey 2016-17

Price is consistently higher under MSP procurement, but number of days taken by the farmer to receive payment is very high under government procurement as compared to selling in the market. In fact, this was the main complaint that farmers had about selling to the government - interminable delays in receiving payments. Discussions with KFCSC revealed that while some time was required to process the payment and effect direct account transfer, quite often, KFCSC itself had no working

capital to pay for the goods procured since it was dependent on the GoK releasing the funds for procurement¹⁶.

5.1.3.2 Satisfaction rating: Quality, quantity and transaction process

Tables 5.6 (quality assessment process), 5.7 (quantity measurement) and 5.8 (overall transaction process) presents the satisfaction levels of farmers as reported in the farmers' survey.

District	Crop	Very satisfied	Satisfied	Moderately satisfied	Moderately unsatisfied	Very unsatisfied	No Answer
Open Market							
Dharwad	Jowar	0.0	36.0	64.0	0.0	0.0	0.0
Gadag		28.6	42.9	20.4	0.0	8.2	0.0
Mandya	Ragi	40.8	46.9	6.1	0.0	0.0	6.1
Tumkur		4.0	22.0	2.0	0.0	0.0	72.0
Government procurement							
Dharwad	Jowar	58.0	22.0	2.0	0.0	0.0	18.0
Gadag		18.4	51.0	6.1	2.0	0.0	22.4
Mandya	Ragi	40.8	18.4	16.3	6.1	4.1	14.3
Tumkur		20.0	48.0	2.0	0.0	0.0	30.0

Source: Primary survey 2016-17

District	Crop	Very satisfied	Satisfied	Moderately satisfied	Moderately unsatisfied	Very unsatisfied	No Answer
Open Market							
Dharwad	Jowar	0.0	32.0	66.0	2.0	0.0	0.0
Gadag		18.4	55.1	18.4	8.2	0.0	0.0
Mandya	Ragi	40.8	49.0	6.1	0.0	0.0	4.1
Tumkur		4.0	12.0	10.0	2.0	0.0	72.0
Government procurement							
Dharwad	Jowar	58.0	18.0	2.0	0.0	0.0	22.0
Gadag		16.3	53.1	4.1	0.0	2.0	24.5
Mandya	Ragi	51.0	20.4	6.1	4.1	4.1	14.3
Tumkur		18.0	30.0	20.0	0.0	0.0	32.0

Source: Primary survey 2016-17

¹⁶ Procurement ends in March, which is the time governments try to restrict cash expenditure.

Overall, more farmers reported being “very satisfied” with the government’s system of checking quality and measuring quantity during procurement as compared to their experience whilst selling in the open market. During our in-depth interviews with farmers and traders, it became clear that most of the farmers hardly take their produce to Agriculture Produce Market Committee (APMC) yards to sell. Most sell to the nearest kirana shop that also doubles up as a collection point for larger traders.

An analysis of the total production of ragi and jowar in Karnataka and its arrivals in APMC markets in the state shows (See table 5.8) that less than 5% of the total production comes to formal markets.

Year	Ragi production (lakh MT)	Ragi market arrivals qtls	% of production arriving in APMC	Jowar production (lakh MT)	Jowar market arrivals qtls	% of production arriving in APMC
2005	16.14	360616	2.23%	13.59	479229	3.53%
2006	16.56	408013	2.46%	14.79	516161	3.49%
2007	6.65	305219	4.59%	11.3	428611	3.79%
2008	13.68	326687	2.39%	16.7	529952	3.17%
2009	12.33	450146	3.65%	14.84	683256	4.60%
2010	11.96	624080	5.22%	12.96	553180	4.27%
2011	15.88	888332	5.59%	14.67	410068	2.80%
2012	12.72	609029	4.79%	11.66	669121	5.74%
2013	9.74	472630	4.85%	13.15	742192	5.64%
2014	12.57	558158	4.44%	13.17	563597	4.28%
2015	12.98	462718	3.56%	11.74	518413	4.42%

Source: GOI Website- dacnet & FRE/Final Estimates of DE&S Bangalore & http://krishimaratavahini.kar.nic.in/reports/Main_Rep.aspx

Table 5.9 shows that farmers are moderately unsatisfied with government procurement processes in Dharwad and Tumkur,, while in Gadag and Mandya, they are satisfied. On the other hand selling to open market has been rated overwhelmingly satisfied or very satisfied.

Table 5.9: Satisfaction rating for physical transaction process							
District	Crop	Very satisfied	Satisfied	Moderately satisfied	Moderately unsatisfied	Very unsatisfied	No Answer
Open Market							
Dharwad	Jowar	86.0	12.0	2.0	0.0	0.0	0.0
Gadag		28.6	63.3	2.0	4.1	2.0	0.0
Mandya	Ragi	85.7	2.0	0.0	0.0	0.0	12.2
Tumkur		18.0	2.0	4.0	8.0	0.0	68.0
Government procurement							
Dharwad	Jowar	0.0	0.0	14.0	64.0	2.0	20.0
Gadag		14.3	51.0	8.2	4.1	0.0	22.4
Mandya	Ragi	36.7	32.7	10.2	2.0	8.2	10.2
Tumkur		0.0	0.0	4.0	46.0	20.0	30.0
Source: Primary survey 2016-17							

During in-depth interviews several farmers mentioned that whilst selling to the government they had to endure long queues, lot of repeated paper work such as, RTC (right to cultivation certificate) had to be signed by Village Accountant, Revenue Inspector and Tahsildar, bank passbook copy had to be certified by bank manager and sometimes RTC holder had to appear in person.

5.2 Consumer survey

Tables in Annexure 3 shows the distribution of the sample of consumers surveyed based on socio economic characteristics by districts and rural and urban sectors.

The consumer survey focused on the following parameters:

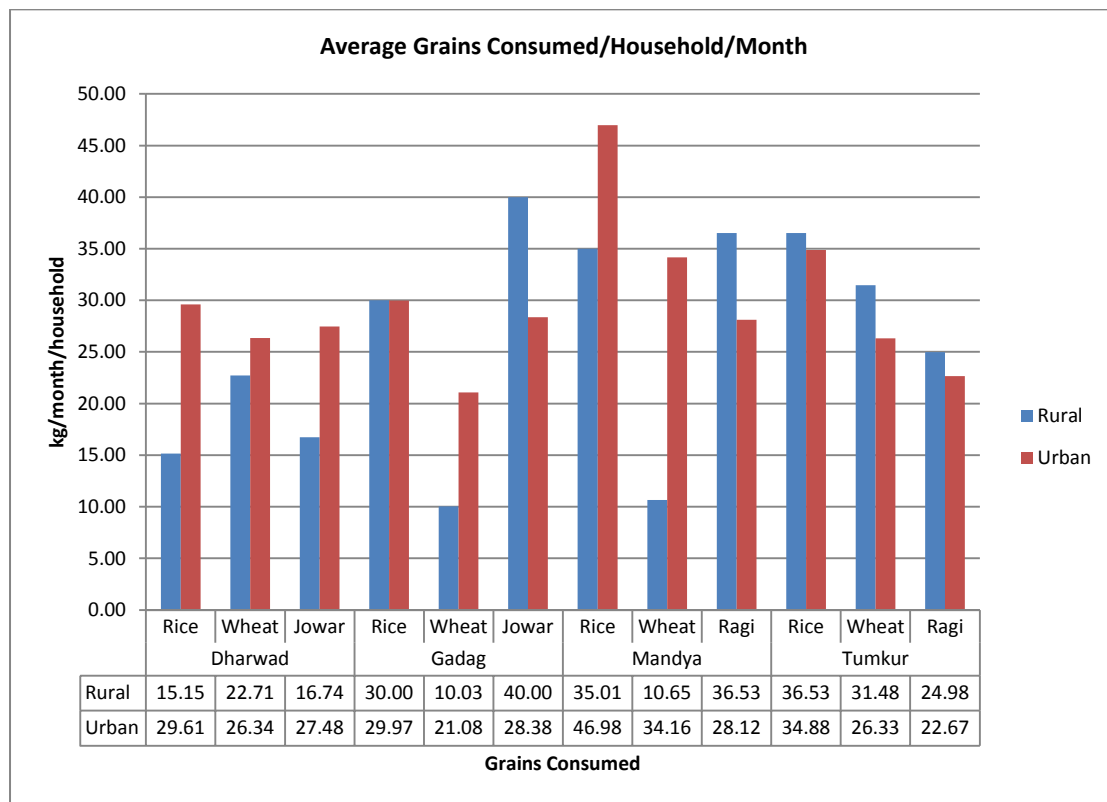
- Composition of cereals (rice and wheat) and millets (jowar and ragi) in the food basket in a household
- Average monthly consumption of these grains in a household
- Sources of these grains (home grown, markets and PDS)
- Price and average expenditure when it is purchased from the market

5.2.1 Composition of Cereals & Millets in Food Basket of a Household

Rice, jowar and wheat in Dharwad and Gadag and rice, ragi and wheat in Mandya and Tumkur are the major cereals and millets that comprise the food basket of a

household in both rural and urban areas. Based on the respondents reported frequency and quantity of each grain consumed, the average quantity consumed per month per household has been calculated and is presented in Figure 5.1.

Figure 5.1: Average grains consumed/month/household

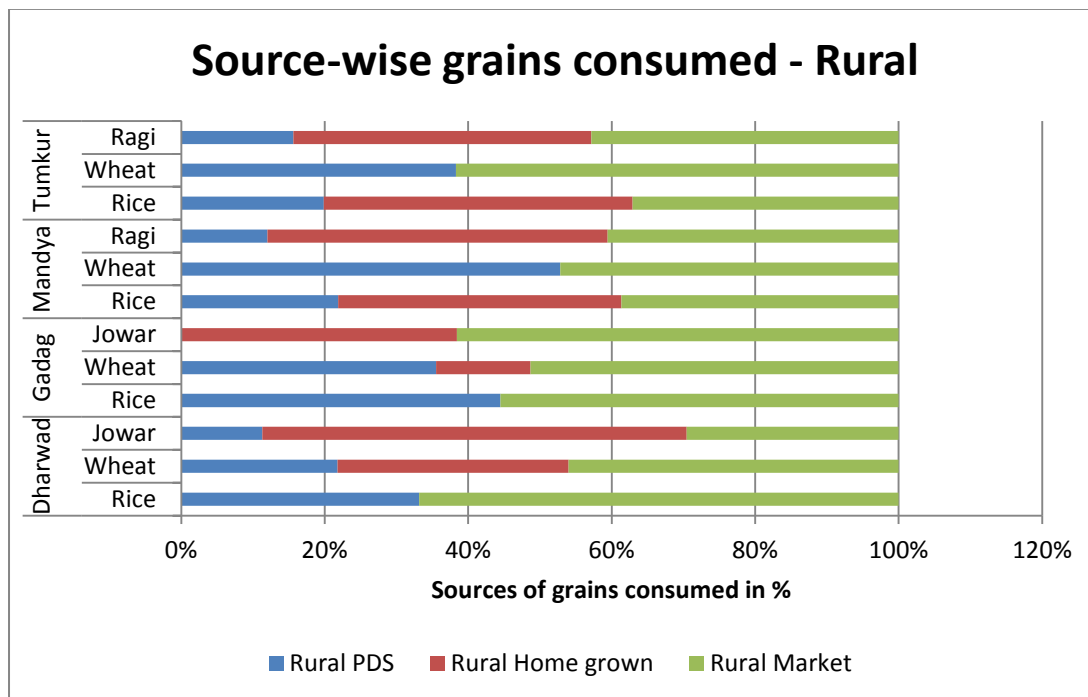


It is seen that except in rural Dharwad and Gadag, rice is by far the single largest grain consumed by households in all the districts across rural and urban areas. Wheat and ragi/jowar are consumed in equal proportion in urban areas while in rural areas, millet consumption is usually more than wheat. These estimates will be used in the study to assess requirement of total millets under PDS.

5.2.2 Sources of Foodgrains

Figures 5.2 and 5.3 show the sources of cereals and millets consumed by rural and urban households respectively in the study area. PDS, home grown and purchase from market are the main sources of grain for a household.

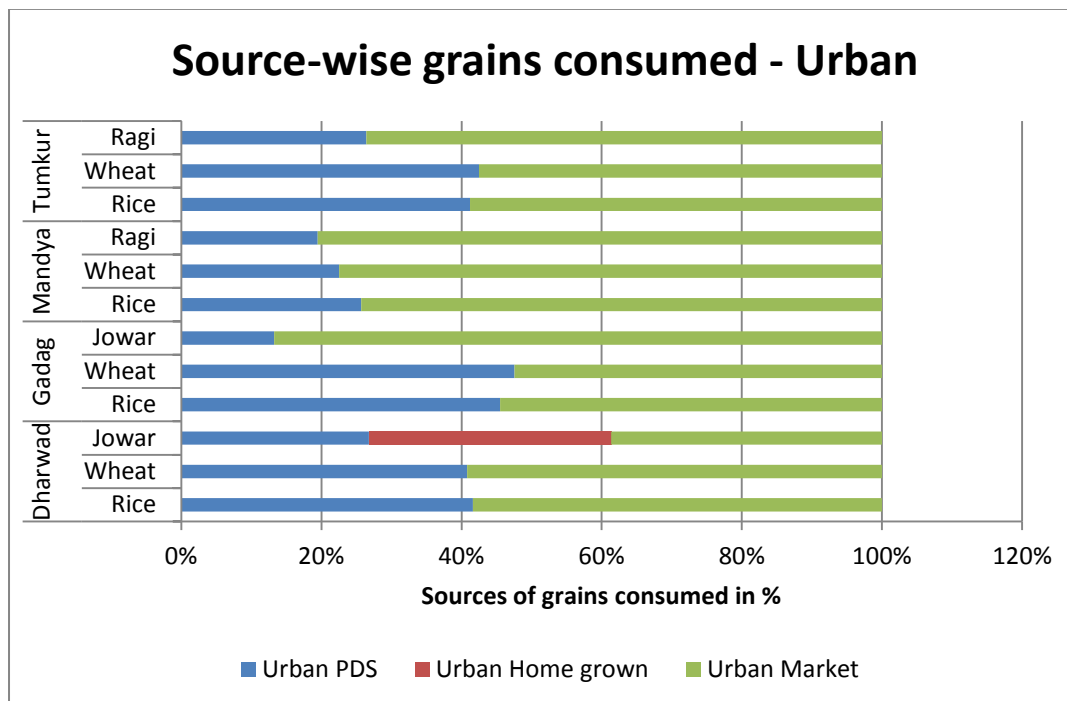
Figure 5-2: Source-wise grains consumed-Rural



Despite, PDS supply of rice, all areas reported that a significant proportion of their rice consumption is purchased from markets, clearly indicating the strong preference for rice in the food basket. Even in rice growing areas such as Mandya and parts of Tumkur, purchase of rice is significant indicating that even the landless¹⁷ were spending on eating rice. Similarly, a significant proportion of ragi/jowar is also sourced from the market. In Dharwad, several respondents mentioned that during rabi, farm workers were always paid wages in the form of maldandi jowar. In fact, the wage for a season is increased or decreased depending on the yield that is recorded, which in turn is largely dependent on how bountiful the monsoon was!

¹⁷ 42% of the total rural households sampled were landless

Figure 5.3: Source-wise grains consumed (Urban)



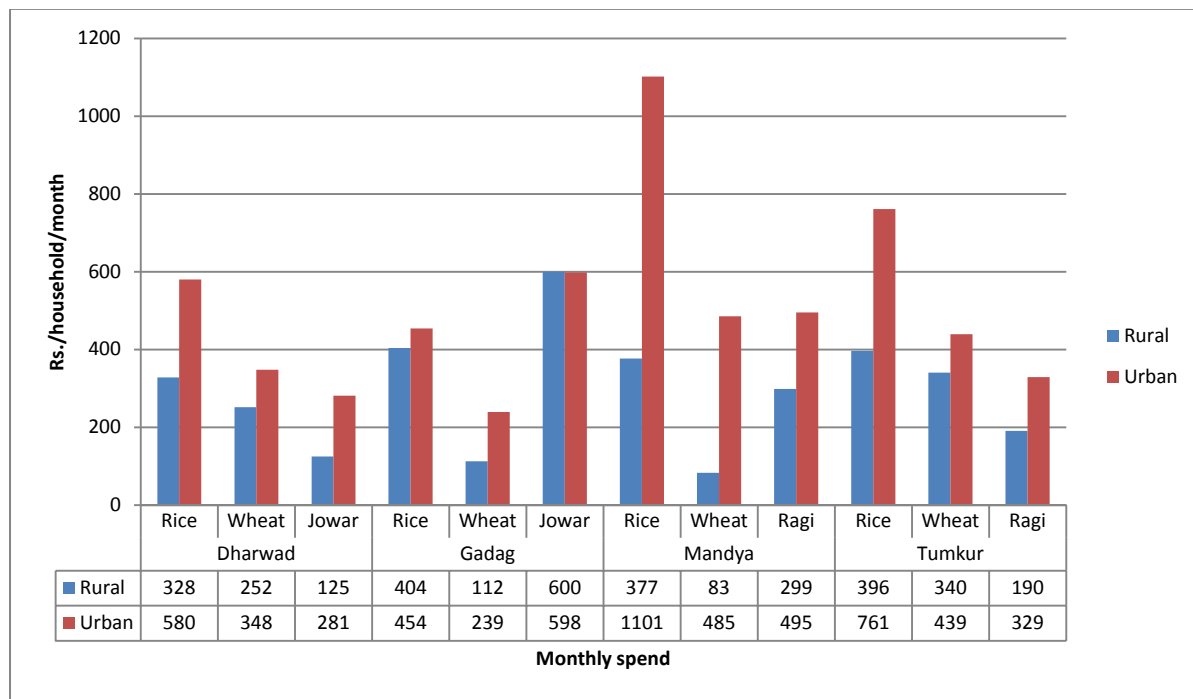
Being urban consumers, grains are mainly sourced from the market. Except for wheat, which is largely PDS sourced, rest are overwhelmingly purchased from the market.

Overall, PDS as a source accounts for less than 25% of the ragi/jowar consumed by both rural and urban customers.

5.2.3 Monthly Expenditure on Market Purchase of Grains

Figure 5.4 shows on an average how much each household spends on buying cereals and millets from the market.

Figure 5.4: Monthly expenditure on grain purchased from market



As is evident, the maximum amount of expenditure is on purchase of rice from the market. This coupled with a high preference for rice as the grain of first choice (as will be seen in the next section) poses an interesting question to policy makers. ***Should one increase the proportion of millets in the PDS given that they are nutritious, or should the government increase the quantum of rice, because its purchase is causing a significant cash outflow from poor families?***

As seen in the previous section, PDS accounts for less than 25% of millets consumed by households, while rice also hovers around the same level in rice eating areas (Mandya and Tumkur). However, the impact of increasing supply of ragi/jowar versus rice is very different on the households, since monthly expenditure on purchase of rice from the market is significantly higher than in the case of millets.

5.2.4 Grain of first choice

Respondents were asked about their preference for grains out of rice, wheat and ragi/jowar and overwhelmingly chose rice as their first choice in both north Karnataka (Dharwad and Gadag) and south Karnataka (Mandya and Tumkur). Ragi and jowar

were the second most preferred with wheat coming a distant and distinct third. See figures 5.5 and 5.6

Figure 5.5: Choice of Grains - Dharwad & Gadag

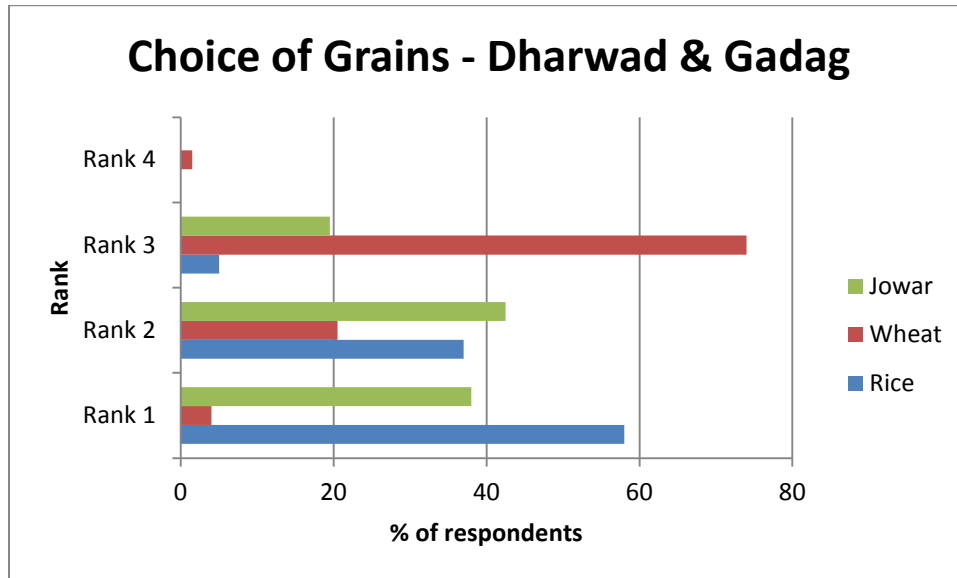
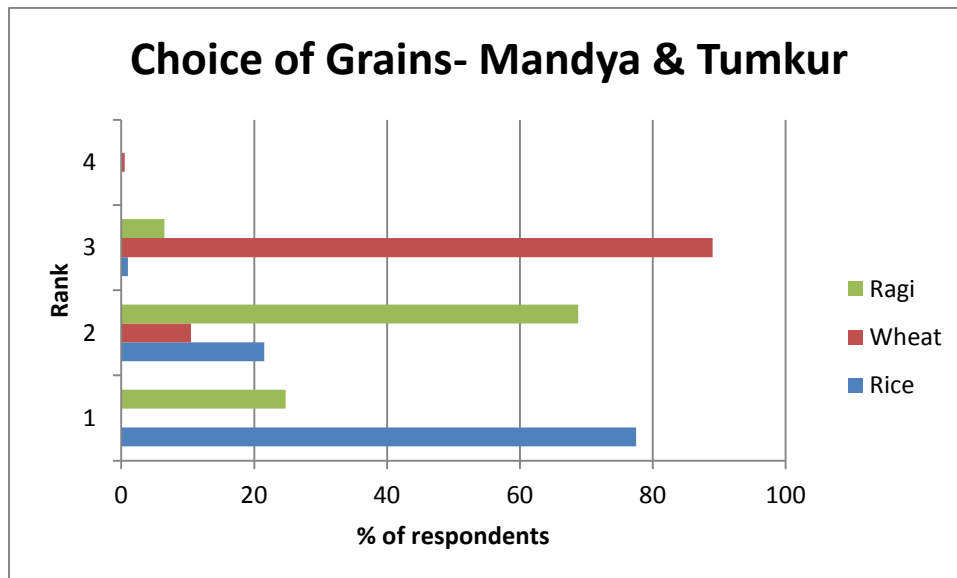


Figure 5.6: Choice of Grains - Mandya & Tumkur



Some of the reasons given for the strong preference for rice were:

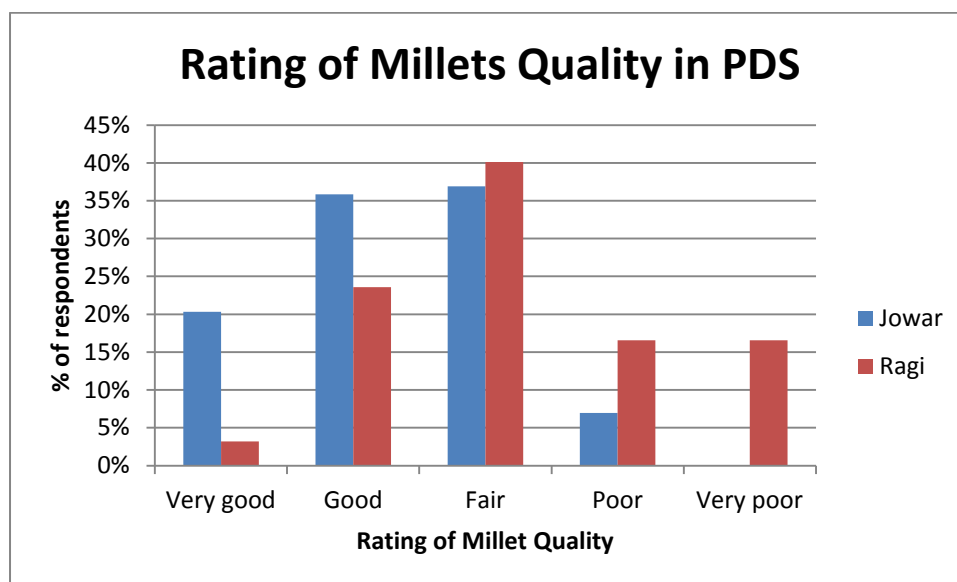
- “Children like it”
- “It is tasty”
- “It is easy to prepare”

On the other hand, ragi and jowar were preferred for their nutritive value and the need for strength by those doing hard physical labour. Interestingly, taste and “children” liking it were not mentioned in favour of millets!

5.2.5 Quality of Ragi/Jowar in PDS

Most of the respondents rated the quality of ragi and jowar as ‘Fair’ or ‘Good’, but nearly 20% felt that jowar was “Very Good” while about 15% felt that ragi was “Poor” and even “Very Poor” (Fig 5.7).

Figure 5.7: Rating of millet quality in PDS



5.2.6 Responses to increasing millets and reducing rice in PDS

More than 70% of the respondents did not want the proportion of millets to be increased in PDS while decreasing the quantum of rice. The reasons advanced were:

- **“We grow ragi/jowar but not rice. Hence rice should be supplied in PDS”**
- **“Rice is liked very much by children, but it is very costly as compared to millets”**

- ***“Rice being given in PDS is not sufficient. We still have to spend a lot of money to buy the rest from the market”***
- ***“We can buy ragi/jowar from farmers at less rate, but rice is not available in our area with farmers”***

6 Observations & Discussion

6.1 Summary of key findings from Farmer Survey

In the preceding sections, we found from the farmers’ survey that:

- 70% of farmers reported that 25% or more of their land was sown with jowar/ragi. Most of the area was rainfed with only Mandya reporting some irrigation for ragi cultivation.
- Yields were very low for jowar at 0.4 MT/acre in Gadag and 0.8 MT/acre in Dharwad. Ragi yields were better in Mandya at 1.5 MT/acre while in Tumkur they were just 1.0 MT/acre.
- MSP and wholesale market prices at APMC yards were frequently lower than actual cost of cultivation (including family labour and own inputs).
- However, less than 5% of total production came to these formal markets, implying that most farmers may not have even received this rate. During discussions with farmers, market rate that farmers actually got were substantially lower. Ragi languished at just Rs.800-1200/qtl while jowar was about Rs.1700-1800/qtl.
- In fact, many farmers mentioned that after the new MSP of Rs.2250/qtl of ragi was announced by the GoK, wholesale prices in informal markets also went up to Rs.1800/qtl.
- Overall, farmers were satisfied with the government procurement of millets, although they felt that long delay in payments was an area of concern and impediment to selling to the government. Many also felt that the paperwork involved in the process was tedious.

6.2 Summary of Findings from Consumer Survey

The following are the key findings from the consumer survey:

- Rice is by far the single largest item in a household’s food basket, except for rural Dharwad and Gadag where jowar is. Ragi and jowar form about 25-45%

of the food basket of a household in the study area, with urban areas scoring lower than rural area.

- A typical rural household in Dharwad and Gadag consumes as much as 30kg/month of jowar while in Mandya and Tumkur about 25-30kg/month of ragi is consumed.
- At a standard scale of issue of 10kg/month/household under PDS, jowar and ragi thus would form about 30% of a family's monthly consumption. However, since millets are supplied only once in two months, the actual figure would be half, i.e., 10-15%. Currently, most families are receiving far lesser than this.
- Of the remaining quantity, nearly, 30-40% in rural areas and about 60-70% in urban areas is purchased from the market at prevailing retail price. On an average, a rural household in Mandya and Tumkur spends about Rs.200-300/month on purchase of ragi from the market. Urban areas spend about Rs.300-500/month.
- About Rs.150-600/- per month is the reported expenditure on jowar in rural Dharwad and Gadag. It is Rs.300-600/- per month in urban areas.
- Rice by far was chosen as the most preferred grain with ragi and jowar coming second. Wheat was the least preferred grain, making it a choice to be replaced with millets.
- Consumers found the quality of jowar supplied in PDS "good to very good" while ragi was rated "fair".
- Overwhelmingly, respondents wanted quantum of rice under PDS increased rather than millets!

Overall, the consumer survey shows that ragi/jowar form a major part of the food basket of consumers in Karnataka. Thus, there are no issues related to consumer demand, but the overwhelming demand for rice portends a clear preference for rice over millets.

6.3 Procuring Ragi/Jowar for PDS – Key Issues

Despite a quantum jump in MSP for ragi and jowar making it attractive for farmers to supply to the government, procurement targets were not fully achieved in 2015-16; 1.5 lakh MT of ragi was procured while hardly any quantity of jowar was procured.

This section analyses the underlying issues related to production, procurement/marketing, farmer behavior, etc.

6.3.1 Production – Is there sufficient millet being produced?

Secondary data shows that cropping pattern in the state has been undergoing great changes. Table 6.1 shows the compounded annual growth rate (CAGR) of area under various crops in the study area over 1998-2012.

Dharwad		Gadag		Mandya		Tumkur	
Crops	CAGR	Crops	CAGR	Crops	CAGR	Crops	CAGR
Cotton	-6%	Cotton	-5%	Coconut	3%	Arecanut	11%
Dry chillies	-11%	Dry chillies	-11%	Horse-gram	-1%	Arhar	-2%
Gram	10%	Gram	11%	Ragi	-5%	Coconut	5%
Groundnut	-7%	Groundnut	-9%	Rice	-4%	Groundnut	-7%
Jowar	-1%	Jowar	0%	Sugarcane	-1%	Horse-gram	-2%
Maize	4%	Maize	7%			Maize	12%
Moong	3%	Moong	6%			Ragi	-3%
Onion	-19%	Onion	-2%			Rice	-9%
Rice	-3%	Sunflower	4%			Sunflower	-13%
Soyabean	12%	Wheat	-1%				
Safflower	3%						
Sunflower	9%						
Wheat	0%						

Source: <https://data.gov.in/catalog/district-wise-season-wise-crop-production-statistics>

Both jowar and ragi have recorded a negative CAGR over the period of analysis while soyabean in Dharwad and gram in both Dharwad and Gadag have recorded a CAGR of 11%. In Mandya, area under coconut has grown by 3%, but in Tumkur, arecanut (11%) and maize (12%) have recorded a strong CAGR. However, the extent of decline in area in 2012 over 1998 is not very significant; just 1% for jowar while for ragi it is 5% (Mandya) and 3% (Tumkur). Therefore, clearly, area under ragi is declining at a faster rate than that for jowar.

Low productivity and low prices, dissuade farmers from allotting more land to millets. As can be seen from the table above, commercial crops or even crops that can fetch a good return (maize) are preferred over millets. However, farmers still plant millets since it provides them food and fodder security.

However, in order to verify, if indeed, the area was falling and if the area reported was accurate, the in-house GIS team of MSSRF, carried out an analysis of satellite imagery of these districts for the years 2005, 2009 and 2015 (LISS III satellite imagery). The key findings¹⁸ are captured in table 6.2 which shows that area in Dharwad and Mandya are under reported in government statistics while they are over reported for Gadag and Tumkur. However, both government and GIS data shows that area under millets is falling in the study area.

District		Dharwad	Gadag	Mandya	Tumkur
Crop		Jowar	Jowar	Ragi	Ragi
2005	Govt.Data	44313	63572	71422	192991
	GIS Data	56152	51602	79344	148729
Difference (Govt-GIS)		-11839	11970	-7922	44262
2009	Govt.Data	37019	59056	59498	177795
	GIS Data	40797	47605	82300	123078
Difference (Govt-GIS)		-3778	11451	-22802	54717
All fig in Ha.	Remarks	Area under reported	Area over reported	Area under reported	Area over reported

Table 6.3 presents the area under millets estimated using satellite imagery over three periods, 2005, 2009 and 2015 and shows that area under millets is consistently falling in all districts over the period.

¹⁸ Although GIS data is available for 2015, comparison with govt. data is being done for only 2005 and 2009 since govt. data for 2015 is not available district-wise yet.

Figs in Ha.	Jowar		Ragi	
	Dharwad	Gadag	Mandya	Tumkur
2005	56152	51602	79344	148729
2009	40797	47605	82300	123078
2015	40727	49199	75507	125669

Using the area under millets in each district for 2015 from table 6.3 and the productivity reported in the farmers' survey, production in the study area has been estimated. The quantity of millets needed at the scale of issue of 10kg every month under PDS for all eligible PDS cardholders¹⁹ in the study area was estimated. Results are presented in table 6.4:

	Production MT (GIS data for 2015)	No. of PDS Cardholders	Millet requirement under PDS (MT)	Requirement as a % of production
Dharwad	81,454	315768	37892	47%
Gadag	49,199	213836	25660	52%
Mandya	283,151	457249	54870	19%
Tumkur	314,173	596932	71632	23%

Source: PDS Cardholders from Economic Survey of Karnataka 2014-15

As is evident from table 6.4, a huge proportion of the current production in the districts is needed merely to meet the PDS requirements covering BPL and AAY families. Given that less than 5 per cent of the produce comes to the formal market, the extent of challenge in procuring becomes enormous. Even taking the government data of area under these crops (latest available is for 2012), the quantum of grains needed to meet the PDS requirement alone is in the range of 20%-40% of millets produced in the district.

¹⁹ All BPL and AAY cardholders in the district are eligible for receiving millets through PDS

6.3.2 Farmers as Consumers – Compounding the Problem

Compounding the procurement challenge is the behavior of farmers as consumers. Millets are grown as seen in the farmer survey mainly for food and fodder. Therefore, farming households tend to stock-up on these grains to meet their requirements throughout the year. This is one of the reasons for very low market arrivals. Needless to say, low productivity and thereby low production, means many farming households may not have enough grain for themselves. Further, given that these are rainfed crops and entirely at the mercy of monsoons, households tend to stock the grain as long as possible. Ragi, can be stored for more than 2 years while, jowar lasts about 8-9 months. Therefore, in years of bumper yields also, farmers tend not to sell away the produce in bulk. This is reflected in the low arrivals of millets in the formal markets.

Ragi and jowar are also sold from time to time to meet the cash requirements of the family to buy inputs for other crops or even day to day needs. When they run out of the millet, they buy it in exchange for cash or more likely other produce such as pulses, etc. Thus, millets are used as a storehouse of value that can be readily exchanged for other goods and sometimes services. This explains, why many farming households have reported that they purchase millets from the market.

Thus, given the long storability of the crops, low prices and relative importance of the crop as staple food, farming households tend not to sell away their produce. On the other hand cotton, maize and sunflower are sold off since they are not needed / consumed as food in the area. Pulses are also sold off since they are highly susceptible to storage pests.

Given this behavior of farming households, it is evident that procurement is a challenge not only on account of low production, but also farmer behavior as a consumer.

6.3.3 Price & Procurement Window – Getting it Right

Low prices and good storability make millets the right product to stock up rather than sell immediately after harvest. An attractive purchase price (in this case MSP) can

disrupt this practice and induce farmers to sell upon harvest. However, some necessary conditions have to be met for this to happen:

- Purchase price should be announced well before sowing so that the farmer allocates adequate land to the crop.
- Farmer should feel assured (through repeated experience) that indeed, the MSP will be offered and honored at the time of harvest.
- Procurement window is currently between January and March. While ragi would have been harvested, jowar would be just about to be harvested. Therefore, even though the price is attractive, jowar would just not be ready for sale.
- Further, as seen in the preceding section, farmers like to exchange millets for other products over the course of the year. Therefore, procurement could be extended for a period of at least another quarter or so; at least till the onset of the next monsoon, when farmer will be in a better position to assess whether to store or sell.
- Payment terms must be attractive too. Delays in payment can turn off sellers, especially if it is as long as 60 days. In such situations, even an attractive price may not be attractive enough.
- Finally, as PDS consumers, farmers should be reasonably certain that they will get millets as per scale of issue every month. This will go a long way in reducing the inhibition to sell off the precious foodgrain that represents food security at the household level.

6.3.4 Physical Procurement – That in itself is a challenge

While production, price and procurement window are challenges that can be largely handled through appropriately designed policies, the physical act of procuring millets is a huge challenge. The key reasons are:

- Relatively short procurement window poses a huge pressure on the procurement mechanism. Almost the entire quantity of millets required under PDS (about 6 lakh MTs/year) is sought to be procured in just 3 months. Several procurement centres reported that they had a riot like situation on hand and the police had to be called to control the irate farmers.

- Staff deputed from the procurement agencies are not specialists in grain procurement. They have very little knowledge of assessing the quality of the millet being procured. This makes them diffident about being strict about procuring only quality grains.
- Staff is supported by third party assayers, who are expected to assess the quality of the produce and certify the same; more or less on the spot. In several centres, faced with an unruly mob of farmers, quality checking had to be given the go by. In fact, assayers that we met during the survey complained that they even feared for their lives and limbs.
- Staff also reported that they were subject to pressure from elected representatives to procure lower quality grains.
- In addition to quality, procurement centres also had to check if the seller was a genuine farmer with a valid bank account. To do this, they asked for certified copies of RTCs and bank pass books. However, they had no access to online records of these documents to verify their authenticity. Many procurement centre officers lamented that they were not able to make payments since names of declared bank account holders did not match the names of the selling farmers.
- During our survey, we found that many of those listed as farmers²⁰ who had sold to the government, were actually traders who had got the RTC from farmers against a small sum and actually off loaded their old stock at a whopping margin, since the MSP was dramatically higher than the existing market price.
- Lack of storage place is one of the major problems reported by procurement officers. Adequate planning in terms of prior identification of storage godowns and having rental agreements with them in advance would help in averting a crisis-like situation after the millet has been procured.

²⁰ It is commendable that KFCSC has put in place an extensive ICT-enabled MIS to capture details of farmers who supplied under MSP procurement. Indeed, it was of great help in carrying out this study, especially in identifying farmers who had sold under MSP procurement.

6.3.5 Getting the Right Procurement Agency

As can be seen in the preceding sections, the role of the procurement agency in organizing itself and the act of procuring is crucial to ensuring successful procurement of millets. KFCSC, the main procurement agency in Karnataka, has acquitted itself well in this. It has put in place a strong MIS architecture to ensure that millets are procured from genuine farmers. For example, it has stipulated the need for RTC (as proof of being a farmer and having a certain area under millets), fixed a quantity of grain that it will procure per acre from a farmer, made arrangements for direct cash transfer to the accounts of the seller, etc. In addition, appointing a third party assayer brings strength to the KFCSC team that lacks in ability to assess quality of the millet being procured. Further, having its own staff in virtually all districts makes it easy for the agency to manage procurement centres throughout the state, a strength that even the Food Corporation of India (FCI)²¹ does not have. It is our view that with experience, KFCSC will improve on its ability to run the procurement process efficiently and smoothly. Key enablers for this to happen are extending the procurement window and ensuring cash flow to KFCSC and thence to farmers!

6.3.6 Local production, procurement and local distribution – Is this better?

Oftentimes, it is suggested that local production, procurement and local distribution of foodgrains instead of a centralized procurement would be a better and more efficient way of delivering grains to the poor.

As part of an experiment in decentralized PDS, in 2009, WASSAN, organized procurement and distribution of millets through Self Help Groups (SHGs) in a few villages of Anantapur district. SHGs procured millets from farmers and sold it at a subsidized rate to the rural poor. The difference in the procurement and selling rate was met through a subsidy provided by the project. The price of ragi was set higher than that of rice and did not attract many buyers until the price gap between rice and ragi was lowered. The experiment was discontinued once the project and the subsidy ended.

²¹ Interestingly, during our field visit, we met with officials from FCI who were deputed from Bellary district to Gadag to procure pulses! They did not have staff in Gadag to do so.

On the other hand, the approach of Deccan Development Society was more radical. They set up an alternate-PDS that did not work with the government machinery at all. It only used funds from the Ministry of Rural Development to subsidize the price gap between procurement and selling price. Apart from being decentralized and completely owned by the local community, it was exclusively focused on empowering Dalits and other marginalized communities by enabling them to produce the millet and vesting them with the authority and responsibility to run the alternate-PDS. Dalit women were built into teams called Sanghams. Women from these Sanghams were given an initial loan (project funds) to take fallow land on lease and cultivate millets. Pay back of the loan was tied to returning in kind (millets) estimated at prevailing market rates. The grain was pooled and sold to the poor at subsidized rates (project funds). In addition, to delivering nutritious millets at low prices to the poor and also empowering Dalit women, bringing additional land under millets helped in increasing agricultural production in the village. The fodder produced from the jowar crop, helped feed the cattle in the village, which in turn produced manure that went to enrich the soils and thus, over a period of time the fallow land would turn fertile.

Both these, experiences are based on extensive mobilization of the community and a close association with the change makers, in this case WASSAN and DDS. Despite the success of these models, especially that of DDS (it was working in more than 32 villages in Zaheerabad Mandal of Medak district in Telangana), they were not scaled up for want of funding support.

Therefore, there is a need for pilots at, say at district level to establish proof of concept at a larger scale.

6.4 Impact of Millets in PDS – On Farmers

Without doubt, increase in MSP (including the bonus announced by the state government over and above the central govt. MSP) will give a boost to farmers' income from growing millets. This should incentivize them to bring more area under the crop. If better varieties are made available and the level of input use is increased, higher production should ensue. Being a hardy crop, this should also enable farmers to better cope with both climate variability and change. Overall, procuring millets at an attractive MSP will indeed result in "Krishi Bhagya" to the farmers.

6.5 Impact of Millets in PDS – On Consumers

As seen in the preceding sections, PDS seeks to deliver about 20-30 per cent of the total millets consumed by a PDS cardholding household. To do this, the government is procuring millets at a price that is substantially higher than the currently prevailing wholesale price. To meet the entire PDS requirement, it needs to procure nearly 20-40 per cent of the total production of millets. Coupled with this scale and an increased MSP, the move is bound to have an upward impact on the retail price of the millet in the open market. This was already evident during the survey for ragi; wholesale price which was languishing at Rs.800-1200/qtl had risen sharply to Rs.1800/qtl in villages in response to an MSP of Rs.2250/qtl.

A moot question is, given that the household after receiving grains from PDS still has to source nearly 60-80 per cent of the millet to meet the current level of consumption of the grain, will not an increase in open market price take away the benefit of receiving subsidized grain from PDS. In the case of rice, the MSP is received by farmers in Punjab and Haryana, thus, the impact of MSP price and procurement would not impact local prices as much as when ragi is procured from say Tiptur²² at higher than market MSP and distributed back in Tiptur at lower prices.

Another issue that needs more study is, assuming that a household saves money on buying millets by receiving it through PDS at substantially lower rates; will it spend the money so saved on:

- Buying more millets or
- Buying more rice (rice being the grain of choice in most households)

And/or, if the household decides to buy more rice, then will it also reduce the quantity of millets purchased from the market? This move, needless to say will defeat the whole purpose of introducing millets into PDS in the first place. Indeed, there is a need to carefully, study the impact of introducing millets in PDS in Karnataka. The duration of the experience so far is neither stable enough nor long enough to answer these questions appropriately.

²² Taluka place in Tumkur district

6.6 Conclusions

- Consumer demand for millets is strong in Karnataka. However, the lure of taste and ease of cooking rice is stronger.
- By jacking up the MSP (topping up central MSP with a state bonus), a strong price signal has been sent to farmers. If the approach is continued, production of the millets should increase, making procurement less uncertain.
- Coupled with pricing, if the procurement window is extended by 3-4 months, then pressure on the procurement team will ease and more procurement is possible.
- With experience, existing procurement agencies can deliver better, but cash flow and storage issues have to be addressed
- Local procurement and distribution needs more piloting, especially at scale to be considered seriously as a new and viable approach to PDS.

7 Issues to be considered in Introducing Millets in PDS

Based on the observations, findings and discussions in the preceding sections, the following are the key issues to be considered while introducing millets into PDS:

- Check whether there is consumer acceptance of the millet being introduced. In Karnataka, ragi in south Karnataka and jowar in north Karnataka form an important part of the household's food basket. Therefore, acceptance of the millet in PDS is not an issue. However, in other areas, where only tribal communities or a section of the population consumes millets, introduction of millets in PDS may not see enough offtake.
- Check whether there is enough production. In many states, millets are grown in small pockets, on degraded lands, with hardly any inputs. In Karnataka, as the study showed, a substantial area is under jowar and ragi, but the same cannot be said of other minor millets such as foxtail, barnyard, etc.

State	Grain	Households eligible under NFSA (lakhs) ²³	Annual requirement in lakh MT	Production in the state 2014-15 (lakh MT)	% of production to be procured to meet PDS requirement
Karnataka	Ragi	49	2.97	12.98	23%
	Jowar	49	2.97	5.87 ²⁴	51%
Rajasthan	Bajra	89	5.32	44.65	12%
Maharashtra	Jowar	148	8.90	12.05	74%

- Table 7.1 shows the requirement of millets to be distributed through PDS under NFSA at the rate of 5kg grain/household/month in each state versus the actual production. It shows that Maharashtra (74%) and Karnataka (51%) will have to procure a substantial portion of the state's production of jowar to meet the requirement.
- Oftentimes, price can be a strong signal to bring more area under the crop as well as incentivize farmers to apply more inputs to the crop to gain a higher yield and thus return. The approach of the GoK in giving a bonus over and above the central MSP is worth following. The incremental cost to the state is only the bonus being paid.
- Procurement window and the process have to be streamlined before introducing millets into PDS. In this regard, there is a lot to learn from the GoK experience.
- Finally, strong political leadership is needed to push millets through the PDS.

²³ Data on no. of eligible households and production of millet in the state has been taken from the Economic Survey (2014-15) of the respective states

²⁴ 50% of jowar produced is taken as maldandi variety. This is the variety that is preferred by customers and is therefore, distributed through PDS as well.

Annexure 1: Questionnaires used in the study

1. Farmers' Survey

Dist

Taluk

GP

Village.....

Basic details

<p>1. Do you cultivate ragi/jowar (yes=1; no=2) <input type="checkbox"/></p> <p>2. Do you plan to cultivate ragi/jowar this year (yes=1; no=2) <input type="checkbox"/></p>	<p>7. Community <input type="checkbox"/></p> <p>1. SC 2. ST 3. OBC 4. Others _____</p>
<p>3. Name of the farmer: Age: <input type="checkbox"/></p> <p>..... <input type="checkbox"/></p> <p>Gender: (male=1; female=2)</p>	<p>8. Family Size (in number) _____</p> <p>Adults: _____ Children: _____</p>
<p>4. Literacy Status <input type="checkbox"/></p> <p>1. Illiterate 2. Read & Write 3. 1-4 std.</p> <p>4. 5-8 std. 5. 9-12 std. 6. College</p>	<p>9. Types of family <input type="checkbox"/></p> <p>1. Nuclear 2. Extended Nuclear 3. Joint</p>
<p>5. Occupation of the Respondent (Primary & Secondary)</p> <p>i) Primary <input type="checkbox"/> ii) Secondary <input type="checkbox"/></p> <p>1. Cultivation; 2. Self-employed in non-Agri.; 3. Agri. Labour;</p> <p>4. Regular wage/salary; 5. Casual labour 6. Others</p> <p>_____</p>	<p>10. House Type <input type="checkbox"/></p> <p>1. Kuccha 2. Semi-Pucca 3. Pucca</p>

6. Religion 1. Hindu 2. Muslim 3. Christian 4. Others _____ <input style="width: 30px; height: 20px;" type="text"/>	
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11. Land details

Land	Total Own land	Irrigated				Unirrigated/ Rainfed			
		Own land	Leased in	Leased out	Fallow land	Own land	Leased in	Leased out	Fallow land
Area in Acres									

12. Total Operational Land (Acres) (*Note: Operational land includes own land as well as leased in – irrigated and rainfed*)

13. Cropping Details (For the last 12 months)

S.No	Crop Name	Variety Name	Area (Acres)			Total Expenses (Rs./acre)	Total Output (Qtl)	Qty – Self Cons. (Qtl)	Qty – Seed (Units) kg.	Qty – Sold (Qtl) Govt	Qty – Sold (Qtl) Open mkt	By product	
			Irrigated	Rainfed	Total							Own use Yes=1;No=2	If Sold Value (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)	7	8	9	10	11	12	13	14
<i>Kharif</i>													
1													

2												
3												
4												
5												
<i>Rabi</i>												
1												
2												
3												

14. Comparison of sale through open market & government procurement- *what is your preference?*

S. No	Crop Name	Variety Name	Government Procurement (yes=1;no=2)	Preference of Sale (open=1; govt.=2)	Price (2015) (Rs./Qtl.)		Payment Duration (Days)		Market Distance (Km.)		Why do you prefer sale open/govt.
					Open Mkt.	Govt.	Open Mkt.	Govt.	Open Mkt.	Govt.	
1											
2											
3											
4											

15. Comparison of sale through open market and government procurement- *what is your satisfaction rating?*

S. No	Crop Name	Fairness of quality checking process		Fairness of quantity measurement		Speed of physical transaction (from the time of bringing the goods - to acceptance of goods by buyer)	
		Open Mkt.	Govt.	Open Mkt.	Govt.	Open Mkt.	Govt.
1							
2							
3							
4							

Rating: 1 to 5; 1 = Very satisfied; 2 = satisfied; 3 = moderately satisfied; 4 = moderately unsatisfied; 5 = very unsatisfied

16. In the last 5 years where have you been selling ragi/jowar?

Ragi/Jowar	2015-16		2014-15		2013-14		2012-13	
	Open mkt	Govt	Open mkt	Govt	Open mkt	Govt	Open mkt	Govt
Yes =1 ; No = 2								
Price in Rs./Qtl								

17. If sold ragi/jowar to govt. (go to 17a or else 17 b)

17a) How did you come to know that govt. is buying ragi/jowar?

17b) Why did you not sell ragi/jowar to govt.?

18. Household yearly Income a) Farm income Rs. _____ b) Animal Husbandry Rs. _____ c) Non-Farm Rs. _____ d) Wage/salary Rs. _____

19. **Since how many years are you cultivating ragi/jowar:** _____

20. **Will you cultivate millets this year (yes=1; no=2)** _____ If no, why

21. **If first time cultivation of ragi/jowar, what is the motivation:**

Respondent street/land mark Details: _____ **Mobile No:** _____

Investigator Name: _____ **Supervisor Name** _____

2. Consumer Survey

Dist Taluk GP/Town Village/Ward..... Type of Ration Card 1= AAY 2 = BPL

1. Name of the Woman Respondent: Age:	10. Types of family 1. Nuclear 2. Extended Nuclear 3. Joint <input type="checkbox"/>
2. Name of the Husband: Age:	11. House Type 1. Kuccha 2. Semi-Pucca 3. Pucca <input type="checkbox"/>
3. Literacy Status of the Respondent 3. Illiterate 2. Read & Write 3. 1-4 std. <input type="checkbox"/> 4. 5-8 std. 5. 9-12 std. 6. College	12. Do you have Electricity Connection 1. Yes 2. No <input type="checkbox"/>
4. Literacy Status of the Husband 1. Illiterate 2. Read & Write 3. 1-4 std. <input type="checkbox"/> 1. 4. 5-8 std. 5. 9-12 std. 6. College	13. Types of Cooking fuel 1. Fire Wood 2. Kerosene 3. Bio-gars 4. LPG <input type="checkbox"/> 5. Others _____
5. Occupation of the Respondent i) Primary <input type="checkbox"/> ii)Secondary <input type="checkbox"/> 1. Cultivation; 2. Self-employed in non-Agri.; 3. Agri. Labour; 4. Regular wage/salary; 5. Casual labour 6. Others _____	14. Ration Card No: _____ 15. Distance of Ration Shop: _____ km 16. Is Ragi / Jowar Sold in PDS? <input type="checkbox"/>
6. Occupation of the Husband i) Primary <input type="checkbox"/> ii)Secondary <input type="checkbox"/> 1. Cultivation; 2. Self-employed in non-Agri.; 3. Agri. Labour;	1. Ragi 2. Jowar

<p>4. Regular wage/salary; Others _____</p> <p>5. Casual labour</p> <p>6. _____</p>	<p>17. Do you have own agriculture land (yes=1; no=2) <input type="checkbox"/></p> <p>If yes total area: _____ (Acres)</p>
<p>7. Religion</p> <p>1. Hindu 2. Muslim 3. Christian 4. Others _____ <input type="checkbox"/></p>	
<p>8. Community</p> <p>1. SC 2. ST 3. OBC 4. Others _____ <input type="checkbox"/></p>	
<p>9. Total Family Size (in number) _____</p> <p>Adults: _____ Children : _____</p>	<p>18. Household Income Yearly (Including Farm, Non-farm, wage & salary)</p> <p>Rs. _____</p>

19. Food consumption frequency, total raw amount cooked per day and source of cereals and millets

S. No	Food Items	Frequency of consumption (code)	Total amount cooked per day (all meals) (grams)	Source (kg/month)			For purchase from market		
				PDS	Home grown	Market	Whole grains=1 Flour=2	Price (Rs.) per/kg	Frequency of purchase (code)
1	Rice raw								
2	Wheat								
3	Ragi								
4	Jowar								

Code For: Consumption of frequency / Ref. Period: Daily=1; Twice /thrice a week=2; Once a week=3; Once in fifteen days=4; Once in a month=5; occasionally=6

20. When you say you are buying ragi/jowar from the market, who are you buying from mainly?

1 = Other farmers in the village 2= Shops in the village 3= Traders/shops outside the village

21. Preference of Cereals and Millets (Give ranking according to your preference)

S. No	Food item	Ranking	Reason for ranking
1	Jowar		
2	Wheat		
3	Rice		
4	Ragi		

22. If not consuming Ragi/Jowar Reasons

S. No	Food Items	Reasons
1	Ragi	
2	Jowar	

23. Quantity and quality of foodgrains given in Ration/ Fare Price Shops (FPS)

S. No	Food Items	Quantity (kg/month)	Number of days sold in a month	Quality (code)	Available Throughout year (code)	Remarks
1	Ragi					
2	Jowar					
3	Rice Raw					
4	Wheat					

Quality: Very Good=1; Good=2; Fair=3; Poor=4; Very Poor=5

Available Throughout year: Whole Year=1; Nine Months only=2; Six Months only=3; Three months only=4; Alternative months=5; others=6 _____

24. Would you prefer if the quantity of ragi/jowar is increased and rice decreased in PDS? Yes =1; No= 2

25. What is the reason for your response?

26. Name of Ration Shop _____ Ration Shop Owner's Name & Mobile No.: _____

Respondent street/land mark Details: _____ Mobile No: _____
 Investigator Name: _____ Supervisor Name: _____

Annexure 2: Sample Characteristics: Farmers (Sample Size: 200)

Table 1: Farmer Survey Sample Details

District	Sale to Govt.	Sale to Pvt Agency	Total
Dharwad	35	15	50
Gadag	35	15	50
Mandya	35	15	50
Tumkur	35	15	50
Total	140	60	200

Table 2: Number of Farmers by gender

District	Male	Female	Total
Dharwad	49	1	50
Gadag	49	1	50
Mandya	46	4	50
Tumkur	43	7	50
Total	187	13	200

Table 3: Literacy status

Education	Dharwad	Gadag	Mandya	Tumkur	Total
Illiterate	9	11	8	13	41
Read & write	5	1	1	0	7
1-4 std.	8	3	5	6	22
5-8 std.	10	7	8	4	29
9-12 std.	11	21	24	23	79
college	7	7	4	4	22
Total	50	50	50	50	200

Table 4: Occupation

Occupation	Dharwad	Gadag	Mandya	Tumkur	Total
Cultivation	49	47	49	36	181
Self-employed in non-Agri.	0	1	1	2	4
Agri. Labour	0	1	0	10	11
Regular wage/salary	1	1	0	1	3
NA	0	0	0	1	1
Total	50	50	50	50	200

Table 5: Religion

Religion	Dharwad	Gadag	Mandya	Tumkur	Total
Hindu	43	48	50	50	191
Muslim	0	2	0	0	2
Christian	3	0	0	0	3
Others	4	0	0	0	4
Total	50	50	50	50	200

Table 6: Community

Community	Dharwad	Gadag	Mandya	Tumkur	Total
SC	0	1	1	3	5
ST	0	1	4	2	7
OBC	45	13	10	6	74
Others	5	35	35	39	114
Total	50	50	50	50	200

Others (GM, 3A, Lingayat..)

Table 7: Household Family Size

Family size	Dharwad	Gadag	Mandya	Tumkur	Total
1 to 2	2	1	1	1	5
3 to 5	19	19	34	28	100
6 & above	29	30	15	21	95
Total	50	50	50	50	200

Table 8: Type of Family

District	Dharwad	Gadag	Mandya	Tumkur	Total
Nuclear	29	10	29	9	77
Extended Nuclear	12	24	14	16	66
Joint	9	16	7	25	57
Total	50	50	50	50	200

Table 9: Type of House

District	Dharwad	Gadag	Mandya	Tumkur	Total
Kuccha	0	0	0	1	1
Semi-picca	44	46	37	45	172
Pucca	6	4	13	4	27
Total	50	50	50	50	200

Table 10: Farmers classified by operational land

Farmer Class	Dharwad	Gadag	Mandya	Tumkur	Total
Marginal (< 1 ha)	1	0	10	7	18
Small (1 - < 2 ha)	5	5	21	18	49
Semi-medium (2 - < 4 ha)	10	7	14	17	48
Medium (4 - < 10 ha)	16	27	5	8	56
Large (10 ha & above)	18	11	0	0	29
Total	50	50	50	50	200

Annexure 3: Sample Characteristics: Consumer Survey (Sample Size: 400)

Table 1: Consumer Survey sample details by sector

District	Rural	Urban	Total
Dharwad	50	50	100
Gadag	50	50	100
Mandya	50	50	100
Tumkur	50	50	100
Total	200	200	400

Table 2: Types of Ration card by sector

District	Rural		Urban	
	AAY	BPL	AAY	BPL
Dharwad	3	47	0	50
Gadag	8	42	6	44
Mandya	3	47	9	41
Tumkur	0	50	1	49
Total	14	186	16	184

Table 3: Literacy status of the Respondent by sector

Literacy Status	Dharwad		Gadag		Mandya		Tumkur	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Illiterate	30	16	32	23	18	34	14	18
Read & write	2	3	4	4	0	0	0	0
1-4 std	2	4	5	6	2	3	12	3
5-8th std	10	12	7	6	16	7	7	8
9-12 std	6	12	2	10	11	5	16	17
College	0	3	0	1	3	1	1	4
Total	50	50	50	50	50	50	50	50

Table 4: Literacy status of Respondent's Husband by sector

Literacy Status	Dharwad		Gadag		Mandya		Tumkur	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Illiterate	12	15	27	20	17	31	8	10
Read & write	4	4	3	1	2	0	3	1
1-4 std	3	5	9	7	2	3	8	4
5-8th std	12	9	5	5	8	5	9	6
9-12 std	8	11	5	9	17	8	13	16
College	1	3	1	1	4	0	1	7
NA	10	3	0	7	0	3	8	6
Total	50	50	50	50	50	50	50	50

Table 5: Occupation of the Respondent by sector

Occupation	Dharwad		Gadag		Mandya		Tumkur	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Cultivation	4	0	3	0	40	0	8	13
Self-employed in non-agriculture	0	1	1	9	3	5	7	21
Agri. Labour	22	1	35	0	5	2	22	1
Regular wage/salary	0	0	0	1	0	1	1	1
Casual labour	7	4	4	8	1	24	12	9
Others	17	32	6	31	1	18	0	5
NA	0	12	1	1	0	0	0	0
Total	50	50	50	50	50	50	50	50

Table 6: Occupation of the Respondent's Husband by sector

Occupation	Dharwad		Gadag		Mandya		Tumkur	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Cultivation	11	0	3	1	43	0	3	1
Self-employed in non-agriculture	0	2	3	10	0	8	3	7
Agri. Labour	18	1	19	1	3	2	23	0
Regular wage/salary	2	1	1	1	0	3	0	1
Casual labour	8	19	16	20	2	25	11	28
Others	0	15	3	6	0	0	0	0
NA	11	12	5	11	2	12	10	13
Total	50	50	50	50	50	50	50	50

Table 7: Religion by sector

Religion	Dharwad		Gadag		Mandya		Tumkur	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Hindu	42	31	45	35	50	40	40	42
Muslim	5	18	5	15	0	9	10	7
Christian	2	1	0	0	0	1	0	0
Others	1	0	0	0	0	0	0	1
Total	50	50	50	50	50	50	50	50

Table 8: Community by sector

Community	Dharwad		Gadag		Mandya		Tumkur	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
SC	0	4	18	18	0	12	1	27
ST	4	8	7	1	2	21	0	12
OBC	44	27	15	12	14	13	18	6
Others	2	11	10	19	34	4	31	5
Total	50	50	50	50	50	50	50	50

Others (GM, 3A, Lingayat...)

Table 9: Family size by sector

District	1 to 2		3 to 5		6 above	
	Rural	Urban	Rural	Urban	Rural	Urban
Dharwad	10	10	30	32	10	8
Gadag	0	5	36	35	14	10
Mandya	2	12	41	31	7	7
Tumkur	9	7	35	38	6	5
Total	21	34	142	136	37	30

Table 10: Types of family by sector

District	Nuclear		Extended Nuclear		Joint	
	Rural	Urban	Rural	Urban	Rural	Urban
Dharwad	40	42	7	7	3	1
Gadag	34	40	8	7	8	3
Mandya	33	41	15	6	2	3
Tumkur	39	36	0	2	11	12
Total	146	159	30	22	24	19

Annexure 4: Cost of cultivation and cost of production of millets

Sl. No.	Details		Tumkur			Mandya			Gadag			Dharwad		
			Unit	Cost/Return (Rs.)	%	Unit	Cost/Return (Rs.)	%	Unit	Cost/Return (Rs.)	%	Unit	Cost/Return (Rs.)	%
A	Variable Cost			18056	66%		24274	65%		6945	60%		11174	58%
I	Human Labour		32	8000	29%	38	8800	23%	9	2300	20%	15	3700	19%
	Family	Male (No.)	6	1800	7%	2	600	2%	2	600	5%	3	900	5%
		Female (No.)	2	400	1%	2	400	1%	2	400	3%	2	400	2%
	Hired	Male (No.)	10	3000	11%	10	3000	8%	3	900	8%	4	1200	6%
		Female (No.)	14	2800	10%	24	4800	13%	2	400	3%	6	1200	6%
II	Machine and Bullock Labour			4650	17%		6600	18%		1350	12%		2850	15%
	Tractor (hrs)		6	3600	13%	11	6600	18%	1.5	900	8%	4	2400	12%
	Bullock (Days)		3.5	1050	4%	0	0	0%	1.5	450	4%	1.5	450	2%
III	Inputs			4300	16%		7250	19%		2880	25%		3935	20%
	FYM (Tractor load)		1.5	3000	11%	2	4000	11%	1	2000	17%	1	2000	10%
	Seeds (kg)		10	360	1%	8	640	2%	4	200	2%	3	240	1%
	Pesticides (ml)		0	0	0%	0	0	0%	0	0	0%	250	825	4%
	Fertilizers (kg)		110	940	3%	130	2610	7%	85	680	6%	100	870	5%
IV	Interest on working capital (15%)			1106	4%		1624	4%		415	4%		689	4%
B	Fixed Cost			9413	34%		13221	35%		4584	40%		8094	42%
I	Depreciation on farm machinery and farm buildings			500	2%		500	1%		250	2%		250	1%
II	Rental/lease value of land			5000	18%		7500	20%		2500	22%		5000	26%

III	Managerial cost (15% of all costs)			3533		13%		4841		13%		1454		13%		2464		13%
C	Cost	Cost A1		16356				23774				6195				10124		
		Cost A1 + FL		18936		69%		25154		67%		7575		66%		11804		61%
		Total Cost (C3)		27470		100%		37495		100%		11529		100%		19267		100%
D	Output	Grain (qtl)	10	14000			18	25200			5	10000			8	16000		
		Price/qtl		1400				1400				2000				2000		
		Hay (bundles)	100	5000			150	7500			80	3200			120	6000		
		Price/bundle		50				50				40				50		
E	Returns	Gross		19000				32700				13200				22000		
		Over A1		2643.75				8926.25				7005.25				11876.13		
		Over cost A1+FL		64				7546				5625				10196		
		Over total cost (C3)		-8470				-4795				1671				2733		
F	Cost of production Rs./qtl	Cost A1		1636				1321				1239				1265		
		Cost A1+FL		1894				1397				1515				1475		
		Total Cost (C3)		2747				2083				2306				2408		