

Developing farmer based potato system in non-traditional seed producing areas to benefit farmers of plateau region (Karnataka) of India



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Baseline Indicators

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Baseline Indicators

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EXECUTIVE SUMMARY

India is the second largest producer to potato after China; however, all parts of the country don't have uniform distribution of potato production and productivity, which are largely, governed by the purchasing power of the farmers to afford quality seed potato. Karnataka being at long distance from the main seed potato producing region of the country *i.e.* Punjab, Himachal Pradesh and Western UP, gets quality seed potato at very high prices. Farmers of the state being poor and subjected to the risk of abiotic (heat and moisture) and biotic (mainly late blight) stresses are unable to purchase expensive seed potato. After realizing the importance of providing quality seed potato to these farmers at affordable prices, Indian Council of Agricultural Research funded this CIP-CPRI collaborative research project for assessing the possibilities of locally producing quality seed potato. Current study was carried out during June 2013 to fix baseline indicators for the possible impact assessment of project activities in the study area. Executive summary of the study is presented point wise in the following text.

1. Karnataka is very important potato producing state not due to the quantity of potato produced here but due to the processing quality and offseason potatoes

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produced in the state at a time when there is dearth of such potatoes in the country.

2. Major potato producing districts of Karnataka showed sizeable fall in potato productivity (annual compound growth rate = (-) 4.61% in Belgaum, (-) 8.16% in Chickmagalur and (-) 12.44% in Hassan) during 1999-00 and 2009-10.
3. Cropping intensity in the study area was 129.5% whereas potato growers had higher cropping intensity (132%) as compared to the non-potato growers (118%). Cropping intensity in Chickmagalur was higher than the Chikballapur mainly due to shortage of irrigation water in the latter one.
4. Potato yield of the respondents in Chickmagalur district (11 t/ha) was more or less half of that in the Chikballapur district (22.5 t/ha).
5. Average rate of seed potato use in Chikballapur district was 1.56 t/ha as compared to 1.15 t/ha in Chickmagalur district.
6. Due to higher abiotic (heat and moisture) and biotic (mainly late blight) stresses the average post harvest potato losses in Chickmagalur district were estimated at 14.6% compared to 6.75% in Chikballapur.
7. About 77% potato growing respondents were satisfied with the price they were getting the markets while this percentage was 61.5% in Chikballapur district. Weekly prices during harvest season (taken from Directorate of Marketing and Inspection, Faridabad) showed lower relative increase in potato prices in Chikballapur during the harvest season of the 2013 (January to March months of the survey year) as compared to the previous two year. However, this increase in potato prices (during July to September 2012) was much higher in Chickmagalur.
8. Highest level of mechanization on potato farms of the study area was adopted for field preparation followed by harvesting/ digging, planting, earthing up and spraying.
9. Kufri Jyoti was the predominant potato variety in the study area. Better yield than Atlantic and late blight susceptibility of this variety were the single most important good and bad qualities of the variety.
10. Average age of family head of farmers in the study area was 52 years while the average age of landless agricultural labourers was 44 years. It indicates that land

keeps the families joint and landless persons have higher tendency of living as nuclear families.

11. The average academic qualification of the head of the households in the study area was between eight and 12 years of schooling for the farmers and less than 7 years of schooling in case of landless agricultural labourers.
12. Agriculture was the primary occupation of 85% potato growers and 72% non potato growers while farm labour was the primary occupation of landless agricultural labourers in the study area. Chikballapur has higher non-farm employment opportunities than the Chickmagalur district.
13. Cent per cent head of the respondent families in the study area were the males indicating very strong male dominated society in the area.
14. Motorcycle was the most commonly used mode of personal transport by the respondents in the study area. Personal car and tractor was afforded only by one fifth of the farmer respondents.
15. On an average the house status index of potato farmers was 3.62 followed by non-potato farmers (3.55) and landless agricultural labourers (2.26). The house status index of respondents in Chikballapur was better than the Chickmagalur.
16. About half of the respondents were storing their food-grains in the sacks exposing the stuff to damage due to moisture or rodents. The proportion of respondents using metallic/ tin storage bins for food-grains was higher in Chikballapur than Chickmagalur.
17. About 8% of respondent marginal potato growers, 7% non-potato growers and 35% landless labourers lacked assured availability of adequate food on all the days in a year. The situation was better in Chikballapur than in Chickmagalur district.
18. About 10% landless agricultural labourers in the study area lacked access to electricity in their houses while only 30% of them had individual water connection in their houses. About 21% potato growers and 44% non-potato growers lacked individual water connections in their houses indicating the need of a lot to be done in the field of rural development in the study area.
19. About 8% of marginal potato growers and 40% of landless labourers in the study area had to use open fields as toilets. About 21% of respondent farmers had temporary toilets without proper automatic flush system.

20. Only 59% potato farmers, 45% non potato growers and 25% landless labourers were the members of social groups like *Kisan* clubs, Self Help Groups, *Mahila Mandals* etc.
21. In the study area 49, 61 and 85% children of respondents from non-potato grower, potato grower and landless agricultural labourer categories were going to government schools for academic studies while the rest were going to private schools.
22. The average monthly family expenditure of respondents in the study area ranged between Rs. 3794 (landless agricultural labourers) to Rs. 11186 (medium + large potato growers). The average monthly expenditure of farmer respondents in the study area was Rs. 8175. The highest expenditure by the respondent families was incurred on food followed by education of children, travelling and payment of bills. The average monthly expenditure of respondent families was higher in Chikballapur compared to Chickmagalur.
23. Except nearly 8% marginal potato farmers and 10% landless labourers all respondents in the study area possessed a television in their houses.
24. Only 15.5% respondents from farming families had landline telephone connections in their houses while none of the landless agricultural labourers had landline telephonic connections. On the other hand only 8% marginal potato grower respondents and 16% landless agricultural labourer respondents lacked possession of at least one mobile telephone in their houses.

The survey report concludes that the respondents in the study area were backward in terms of their capabilities to employ latest package of practices in the field of potato farming owing to operation of a sort of vicious circle of poverty. Several socio-economic indicators suggest that the respondents were poor. The potato growing respondents of Chickmagalur district were exposed to higher risk due to abiotic (heat and moisture) and biotic (late blight) stresses to potato crop. With the result farmers had tendency of mitigating risk by just reducing their cost of potato cultivation by using cheaper seed potato and other inputs. Research and development organisations have a challenge to take such farmers out of the negative loop and make them adopt the latest scientific practices of potato growing. Such development in the form of new potato varieties (Kadian *et al.*, 2012) and irrigation techniques will not only benefit farmers, but the nation too, by augmenting potato supply.

INTRODUCTION

Besides major food crop, potato is an important poverty alleviation and food as well as nutritional security option for the global poor (Thiele *et al.*, 2010). India has attained potato production of 45 million t from an area equal to 1.9 million t and a productivity of 23.68 t/ ha during 2012 (FAOSTAT). Now India is the second largest producer of potato after China and has higher productivity than the world average (18.8 t/ha) and other top three potato producers *i.e.* China (15.9 t/ha), Russian Federation (12.8 t/ha) and Ukraine (15.4 t/ha) during 2012 (FAOSTAT). Strong indigenous potato research and development programme having domestic variety development and seed production system is primarily responsible for this advantage in India. Details of potato area and production scenario in top 5 potato producing countries are given in **Fig. 1 and 2**.

Karnataka state of India is an important potato producing state. This importance is not due to quantity of potato the state produces but due to the time and quality of potatoes produced here. The state is a noted producer of *kharif* season and processing quality potatoes in

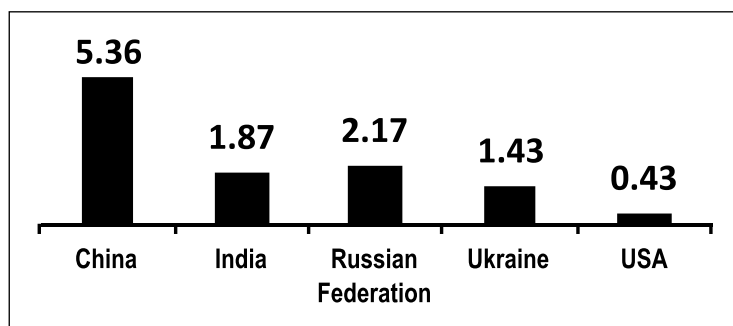


Fig. 1. Average potato area of top five countries (million ha, TE 2012)

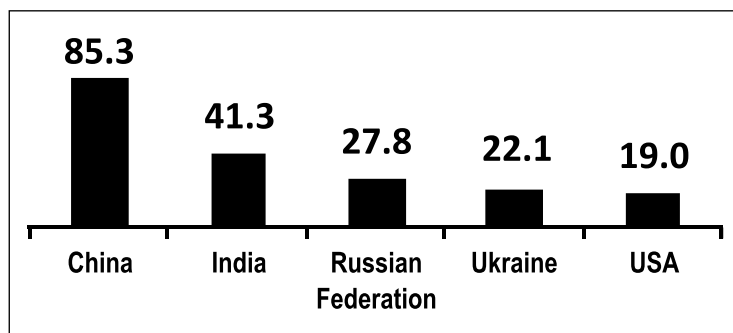


Fig. 2. Average potato production of top five countries (million t, TE 2012)

India. State has played an important role in the fast growing potato processing sector in India (Keijbets, 2008; Singh and Rana, 2012; Rana *et al.*, 2013a; 2013b). However, the fall in already poor productivity of the state during almost one decade is making growers loose their interest in the potato crop (**Table 1, 3 and 4**). Availability of healthy seed has been identified as the principal constraint for the fall in potato productivity in this part of the contry (Rana *et al.*, 2013a; 2013b). If India has to process 25 million t of potato tubers by 2050 (Singh *et al.*, 2014) then the nation cann't afford to overlook legitimate problems of the farmers of the state.

Table 1: Potato production scenario in Karnataka vis-a-vis other states of India.

States	Production			Area			Productivity	
	Million t	Rank	% age	Million ha	Rank	% age	t/ha	Rank
Uttar Pradesh	14.04	1	33.99	0.58	1	31.02	24.21	4
West Bengal	11.56	2	27.98	0.38	2	20.32	30.42	2
Bihar	4.25	3	10.29	0.21	3	11.23	20.24	9
Gujarat	2.26	4	5.47	0.075	7	4.28	30.13	1
Punjab	2.11	5	5.11	0.084	6	4.28	25.12	3
Madhya Pradesh	1.62	6	3.92	0.086	5	4.81	18.84	11
Assam	0.88	7	2.13	0.094	4	4.81	9.36	24
Jharkhand	0.66	8	1.60	0.045	9	2.67	14.67	17
Haryana	0.63	9	1.53	0.028	12	1.60	22.50	6
Chhattisgarh	0.58	10	1.40	0.040	11	2.14	14.50	16
Top 10 states	38.59		93.42	1.62		86.63	23.82	
Karnataka	0.53	12	1.29	0.044	10	2.41	12.18	22
All India	41.31		100.0	1.87		100.0	22.12	

Data source: National Horticultural Board

Note: 1. Potato production and area figures are averages of triennium ending 2012-13

2. Delhi (22.69t/ha) is at 5th rank in terms of potato productivity

The urgency of the situation was very well understood by the Indian Council of Agricultural Research (ICAR) and International Potato Centre (CIP) was provided funds to resolve the seed potato problems of the state. CIP had created success story in the seed potato supply chain management in Andean highlands under multination and multipartner action research project (Devaux *et al.*, 2009). The current study is an effort to identify baseline indicators in

order to set benchmarks for future impact assessment of the ICAR funded CIP-CPRI research project on “Developing farmer based potato system in non-traditional seed producing areas to benefit farmers of plateau region (Karnataka) of India”.

METHODOLOGY

For assessing suitability of areas for seed potato multiplication, Chickmagalur, Coorg (Kodagu) and Chikballapur districts of Karnataka were selected for the project using the information received from GIS modelling. Since, Coorg is a negligible producer of potatoes and there are very few potato growers in the district due to absorption of farm labour in coffee plantations the baseline study was conducted only in Chickmagalur and Chikballapur districts of the state. Potato cultivation in Chickmagalur district is done in rainy season (*kharif* season) while in Chikballapur the crop is taken in winter season (*rabi* season). The survey was conducted during June month of 2013 and the sampling details of the survey have been given in **Table 2**. Respondent potato farmers were categorised in to marginal (farm holding ≤ 1 ha), small (>1 and ≤ 2 ha), and medium plus large (>2 ha) categories. In addition, non-potato growers and landless agricultural labourers were also interviewed for the future comparison.

Table 2: Sampling details (number of respondents)

Particulars	Cultivators						Land less agricultural labourers	All
	Potato growers				Non-potato	All		
	Marginal	Small	Medium + large	All				
District								
Chickmagalur	10	09	08	27	09	36	11	47
Kodagu (Coorg)	0	0	01	01	19	20	05	25
Chikballapur	16	13	10	39	09	48	09	57
Total	26	22	19	67	37	104	25	129
Population # (%)								

@: Marginal = farm holding up to 1 ha; small = having farm holding more than 1 ha and up to 2 ha and medium + large = having farm holding more than 2 ha.

Table 3: District wise details on potato area, production and yield in Karnataka

District	TE area (ha)		Growth (%)	% age in state\$	TE production (t)		Growth (%)	% age in state\$	TE yield (t/ha)		Growth (%)
	00-01	09-10#			00-01	09-10#			00-01	09-10#	
Bangalore (rural)	1412	1281	-9.3	1.6	22821	17559	-23.1	6.07	16.16	13.70	-15.19
Bangalore (urban)	550	211	-61.6	0.3	8963	2116	-76.4	0.73	16.31	10.03	-38.50
Belgaum	5792	3776	-34.8	4.9	65170	35131	-46.1	12.15	11.25	9.30	-17.31
Chickmagalur	926	4452	380.9	5.7	12819	24205	88.8	8.37	13.85	5.44	-60.74
Dharwad	5063	1463	-71.1	1.9	46337	7708	-83.4	2.67	9.15	5.27	-42.45
Hassan	13627	39705	191.4	51.1	147996	90379	-38.9	31.25	10.86	2.28	-79.04
Kolar + Chikballapur	7702	5912	-23.2	7.6	138340	84545	-38.9	29.24	17.96	14.30	-20.38
Mandya	83	388	367.1	0.5	1198	4863	305.8	1.68	14.44	12.54	-13.11
Mysore	29	141	385.1	0.2	296	522	76.4	0.18	10.20	3.71	-63.63
Tumkur	15	31	106.7	0.0	184	351	90.4	0.12	12.02	11.45	-4.79
Others	44	274	526.7	0.4	667	1711	156.4	0.59	15.28	6.25	-59.09
Karnataka	35242	57632	63.53	100.0	444791	269090	-39.50	100.0	12.62	4.67	-63.01

TE: Triennium ending year; #: The latest available data from the DES, 2014, was for the year 2009-10 (assessed May, 2014); \$: Based on the TE 2009-10

Simple mathematical and statistical tools were used for analysing the data collected in the survey. For effective comparison of some important indicators and attributes, indices were computed. Details of various assumptions and procedures adopted for constructing these indices are given in the end of their respective Tables. District wise Annual Compound Growth Rates (ACGRs) of potato area, production and productivity were estimated (1999-00 to 2009-10) and were used to describe growth scenario among different districts of Karnataka. District wise potato area, production and productivity data were obtained online from Directorate of Economics and Statistics, Ministry of Agriculture GOI in December 2011. However, these data were available only up to 2009-10. Corresponding ACGRs for Karnataka state and national level were also computed. Following procedure was adopted to estimate this ACGR:

$$Y_t = Y_o (1 + r)^t$$

$$\text{or } \ln Y_t = \ln Y_o + \ln(1 + r)t$$

$$\text{or } Y_t = A + B * t \quad [A = \ln Y_o \text{ and } B = \ln(1 + r)]$$

$$r = \exp(B) - 1$$

Here r = Annual compound growth rate (ACGR);

\exp = Exponential value;

\ln = Natural log;

t = Time period in years for which ACGRs are calculated.

RESULTS AND DISCUSSION

For fulfilling basic objective of the study this section is discussed to highlight potato production scenario in the state and to list the baseline indicators for future impact assessment.

Potato production scenario in Karnataka

Karnataka produced 1.3% of national potato from 2.41% of national potato area (triennium ending (TE) 2012-13 average of data taken from National Horticulture Board). The state ranks poorly at 10, 12 and 22 position among Indian states in relation to potato area, production and productivity, respectively (**Table 1**). Hassan followed by Kolar + Chikballapur, Belgaum, Dharwad, Bangalore (rural) and Chickmagalur are the important potato producing districts

in Karnataka (**Table 3**). Unfortunately these districts (except Chickmagalur) have experience fall in potato production as compared to the TE 2000-01 average by 23 to 83%. The more disturbing fact is that all the districts of the state have faced fall in potato productivity during this period. This fall ranges from just 5% in Tumkur (negligible potato producer) to 79% in the largest potato producing district (Hassan). Overall the potato productivity fell by 63% in the state of Karnataka during TE 2009-10 average compared to the TE 2000-01 average.

ACGRs: District wise annual compound growth rates (ACGRs) were computed to include the effect of all years in the range unlike the TE years or simply the border years of the range in case of simple growth rates. ACGRs indicate the highest decrease in potato area in Dharwad district while Chickmagalur and Hassan along with less significant potato producing districts like Mandya and Mysore showed healthy growth in the potato area during 1999-00 to 2009-10 (**Table 4**). Similarly, Dharwad, followed by Bangalore (urban) and Belgaum districts showed declining trends in ACGRs of potato production while Mandya followed by Tumkur and Chickmagalur districts increased their potato production at very high ACGRs. Potato productivity decreased at the highest ACGR in the largest potato district (Hassan) by 12.5% followed by Mysore and Chickmagalur. Contrary to the simple growth rates Dharwad and Tumkur showed positive ACGRs in term of potato productivity.

Table 4: District wise ACGRs of potato area, production and productivity in Karnataka during 1999-00 and 2009-10

District/ geography	Area	Production	Productivity
Bangalore (rural)	0.63	0.22	-0.41
Bangalore (urban)	-5.29	-8.79	-3.70
Belgaum	-3.86	-8.29	-4.61
Chickmagalur	18.78	9.09	-8.16
Dharwad	-14.19	-9.16	5.85
Hassan	11.39	-2.46	-12.44
Kolar + Chikballapur	-2.46	-3.71	-1.28
Mandya	16.45	13.99	-2.11
Mysore	15.60	4.51	-9.59
Tumkur	8.70	11.64	2.71
Others	23.76	13.51	-8.28

Data source: Directorate of Economics and Statistics, Ministry of Agriculture, GOI

Baseline indicators for future impact assessment

Agricultural scenario

Different socio-economic baseline indicators were estimated and fixed for the possible future impact assessment exercise of the project activities in the study area. The brief and pin pointed information on the baseline indicators is presented in the following heads.

Land use pattern: Land use pattern provides important information for comparing land ownership and utilization pattern at some future date. In Chickmagalur district, on an average, potato farmers used 45% of cultivated land for potato growing (**Table 5**). This proportion ranged between 32% on medium + large farm to 73% in marginal farm category of potato farmers. The pattern of change for this proportion in the future will provide valuable input for the researchers as well as policy makers.

In Chikballapur district the highest proportion of cultivated land was put to potato cultivation by marginal farmers (67 %) while the medium + large category of potato growers put just 31% of cultivated land under potato (**Table 6**). Overall potato farmers of the district put about 40% of cultivated land under potato.

Table 5: Land use pattern of sampled households (land in ha) Chickmagalur

Particulars	Potato growers				Non - potato growers	All
	Marginal	Small	Medium + large	All		
Cultivated land (owned)	0.72	1.62	4.88	2.24	0.84	1.89
1. Irrigated	0.19	0.95	2.93	1.25	0.44	1.05
2. Rain fed	0.53	0.67	1.95	0.99	0.40	0.84
Cultivated land (rented in)	0.08	0.00	0.00	0.05	0.00	0.03
Self cultivated land	0.84	1.62	4.88	2.29	0.84	1.92
1. Irrigated	0.23	0.95	2.93	1.27	0.44	1.06
2. Rain fed	0.61	0.67	1.95	1.02	0.40	0.86
Potato land irrigated	0.18	0.22	0.37	0.25	0.00	0.65
Potato land rain fed	0.43	0.73	1.21	0.76	0.00	2.04
Total potato land	0.61	0.95	1.58	1.01	0.00	2.55

Table 6: Land use pattern of sampled households (land in ha) Chikballapur

Particulars	Potato growers				Non - potato growers	All
	Marginal	Small	Medium + large	All		
Cultivated land (owned)	0.64	1.72	4.60	2.01	2.65	2.13
1. Irrigated	0.57	1.35	3.08	1.47	1.24	1.43
2. Rain fed	0.07	0.37	1.52	0.54	1.41	0.70
Cultivated land (rented in irrigated)	0.35	0.01	0.36	0.23	0.18	0.22
Self cultivated land	0.99	1.73	4.96	2.24	2.83	2.35
1. Irrigated	0.92	1.35	3.24	1.64	1.24	1.57
2. Rain fed	0.07	0.38	1.72	0.60	1.59	0.78
Potato land irrigated	0.61	0.74	1.24	0.82	0.00	0.66
Potato land rain fed	0.05	0.00	0.28	0.09	0.00	0.07
Total potato land	0.66	0.74	1.52	0.89	0.00	0.73

Land use pattern of the study area (Chikballapur + Chickmagalur) was also estimated (**Table 7**). Marginal potato farmers put 69% of the cultivated land under potato while medium + large farmers cultivated potato only on 32% of cultivated land. All potato farmers cultivated potato on their 42% cultivated land.

Table 7: Land use pattern of sampled households (land in ha) Karnataka (Chikballapur + Chickmagalur)

Particulars	Potato growers				Non - potato growers	All
	Marginal	Small	Medium + large	All		
Cultivated land (owned)	0.67	1.68	4.72	2.10	1.80	2.03
1. Irrigated	0.42	1.19	3.01	1.38	0.86	1.27
2. Rain fed	0.25	0.49	1.71	0.72	0.93	0.76
Cultivated land (rented in irrigated)	0.25	0.01	0.20	0.16	0.10	0.14
Self cultivated land	0.93	1.69	4.92	2.26	1.84	2.17
1. Irrigated	0.65	1.19	3.10	1.49	0.86	1.35
2. Rain fed	0.28	0.50	1.82	0.77	1.03	0.81
Potato land irrigated	0.44	0.53	0.85	0.59	0.00	0.66
Potato land rain fed	0.20	0.30	0.69	0.36	0.00	0.90
Total potato land	0.64	0.83	1.55	0.94	0.00	1.50

Crop wise area: Market and policy changes influence area under a particular crop *vis-a-vis* total cropped area hence, this attribute was considered important baseline indicator for the future. In Chickmagalur district farmers put highest proportion of cropped area under vegetables (32%) followed by potatoes (30%) (**Table 8**). However, the non-potato growers put highest proportion of cropped area under vegetables followed by ginger and maize. All farmers (potato and non-potato) put 36 and 26% of cropped area under vegetables and potato, respectively. The cropping intensity of non potato growers (175%) was higher than that of the potato growers (149%).

Table 8: Area under different crops grown by sampled households in Chickmagalur (ha).

Particulars	Potato growers				Non - potato growers	All
	Marginal	Small	Medium + large	All		
Paddy	0.01	0.04	0.09	0.04	0.04	0.04
Maize	0.12	0.27	0.52	0.29	0.13	0.25
Ginger	0.13	0.22	0.27	0.20	0.19	0.20
Potato	0.61	0.95	1.58	1.01	0.00	0.76
Vegetable	0.38	0.68	2.41	1.08	0.99	1.06
Ragi	0.02	0.07	0.15	0.08	0.08	0.08
Others	0.24	0.44	1.53	0.69	0.04	0.53
Total cropped area	1.51	2.67	6.55	3.39	1.47	2.91
Total cultivable area	0.84	1.62	4.88	2.28	0.84	1.92
Cropping intensity (%)	179.76	164.81	134.22	148.68	175.00	151.56

Note: Vegetable area is exclusive of potato area

Cropping pattern in Chikballapur district was affected by the shortage of irrigation water. Potato and vegetables (33% of the cropped area for the each) were the major crops grown by the sampled farmers (**Table 9**). However, the non-potato growers allocated 46% of the cropped area to vegetables followed by Ragi (18%). The proportion of potato area out of the total cropped area ranged from 29.5% in medium + large farmers to 41.5% in marginal farmers. The cropping intensity of non-potato growers (101%) was lower than the potato growers (120%). The potato growers with smaller land holdings were opting to grow more number of crops in the year.

Table 9: Area under different crops grown by sampled households in Chikballapur (ha).

Particulars	Potato growers				Non - potato growers	All
	Marginal	Small	Medium + large	All		
Paddy	0.01	0.09	0.17	0.08	0.14	0.09
Maize	0.04	0.17	0.36	0.17	0.25	0.19
Ginger	0.00	0.00	0.00	0.00	0.00	0.00
Potato	0.66	0.74	1.52	0.91	0.00	0.74
Vegetable	0.72	0.58	1.62	0.90	1.32	0.98
Ragi	0.08	0.35	0.56	0.29	0.52	0.33
Other	0.08	0.29	0.93	0.37	0.63	0.42
Total cropped area	1.59	2.22	5.16	2.72	2.86	2.75
Total cultivable area	0.99	1.79	4.96	2.26	2.83	2.37
Cropping intensity (%)	160.61	124.02	104.03	120.35	101.06	115.88

Note: Vegetable area is exclusive of potato area

The overall cropping pattern in the study area *i.e.* combined scenario of both Chickmagalur and Chikballapur districts has been presented in **Table 10**. Vegetables (32.4% of cropped area) followed by potato (31.8% of cropped area) were the predominant crops grown by potato grower in the study area. Vegetables (53% of cropped area) followed by Ragi (14% of cropped area) were the predominant crops grown by the non-potato growers. Cropping intensity of the study area was higher for potato grower (132%) compared to the non-potato grower (118%). The potato growers with smaller land holdings were cultivating more number of crops in a year.

Table 10: Area under different crops grown by sampled households in study area\$ (ha).

Particulars	Potato growers				Non - potato growers	All
	Marginal	Small	Medium + large	All		
Paddy	0.01	0.07	0.13	0.06	0.09	0.07
Maize	0.07	0.21	0.43	0.22	0.19	0.22
Ginger	0.05	0.09	0.12	0.08	0.10	0.09
Potato	0.64	0.83	1.55	0.95	0.00	0.75
Vegetable	0.59	0.62	1.97	0.97	1.16	1.01
Ragi	0.06	0.24	0.38	0.20	0.30	0.22
Other	0.14	0.35	1.20	0.50	0.34	0.47
Total cropped area	1.56	2.40	5.78	2.99	2.17	2.82
Total cultivable area	0.93	1.73	4.92	2.27	1.84	2.18
Cropping intensity (%)	167.66	138.96	117.43	131.90	117.66	129.49

Note: Vegetable area is exclusive of potato area

\$: for both Chickmagalur and Chikballapur

Potato yield: Yield data for the year 2013 was not available for Chickmagalur district as the study was conducted during June month and harvesting of the potato crop in the district takes place in August-September. However, potato crop is cultivated as *rabi* crop in Chikballapur, hence, the data for 2013 was available in this district. Yield of potato crop in Chickmagalur district (*kharif* crop) is about half of the crop yield in Chikballapur (**Table 11**) due to biotic (late blight infestation) and abiotic (heat and moisture) stresses in addition to the tendency of potato farmers to purchase cheaper seed potato in the former district. The average potato yield of the respondent potato farmers in the study area was 18.5 t/ha. Medium and large farmers could attain higher potato yield in all the cases.

Table 11: Potato yield (t/ha) in the study area

Particulars	Potato growers			
	Marginal	Small	Medium + large	All
Chickmagalur				
2013	-	-	-	-
2012	10.58	10.33	12.20	10.98
Chikballapur				
2013	19.11	23.88	24.19	22.00
2012	20.89	24.05	25.65	23.16
Overall				
2013	-	-	-	-
2012	16.92	18.77	20.48	18.45

Note: Overall scenario was estimated based upon the respondents of Chickmagalur and Chikballapur as the number of potato growers in Kodagu district was negligible.

Rate of seed potato use: The seed potato utilization rate among the respondent farmers was about half of the general recommendation on seed rate (2.5 to 3 t/ha) (**Table 12**). The amount of seed potato used in Chickmagalur was much lower (1.15 t/ha) compared to the Chikballapur (1.56 t/ha). Lower seed rate in Chickmagalur district was on account of risk mitigation as the farmers in the district were not managing late blight professionally. Using cut seed is more or less a convention among the potato growers. However, due to higher yields and lower risk and uncertainty to the potato crop in Chikballapur the growers used higher quantity of seed potato in addition to better quality and expensive seed. The difference in seed potato rate didn't considerably vary among various categories of the farmers.

Table 12: Rate of seed potato use in the study area (t/ha)

Particulars	Potato growers			
	Marginal	Small	Medium + large	All
Chickmagalur				
2011	1.119	1.167	1.134	1.139
2012	1.123	1.200	1.219	1.177
Chikballapur				
2011	1.517	1.617	1.552	1.559
2012	1.567	1.512	1.667	1.574
Overall				
2011	1.364	1.433	1.366	1.387
2012	1.396	1.384	1.468	1.412

Post harvest losses: Post harvest losses is an important cause of concern of farmers, researchers and policy makers in a country like India where food insecurity has been viewed as an impending threat. Harvesting method, handling and moisture/ temperature exposure to the produce are some of the crucial factors responsible for post harvest losses.

The respondent potato farmers in Chickmagalur district were harvesting potatoes mainly (81% respondents) with the help of bullocks (**Table 13**). However, some farmers were harvesting the crop manually. Farmers in the area were also using both the methods of harvesting *i.e.* manual as well as with bullocks. However, lower proportion of larger farmers was using bullocks only for harvesting. On an average 14.5% of the potato produce was lost in Chickmagalur district as post harvest losses. The highest proportion of losses was due to cracking and deformity affected by moisture and heat stresses followed by rotting of late blight affected and damaged tubers, smaller sized unmarketable tubers (heat stress) and greening of potato tubers. No considerable difference in post harvest losses was observed among different farm size categories of potato growers in the district.

Table 13: Assessment of post harvest losses in potato crop (Chickmagalur) (%)

Particulars	Potato growers			
	Marginal	Small	Medium + large	All
Harvesting method				
Manual	33	56	63	50
By bullocks	89	78	75	81
Post harvest losses (%)				
Cut, crack & deformed	5.31	5.24	5.50	5.34
Green	2.37	2.44	1.95	2.27
Odd size	3.01	3.17	2.94	3.04
Rottage	4.20	3.88	3.72	3.95
Total	14.89	14.73	14.11	14.61

In Chikballapur district the respondent potato farmers were mainly harvesting potatoes manually (86%) while only 23% respondents used bullocks for this purpose (**Table 14**). The post harvest losses in this district were nearly half of the Chickmagalur district. Cut, crack and deformed tubers (2.6%) was the main source of post harvest losses in the district followed by odd sized tuber (1.65%), greening of tubers (1.5%) and rotting of tubers (1%). Better climatic conditions for *rabi* cultivation of potatoes, lower sunshine intensity and favourable temperature after the harvest season were some of the reasons for lower post harvest potato losses in this district.

Table 14: Assessment of post harvest losses in potato crop (Chikballapur) (%)

Particulars	Potato growers			
	Marginal	Small	Medium + large	All
Harvesting method				
Manual	80	83	100	86
By bullocks	25	23	20	23
Post harvest losses (%)				
Cut, crack & deformed	2.75	2.33	2.64	2.58
Green	1.51	1.60	1.45	1.52
Odd size	1.66	1.59	1.73	1.65
Rottage	0.97	1.06	0.93	0.99
Total	6.89	6.58	6.75	6.75

Overall post harvest potato losses in the study area have been estimated at 9.9% of the harvested produce (**Table 15**). About 70% respondents manually harvested their potato crop while 45% used bullocks indicating that some of the growers were harvesting their crop using bullocks as well as humans. Cut, cracked and deformed tubers (3.7%) were the major cause of post harvest losses in the study area. Odd size of tubers (mainly the small sized unmarketable tubers) was another important cause (2.21%) of post harvest losses followed by rotting of tubers (2.17%) and greening of tubers (1.8%). Taking into consideration that potato crop of both *rabi* and *kharif* seasons in Karnataka gets ready market and farmers don't go for long time storage the post harvest losses in the state are really high.

Table 15: Assessment of post harvest losses in potato crop (Chickmagalur + Chikballapur (%))

Particulars	Potato growers			
	Marginal	Small	Medium + large	All
Harvesting method				
Manual	60	72	83	70
By bullocks	50	43	40	45
Post harvest losses (%)				
Cut, crack & deformed	3.73	3.52	3.81	3.68
Green	1.84	1.94	1.65	1.82
Odd size	2.18	2.24	2.23	2.21
Rottage	2.21	2.21	2.07	2.17
Total	9.97	9.91	9.76	9.89

Price satisfaction level: Price satisfaction level of potato growers was assessed in order to gauge the sustainability of potato cultivation in the study area. The overall price satisfaction by 68% farmers indicates that farmers want still higher prices for their produce (**Table 16**). The price satisfaction was lower in Chikballapur district compared to the Chickmagalur. Large farmers had lower price satisfaction level in the study area. Higher price dissatisfaction by the potato growing respondents of Chikballapur is evident from the fact that rise in 2013 (January to March) prices was lower than the rise in 2012 potato prices (July to September)

in Chickmagalur district (**Table 17**). Chickmagalur farmers sell their potatoes (*kharif* crop) during July and September months while the Chikballapur farmers sell potatoes (*rabi* crop) during January to March months.

Table 16: Price satisfaction level of sampled potato farmers (% responses)

Particulars	Potato growers			
	Marginal	Small	Medium + large	All
Chickmagalur	80.0	77.7	71.4	76.7
Chikballapur	62.5	61.5	60.0	61.5
Overall	69.2	68.1	65.1	67.7

Table 17: Potato prices data during the harvest season in the study area (Rs./ q)

Month	Week	Chickmagalur (year)				Month	Week	Chikballapur (year)			
		2010	2011	2012	TE 2012			2011	2012	2013	TE 2013
July	1	1000	900	1600	1167	Jan	1	NA	671	1169	920*
	2	850	906	1587	1114		2	900	663	1067	876
	3	800	900	1541	1080		3	1077	679	985	914
	4	791	1000	1668	1153		4	1100	700	1471	1090
Aug	1	804	1000	1672	1158	Feb	1	662	800	1000	821
	2	800	833	1600	1078		2	1000	559	1105	888
	3	640	711	1514	955		3	849	500	871	740
	4	596	667	1379	881		4	653	463	913	676
Sep	1	711	907	1476	1031	Mar	1	609	500	830	646
	2	700	780	1417	965		2	NA	581	500	541*
	3	680	733	1428	947		3	NA	583	1011	797*
	4	652	776	1435	954		4	NA	580	964	772*

Note: NA=data not available, TE=triennium ending year, *=average of two years data

Data source: Directorate of Marketing and Inspection, Ministry of Agriculture, GOI, Faridabad, Haryana.

Mechanisation level: Mechanization level indicates the level of agricultural development in an area. In Chickmagalur district the mechanisation level of the respondent potato farmers was the highest for field preparation followed by potato harvesting/ digging, earthing up and planting (**Table 18**). Spraying of agro-chemicals by the respondent potato farmers was hundred per cent manual.

Table 18: Level of mechanisation (% responses) in Chickmagalur

Responses	Potato growers			
	Marginal	Small	Medium + large	All
Field preparation				
Partial	30.0	22.2	25.0	25.9
Total mechanization	70.0	77.8	75.0	74.1
Planting				
No mechanization	80.0	77.8	75.0	77.8
Partial	20.0	22.2	25.0	22.2
Spraying				
No mechanization	100.0	100.0	100.0	100.0
Partial	0.0	0.0	0.0	0.0
Earthing up				
No mechanization	80.0	75.0	62.5	73.1
Partial	20.0	25.0	37.5	26.9
Digging				
No mechanization	20.0	37.5	37.5	31.0
Partial	80.0	62.5	62.5	69.0

Field preparation was more mechanised on the farms of respondent potato farmers in Chikballapur (79%) compared to the Chickmagalur district (74%) (**Table 19**). Partial mechanization (18% respondents) in spraying in this district was again better than cent per cent manual spraying in Chickmagalur. Mechanisation level was almost same in both the districts in terms of planting. However, earthing up and digging operations were less mechanised in Chikballapur district compared to the Chickmagalur.

Table 19: Level of mechanisation (% responses) in Chikballapur

Responses	Potato growers			
	Marginal	Small	Medium + large	All
Field preparation				
Partial	26.7	15.4	20.0	21.2
Total mechanization	73.3	84.6	80.0	78.8
Planting				
No mechanization	80.0	76.9	70.0	76.4
Partial	20.0	23.1	30.0	23.6
Spraying				
No mechanization	83.3	81.8	80.0	82.0
Partial	16.7	18.2	20.0	18.0
Earthing up				
No mechanization	93.7	88.9	90.0	91.2
Partial	6.3	11.1	10.0	8.8
Digging				
No mechanization	73.3	69.2	70.0	71.1
Partial	26.7	30.8	30.0	28.9

The mechanisation level of potato farmers in the study area (both Chickmagalur and Chikballapur districts) was the highest in field preparation (77% respondents) followed by digging/ harvesting, planting, earthing up and planting operations (**Table 20**). In potato planting, spraying of agro-chemicals, earthing up and harvesting/ digging operation only partial mechanisation was adopted in both the districts.

Table 20: Level of mechanisation (% responses) in the study area (Chickmagalur + Chikballapur)

Responses	Potato growers			
	Marginal	Small	Medium+ large	All
Field preparation				
Partial	28.0	18.2	22.2	23.1
Total mechanization	72.0	81.8	77.8	76.9
Planting				
No mechanization	80.0	77.3	72.2	77.0
Partial	20.0	22.7	27.8	23.0
Spraying				
No mechanization	89.7	89.2	88.9	89.3
Partial	10.3	10.8	11.1	10.7
Earthing up				
No mechanization	88.4	83.2	77.8	83.8
Partial	11.6	16.8	22.2	16.2
Digging				
No mechanization	24.1	33.5	33.3	29.8
Partial	75.9	66.5	66.7	70.2

Desirable and undesirable qualities of Kufri Jyoti: Kufri Jyoti was the predominant and only potato variety having significant area under it in both the districts (Chickmagalur + Chikballapur). An index of desirable and undesirable qualities was made giving double weight to the first response, equal weight for second and third response and half weight for the subsequent responses. Based on this index better yield than Atlantic followed by better late blight tolerance than FL-1533 and Atlantic, better taste and texture and better skin colour were the good qualities elicited by the respondents (**Table 21**). On the other hand the index suggests that late blight susceptibility followed by cracking and deformation of tubers, lower yield than FL-1533 and bad quality of available seed were the salient bad qualities of the variety.

Table 21: Responses on desirable and undesirable qualities of Kufri Jyoti (indices#) in the study area§

Particulars	Potato growers			
	Marginal	Small	Medium + large	All
Good qualities				
Better yield than Atlantic	1.26	1.43	1.17	1.29
Better late blight tolerance	0.44	0.36	0.46	0.42
Better taste and texture	0.25	0.36	0.15	0.26
Better skin colour	0.13	0.08	0.15	0.12
Bad qualities				
Late blight susceptibility	1.80	1.73	1.55	1.71
Cracking and deformation of tubers	0.85	1.07	0.97	0.96
Lower yield than FL-1533	0.20	0.18	0.36	0.24
Bad quality of seed	0.20	0.15	0.18	0.18

#:The indices were calculated by assigning double weight for first response, equal weight for second and third response and half weight for the subsequent responses; while the negative elicitation (e.g., consciously negating a particular good/ bad qualities) was given zero weight. The indices range from 0 to 2.

§: Due to less number of responses district wise compilation/ analysis was not carried out.

Socio-economic profile of head of the family

Head of the family is the key decision maker and his personal profile has an important bearing on his decisions. Some of the important points of socio-economic profile of the head of the respondent families have been given in **Table 22**.

Age of the family head: Average age of the head of the respondent farming families in all cases and both the districts was more or less comparable to the average of the area at 52 years (**Table 22**). However, the average age of the head of the landless agricultural labourers was considerably lower than the farming families in both the districts. This was a strong evidence to show that land kept families join to a higher extent and landless people have higher tendency of separate living in the form of nuclear families.

Academic qualification of the family head: Academic qualification of a person determines his/ her ability to take informed decisions with a greater confidence. This is equally true in case of all farmers and potato farmers who have to take numerous decisions for adoption

Table 22: Socio-economic profile of head of the respondent family.

Particulars	Cultivators						Land less agri. labour	All
	Potato growers			Non-potato	All growers			
	Marginal	Small	Medium + large					
Chickmagalur								
Age (years)	50	55	52	52	53	52	45	51
Academic qualification level (1-5)	2.5	2.7	2.8	2.7	2.5	2.6	1.7	2.4
Largest primary occupation (%)	80.0 (Agri)	88.9 (Agri)	100.0 (Agri)	88.9 (Agri)	77.8 (Agri)	86.1 (Agri)	63.6 (Labour)	66.0 (Agri)
Gender (%)								
1. Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. Male	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Chikballapur								
Age (years)	53	48	52	51	50	51	42	49
Academic qualification level (1-5)	2.3	2.5	2.7	2.5	2.5	2.5	1.6	2.3
Largest Primary Occupation (%)	81.3 (Agri)	84.6 (Agri)	80.0 (Agri)	82.1 (Agri)	66.7 (Agri)	79.2 (Agri)	55.6 (Labour)	66.7 (Agri)
Gender (%)								
1. Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. Male	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Overall								
Age (years)	52	51	52	52	52	52	44	50
Academic qualification level (1-5)	2.4	2.6	2.7	2.5	2.5	2.5	1.6	2.4
Largest Primary Occupation (%)	80.8 (Agri)	86.4 (Agri)	88.9 (Agri)	84.9 (Agri)	72.3 (Agri)	82.2 (Agri)	60.0 (Labour)	66.6 (Agri)
Gender (%)								
1. Female	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. Male	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Average academic qualification levels were calculated by assigning following value: Illiterate = 1; 7 years of schooling = 2; secondary = 3; secondary specialized = 4; and higher education = 5

and adjustment to new technologies, awareness of government schemes and latest inputs etc. The academic qualification index (1-5) of the head of the household was more or less comparable in different farm categories of potato farmers as well as the non-potato growers in both the sampled districts (**Table 22**). However, the average academic qualification of land less agricultural labourers was considerably lower in both the districts (less than 7 years of schooling).

Primary occupation of family head: Agriculture was the primary occupation of all the farmers *i.e.* potato as well as non-potato growers (**Table 22**). The proportion of responses of potato growers on primary occupation of the head of the household was higher (85%) compared to the non potato growers (72%). However, only 60% of head of the families of landless labourers were opting for farm labour as occupation. On an average, Chikballapur had higher non-farm employment opportunities than in Chickmagalur, in all the cases.

Gender ratio of head of households: In order to assess empowerment and decision taking ability of a person of particular sex in the overall agriculture and social system, gender of the head of household was studied. However, cent per cent heads of respondent families in farming as well as landless labourers were males (**Table 22**). This provides very strong evidence that the society in the study area is firmly male dominated society.

Household assets

Household assets were also considered as indicators of economic wellbeing in the baseline survey for the possible future comparison.

Ownership of automobiles: Three types of automobiles viz. motorcycles (personal use), cars (personal use) and tractors (any use) were benchmarked for comparing socio-economic indicators of economic well being of the respondents in the study area. In Chickmagalur district cars were owned only by the 37.5% medium + large potato growing and 11% non-potato growing respondents (**Table 23**). Motorcycle was the most commonly used personal vehicle in the district. Tractors were possessed only by the medium + large potato growers among the respondent farmers in Chickmagalur district. In Chikballapur district all categories of the respondents possessed motorcycles while only the landless agricultural labourers didn't possess cars at all (**Table 24**). All grower category respondents of the

Table 23: Average inventory of household assets and standard of living in Chickmagalur.

Particulars	Cultivators						Land less agri. labour	All
	Potato growers				Non-potato	All		
	Marginal	Small	Medium + large	All				
Motorcycle (%)	30.0	33.3	75.0	44.4	33.3	41.7	18.2	36.2
Car (%)	0.0	0.0	37.5	11.1	11.1	11.1	0.0	8.5
Tractor (%)	0.0	0.0	12.5	3.7	0.0	2.8	0.0	2.1
House condition (1-5)	3.10	3.50	4.00	3.5	3.00	3.4	2.00	3.1
Food grain storage (%)								
Tin container	30.0	44.4	75.0	48.1	33.3	44.4	18.2	38.3
Sacks	70.0	55.6	25.0	51.9	66.7	55.6	81.8	61.7
Food security (%)	80.0	100.0	100.0	92.6	85.7	90.9	54.5	82.4
Water connection (%)	70.0	87.5	100.0	84.7	44.4	74.6	18.2	61.4
Electrification (%)	100.0	100.0	100.0	100.0	100.0	100.0	81.8	95.7
Sanitation (%)								
Flush toilet	60.0	88.8	100	81.5	75.6	77.8	18.2	63.8
Temporary toilet	30.0	11.1	0.0	14.8	24.4	19.4	36.4	23.4
Open field	10.0	0.0	0.0	3.7	0.0	2.8	45.4	12.8
Social participation (%)	40.0	55.6	83.3	58.0	55.6	57.4	27.3	50.4
School type of children (%)								
Government	80.0	66.7	25.0	59.3	54.4	58.1	81.8	61.7
Private	20.0	33.3	75.0	40.7	45.6	41.9	18.2	38.3
Monthly expenditure (INR)								
Food	2470	3875	4710	3602	3644	3613	1890	3209
Children education	966	1860	2857	1824	1650	1781	440	1467
Travel	710	1280	1950	1267	1340	1286	940	1205
Bills	665	1070	1430	1027	1120	1050	405	899
Total	4811	8085	10947	7720	7754	7730	3675	6780
TV (%)	90.0	100.0	100.0	96	100.0	97.2	90.9	95.7
Landline (%)	0.00	11.1	25.0	11.1	11.1	11.1	0.00	8.5
Mobile (%)	90.0	100.0	100.0	96.3	100.0	97.2	81.8	93.6

Table 24: Average inventory of household assets and standard of living in Chikballapur.

Particulars	Cultivators						Land less agri. labour	All
	Potato growers				Non-potato	All		
	Marginal	Small	Medium + large	All				
Motorcycle (%)	62.5	92.3	100.0	82.0	88.9	83.3	36.4	75.9
Car (%)	6.3	30.8	50.0	25.7	33.3	27.1	0.0	22.8
Tractor (%)	12.5	30.8	80.0	35.9	33.3	35.4	0.0	29.8
House condition (1-5)	3.06	3.86	4.50	3.70	4.10	3.77	2.57	3.58
Food grain storage (%)								
Tin container	50.0	62.5	87.5	63.8	66.7	64.3	33.3	59.4
Sacks	50.0	37.5	12.5	36.2	33.3	35.7	66.7	40.8
Food security (%)	100.0	100.0	100.0	100.0	100.0	100.0	77.8	96.5
Water connection (%)	56.3	76.9	100.0	74.4	66.7	72.9	44.4	68.4
Electrification (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sanitation (%)								
Flush toilet	50.0	81.8	100.0	73.4	88.9	76.3	33.3	69.5
Temporary toilet	43.7	18.2	0.0	24.0	11.1	21.6	33.3	23.5
Open field	6.3	0.0	0.0	2.6	0.0	2.1	33.3	7.0
Social participation (%)	43.8	61.5	80.0	59.0	33.3	54.2	22.2	49.1
School type of children (%)								
Government	81.3	61.5	30.0	61.5	44.4	58.3	88.9	63.1
Private	18.7	38.5	70.0	38.5	55.6	41.7	11.1	36.9
Monthly expenditure (INR)								
Food	3156	4508	5100	4105	4350	4151	2125	3831
Children education	1180	1935	2710	1824	1850	1829	670	1646
Travel	1191	1692	2167	1608	1714	1628	814	1500
Bills	546	958	1400	902	900	902	330	812
Total	6073	9093	11377	8439	8814	8510	3939	7789
TV (%)	93.8	100.0	100.0	97.5	100.0	97.9	88.9	96.5
Landline (%)	6.3	23.1	30.0	18.0	22.2	18.8	0.0	15.8
Mobile (%)	93.8	100.0	100.0	97.5	100.0	97.9	87.5	96.3

district possessed tractors. However, the proportion of respondents possessing automobiles increased with the size of land holding in case of potato growers. The extent of automobile ownership among the respondents of non-potato growers in the district was more or less comparable to the overall potato growers. Overall in the study area (Chickmagalur + Chikballapur) 58% respondents (67% farmers; 61% non-potato growers and 26% landless labourers) possessed motorcycles (**Table 25**). About 23% potato growers and 17% non-potato growers in the study area possessed tractors. One fifth of the respondent farmers in the study area had cars for their personal use (not used as public or goods transport as part of business). Proportion of respondent potato growers having all studied automobiles increased with the increase in size of landholding.

House status: Status of a house is one of the most reliable indicators of economic wellbeing of the respondents. A house status index was prepared assigning weight equal to 1 for house worth <Rs. 20000; 2 for <Rs. 50000; 3 for <Rs. 0.1 million; 4 for <Rs. 0.5 million and 5 for \geq Rs. 0.5 million. The house status index of all potato growing respondents in Chickmagalur district was 3.5 (worth less than Rs. 0.5 and more than 0.1 million) while the index for respondents of non-potato growers and landless agricultural labourers in the district was 3 and 2, respectively (**Table 23**). House status index of the potato farming respondents improved with the increase in landholding size in this district. House status of non-potato grower respondents (4.1) in Chikballapur district was better than that of the all potato grower (3.7) respondents (**Table 24**) in the district. The house status of potato grower respondents increased with the increase in landholding size. The house status index of landless farmers was 2.57 in this district. Overall in the study area (Chickmagalur + Chikballapur) the house status index was 3.62 (potato growers), 3.6 (non-potato growers) and 2.26 (landless agricultural labourers (**Table 25**)). With the same criteria Rana *et al.*, 2014 reported house status 2.99 for potato growers, 2.63 for non-potato growers and 1.61 for landless agricultural labourers for a survey in Hassan district of Karnataka during 2009. Thanks to social developments and employment guarantee schemes that house status index of landless labourers and farmers considerably improved during 2013 (current survey) compared to the 2009.

Food grain storage: More or less half of the respondents in the study area storing their food grains in sacks (**Table 25**) rather than in metallic/ tin containers indicate the possibility of damage due to rodent infestation or moisture exposure. Though the situation of food grains storage was better in Chikballapur (**Table 24**) compared to Chickmagalur (**Table 23**), yet it is

in the interest of poor people and the nation that metallic food grain storage containers are ensured to the all.

Food security: Food security is not only an important indicator of economic well-being but is also the international shame when we fail to ensure it to the all (Acharya, 2009; Singh and Rana, 2013). Overall in the study area (Chickmagalur + Chikballapur) 8% marginal potato growers, 7% non-potato growers and 35% landless farmers had irregular availability of adequate food on all the days in a year (**Table 25**). The situation was much worse in Chickmagalur (**Table 23**) than in Chikballapur (**Table 24**) districts.

Water and electricity connections: Overall in the study area (Chikballapur + Chickmagalur) all growers had access to electricity in their houses while 10% of landless labourers didn't have electricity in their houses (**Table 25**). However, even all landless labourer respondents in Chikballapur had electricity connections in their houses (**Table 24**) but the situation was grimmer in case of Chickmagalur where only 82% landless labourers (**Table 23**) had electricity connections in their houses. Only all medium + large potato growing respondents had individual water connections in their houses while only 30% landless agricultural labourers had access to individual water connections (**Table 25**) indicating that a lot still has to be done for the uplift of the area.

Toilets: People with traditional mindset don't consider toilet as essential part of the house. People in villages prefer to build toilets at a distance. About 77% farmers in the study area (Chickmagalur + Chikballapur) had toilets with proper flush system while the 21% respondent farmers had temporary ones (**Table 25**). About 8% of marginal potato growers and 40% landless agricultural labourers were using open fields as toilets. The situation in Chikballapur (**Table 24**) was slightly better than the Chickmagalur (**Table 23**) but the developmental agencies need to put concerted efforts in order to provide toilets for the each one.

Social participation: Social participation was considered important for having better judgement of events and developments enhancing respondents' chances of exposure to the fresh knowledge resulting in his/ her improved decision making ability. Membership of social organisation such as *Mahila Mandals* (women welfare groups), various self-help groups, farmers' clubs, cooperative societies etc. was considered for estimating social participation.

Table 25: Average inventory of household assets and standard of living in the study area (Chickmagalur + Chikballapur).

Particulars	Cultivators						Land less agri. labour	All
	Potato growers				Non-potato	All		
	Marginal	Small	Medium + large	All				
Motorcycle (%)	50.0	68.2	88.9	66.7	61.1	65.5	26.4	58.0
Car (%)	3.9	18.2	44.4	19.7	22.2	20.2	0.0	16.4
Tractor (%)	7.7	18.2	50.0	22.7	16.7	21.4	0.0	17.3
House condition (1-5)	3.08	3.71	4.28	3.62	3.55	3.60	2.26	3.34
Food grain storage (%)								
Tin container	42.3	55.1	81.9	57.4	50.0	55.8	25.0	49.9
Sacks	57.7	44.9	18.1	42.6	50.0	44.2	75.0	50.1
Food security (%)	92.3	100.0	100.0	97.0	92.9	96.1	65.0	90.1
Water connection (%)	61.6	81.2	100.0	78.6	55.6	73.7	30.0	65.3
Electrification (%)	100.0	100.0	100.0	100.0	100.0	100.0	90.0	98.1
Sanitation (%)								
Flush toilet	53.8	84.7	100.0	76.8	77.8	76.8	25.0	67.0
Temporary toilet	38.5	15.3	0.0	20.2	22.2	20.8	35.0	23.4
Open field	7.7	0.0	0.0	3.0	0.0	2.4	40.0	9.6
Social participation (%)	42.3	59.1	81.5	58.6	44.5	55.6	25.0	49.7
School type of children (%)								
Government	80.8	63.6	27.8	60.6	49.4	57.1	85.0	62.5
Private	19.2	36.4	72.2	39.4	50.6	42.9	15.0	37.5
Monthly expenditure (INR)								
Food	2892	4249	4927	3899	3997	3920	1996	3550
Children education	1098	1904	2775	1824	1750	1808	544	1565
Travel	1006	1523	2071	1469	1527	1481	883	1366
Bills	592	1005	1413	953	1010	966	371	852
Total	5588	8681	11186	8145	8284	8175	3794	7333
TV (%)	92.3	100.0	100.0	97.0	100.0	97.6	90.0	96.2
Landline (%)	3.9	18.2	27.8	15.2	16.7	15.5	0.0	12.5
Mobile (%)	92.3	100.0	100.0	97.0	100.0	97.6	84.4	95.1

Overall in the study area (Chickmagalur + Chikballapur) the social participation of potato farmers was 59% followed by non-potato growers at 45% and landless labourers at 25% (**Table 25**). Social participation of non-potato growers and landless agricultural labourer respondents in Chickmagalur (**Table 23**) district was slightly better than the Chikballapur (**Table 24**).

School type of the children: Though it is an unhealthy development, yet it is true that very large proportion of students join government run schools whose parents couldn't afford to pay heavy charges of private schools. In the study area, 49% children of non-potato growers followed by 61% potato growers and 85% landless agricultural labourers were studying in government run schools (**Table 25**). The proportion of children going to government schools was lower in Chickmagalur (**Table 23**) compare to the Chikballapur (**Table 24**) district.

Expenditure pattern: Average expenditure of a family reflects its wellbeing over long period of time as sudden increment/ decrease in the family income is not exactly corresponded by the expenditure. Average monthly expenditure of respondent farmers in different categories was estimated for items like food, children education, travel and regular monthly bills *etc.* Expenditure is directly correlated to the income of a family. In the study area respondents' monthly family expenditure ranged between Rs. 3794 for landless agricultural labourers and Rs. 11186 for medium + large potato growers (**Table 25**). On an average farming families were spending Rs. 8175 per month. Food was the principal cause of expenditure in categories of the respondents followed by education of the children, travelling and payment of bills. Average monthly family expenditure of respondents was lower in Chickmagalur (**Table 23**) compared to the Chikballapur (**Table 24**).

Electronics and communication indicators: Television and telephone (landline or mobile) are the powerful tools of communication and awareness. Such tools are generally linked to the improvement and up-gradation of people's ability to take right and timely decisions. The proportion of respondents having television and mobile connections in the study area was very high (**Table 25**) indicating that people are now highly equipped with the basic communication needs. However, landline telephone connections were with about 16% farmers. The proportion of respondents possessing landline connections in Chikballapur (**Table 24**) was higher than that of in Chickmagalur (**Table 23**).

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