

## The Effect of Commercialization of Subsistence Agriculture on the Living Standards of the Farming Families

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**ABSTRACT** The present study was directed towards measuring the effect of changing farming systems towards cash cropping on the living standards, viz. demography, socio-economic and dietary characteristics. The study covered a random population of 285 households located in 17 villages belonging to Bijawara mandal of Devanahalli taluk in Bangalore rural district of Karnataka State in India. The households represented three different farming groups, viz. commercial agriculture group with irrigation (CG-I), without irrigation (CG-WI) and subsistence agriculture (SG). Results of the study indicated that CG-I households involved in diversified commercialized agricultural system, viz. horticulture, sericulture and animal husbandry, were found to have improved, living conditions in terms of housing, sanitary system, health care, material possession. However, there was no improvement in the dietary characteristics of the farming families. The study reinforces the fact that increased income alone is insufficient to improve the household nutrition.

### INTRODUCTION

Agriculture is the most important sector of Indian economy supporting directly or indirectly about 70 per cent of the population and accounting for about 33 per cent of the gross domestic product and 50 per cent export (Datt and Sundaram, 1991). During the past four decades there have been significant changes in the field of agriculture characterized by commercialization (Swaminathan, 1991). Commercialization of the agricultural system involves a change from subsistence to cash cropping (Smith, 1986). The underlying assumption is that commercialization leads to increase in the real income which in turn may raise the living standards leading to better nutrition of the farming families (Dewey, 1979; Gonzaga et al., 1990 and Kaiser and Dewey, 1991). However, studies have indicated that the

increase in the real income may not translate into better food and dietary patterns as the tendency to spend on non-food items may dominate (Berg, 1973; Kennedy and Cogill, 1987 and Sahn, 1990). By and large the increased expenditure on items like housing, health and education may prove to be beneficial in the long run. Therefore, the present study was undertaken to evaluate the effect of commercialization of agriculture along with subsistence cropping on the living standards of farming families who were involved in cash cropping over a duration of more than a decade.

### STUDY DESIGN

#### Description of the Study Area

The study was conducted in Devanahalli taluk in Bangalore rural district in the state of Karnataka, India. The area was selected as it has resource potential for cash crop production. The taluk has gone into both traditional and commercial cropping. It has a slightly more number of big farmers (52%) than small farmers (48%). Ragi (*Eleusine coracana*) is the main cereal grown in a large area of 8726 hectares followed by hybrid maize (*Zea mays*) usually grown under rainfed condition. Cow pea (*Vigna catjang*), horse gram (*Dolichos biflorus*) and field bean (*Dolichos lablab*) are the important pulse crops grown in the taluk. The groundnut-oil seed crop is also grown to a large extent. Crops like vegetables, grapes and other non-food crops like mulberry were the main cash crops grown in irrigated land.

#### Profile of the Study Villages

The study was carried out in 17 villages out of the 23 villages belonging to Bijawara mandal.

The selected 17 villages were located at a distance of about 1 to 9 kms from main mandal. Cropping system included both subsistence and commercial farming in varying degrees usually in combination with wage labour. The subsistence agriculture was based on traditional cultivating practices using mostly manual labour. Ragi was the most important staple crop covering 1610 hectares of the total area under cultivation. At present the involvement in commercial agriculture appeared to be dependent on the availability of own irrigation. Hence, commercial agriculture or cash crop cultivation was found to be dominant form of land use for those with irrigation facilities in this area. The trend appeared to be towards increased production of fruits (grapes), vegetables and mulberry and also increased involvement in dairy with the introduction of dairy development programme.

#### **Selection of Households**

A three stage sampling procedure was adopted to select the households for the survey. In the first stage all households which had at least one preschool child and having land holding of minimum of 0.5 acres were identified. Among these a total of 285 households were selected at random for general survey. In the second stage the selected households were further stratified into two categories based on the commercialization index which is based on the share of income derived from the main staple crop out of the total farm net income. It was presumed that households receiving lower percentage of total farm net income from ragi would grow higher percentage of commercial crops. Hence a cut-off level of total net farm income of 30 per cent from ragi was used as a basis of categorizing these households into subsistence group (SG) and commercialized group (CG).

It was observed that among CG while a total number of 125 households has the irrigation facilities which included availability of ground water, other households (74 nos.) did not possess such facilities. Hence in the third stage the CG was further stratified into two groups (i.e. irrigated group (CG-I) and without irrigation group (CG-WI)). Thus in subsistence group (86 nos.) the agriculture was predominantly rainfed. However, soil type and climatic conditions were similar among these farming groups.

Also to assess the impact of total working hours spent in agriculture related activities on other household tasks particularly child care the selected mothers were classified into three groups based on the nature, type and duration of the work that they were engaged in. Mothers who were actively engaged in agricultural labour either in their own farm and/or for wages working, at least for a period of 8 to 10 hours in a day, were grouped as employed women (EW). Women who were engaged for about 4 hours a day in any of the agriculture related operations were classified as partially employed women (PEW). The women who were not involved in any of the agricultural activities (own farm or for wages) formed the control group defined here as unemployed women (UEW) for the purpose of comparison.

#### **Development of Tools**

The tools were developed around the following variables of the study - demographic data, socio-economic status of the households, type of farming systems, dietary pattern and food behaviour of the households and other aspects related to family health. Survey forms were developed for data gathering covering the above aspects using a combination of tools such as interview schedule and observation. Each form had a specialized topic of coverage and specific chronological sequence of use. The forms were pretested with twenty households.

#### **Data Computation**

The collected information from the general survey on households (demographic characteristics, socio-economic status, food habits, dietary pattern and health status) was consolidated and computed using descriptive analysis. The descriptive analysis employed were the frequency counts and percentage distributions.

#### **Statistical Analysis**

The computed data was analyzed for statistical significance. The preliminary analysis was carried out employing tabular analysis where the data were expressed in means and percentages. Appropriate statistical procedures were employed to test the significance of the estimated values. Analysis of variance (one way ANOVA)

was applied to find out the difference in measurements within a variable between the farming groups with respect to demographic characteristics and socio-economic conditions.

## RESULTS

### A. ENVIRONMENTAL INFORMATION OF THE FARMING FAMILIES

#### 1. Demographic Characteristics

Demographic characteristics of the selected households are presented in table 1. A total of 285 households were enumerated with a total population of 2187 members. Among these, 125 households (44%) belonged to CG-I with 1122 persons, 74 households (26%) with 526 individuals belonging to CG-WI and the subsistence agriculture group consisted of 86 households (30%) with a total of 539 members. Age distribution was highly skewed with 58, 57 and 53 per cent belonging to CG-I, CG-WI and SG respectively, having members more than 18 year old (adult

male and female). The percentage of population representing the age group (0-6 years) among all families was small (21-28%). The male to female ratio among the selected farming families was found to be 1000:960 (CG-I), 1000:930 (CG-WI) and 1000:1030 among SG families

Majority of the CG-I families (66%) belonged to joint families (Table 1). Nuclear type of families were found to be more in SG (64%) and least in CG-I (34%). The type of family differed significantly among the farming groups.

Mean family size of the farming families was found to be 8.9 (CG-I), 7.1 (CG-WI) and 6.2 in SG respectively (Table 1). In terms of adult consumption unit (ACU) the data revealed that it ranged from 5.1 in SG to 5.7 in CG-WI and 7.6 in CG-I. While the difference in family size and ACU was significant between the CG-I and the other two farming groups, it was not significantly different between CG-WI and SG.

The mean age of the household heads (male and female) were found to be 32 and 25 years, respectively, irrespective of the farming groups with no significant difference in the mean age of household heads (Table 1).

#### 2. Socio-economic Status

Socio-economic characteristics of the families are presented in table 2.

The level of education obtained by the male and female heads of the households was found to be better in CG-I (Table 2). More number of heads of households belonging to CG-I were literate and had 5-10 years of formal education than other groups. Significant percentage of men and women in SG reported not having received formal education when compared to CG-I. Although literacy level was low, significant proportion of female heads not having received formal education was seen in CG-WI and SG.

The estimated mean annual household income and also annual per capital income (Table 2) was low in families belonging to SG. As expected, the households growing commercial crops (CG-I) received significantly higher income followed by CG-WI.

Employment status of women, i.e. women employed outside full time/part time and also unemployed, is shown in table 2. It was apparent that among all the farming groups, CG-I had significantly

**Table 1: Demographic Characteristics of the Study Population**

Characteristics	Farm Group		
	CG-I	CG-WI	SG
Total households	125 (44)	74 (26)	86 (30)
Total household members	1122	526	539
Age Group (in years):			
< 1	18 <sup>a</sup> (2)	21 <sup>a</sup> (4)	9 <sup>a</sup> (2)
>1-6	208 <sup>a</sup> (19)	116 <sup>a</sup> (22)	138 <sup>a</sup> (26)
>6-14	187 <sup>c</sup> (17)	70 <sup>b</sup> (13)	78 <sup>b</sup> (15)
>14-18	59 <sup>a</sup> (5)	22 <sup>a</sup> (4)	25 <sup>a</sup> (5)
Adult males > 18	331 <sup>c</sup> (30)	150 <sup>b</sup> (29)	142 <sup>b</sup> (26)
Adult females > 18	319 <sup>c</sup> (28)	147 <sup>b</sup> (28)	147 <sup>b</sup> (27)
Male to female ratio	1000:960	1000:930	1000:1030
Other details :			
Type of family			
Nuclear	43 <sup>a</sup> (34)	37 <sup>ab</sup> (50)	55 <sup>ab</sup> (64)
Joint	82 <sup>b</sup> (66)	37 <sup>ab</sup> (50)	31 <sup>cb</sup> (36)
Mean household size	8.9 <sup>c</sup>	7.1 <sup>c</sup>	6.2 <sup>ab</sup>
Mean adult consumption unit	+7.6 <sup>b</sup>	+5.7 <sup>a</sup>	+5.1 <sup>a</sup>
	±3.9	±2.4	±2.3
Mean age of household head (Male)	31 <sup>a</sup>	32 <sup>a</sup>	32 <sup>a</sup>
Mean age of household head (female)	26 <sup>a</sup>	24 <sup>a</sup>	26 <sup>c</sup>

Any two means in rows carrying different superscripts a,b,..... differ significantly (P 0.05)

Figure in paranthesis indicate the percentage

**Table 2: Socio-economic Characteristics of the Farming Families**

Criteria/Characteristics	Farming Group					
	CG-I		CG-WI		SG	
	H.H.Head	H.Wife	H.H.Head	H.Wife	H.H.Head	H.Wife
<i>Educational Status (years)</i>						
None	15 <sup>a</sup> (12)	41 <sup>a</sup> (33)	20 <sup>ab</sup> (27)	41 <sup>b</sup> (55)	38 <sup>b</sup> (44)	50 <sup>c</sup> (58)
1-5	18 <sup>a</sup> (14)	22 <sup>b</sup> (18)	11 <sup>a</sup> (15)	10 <sup>a</sup> (14)	19 <sup>a</sup> (22)	16 <sup>b</sup> (19)
5-10	86 <sup>b</sup> (69)	60 <sup>b</sup> (47)	39 <sup>b</sup> (53)	20 <sup>a</sup> (27)	24 <sup>a</sup> (28)	20 <sup>a</sup> (23)
10	6 <sup>a</sup> (5)	2 <sup>a</sup> (2)	4 <sup>a</sup> (5)	3 <sup>a</sup> (4)	5 <sup>a</sup> (6)	
Mean annual household income (Rs.)	31193 <sup>c</sup>		14530 <sup>b</sup>		10061 <sup>a</sup>	
Mean annual percapita income (Rs.)	3414 <sup>c</sup>		1975 <sup>b</sup>		1604 <sup>a</sup>	
<i>Women's Employment Status</i>						
Employed women	55 <sup>b</sup> (44)		29 <sup>a</sup> (39)		34 <sup>a</sup> (40)	
Partially employed women	27 <sup>a</sup> (22)		30 <sup>b</sup> (41)		15 <sup>a</sup> (17)	
Unemployed women	43 <sup>b</sup> (34)		15 <sup>a</sup> (20)		37 <sup>b</sup> (43)	

Figures in parenthesis indicate the percentage

Any two means in rows carrying different superscripts a,b,c..... differ significantly ( $P \leq 0.05$ ).

higher percentage (44%) of women having been employed outside on full time basis. The families of CG-I were found to be engaged in diversified farming in their own farms throughout the year which provided labour to all the members including women, though it was mostly non-monetary.

Because of their involvement in dairying, number of women taking up part time employment was found to be significantly higher in CG-WI when compared to CG-I and SG.

It was found that significant percentage (40%) in SG who had small land holdings was also engaged in paid agricultural labour. However, their employment was limited to short periods coinciding with peak agricultural season.

The average size of total dry land holdings was 7.7, 2.4 and 2.2 acres by CG-I, CG-WI and SG respectively. As seen in table 3 the mean size of total dryland was significantly higher in families belonging to CG-I. Nevertheless, the comparison made between latter two groups was not statistically significant.

Data on land ownership indicated (Table 3) that only 11 per cent of the households in CG-I had less than 2.5 acres of total dry land unlike 69 and 73 per cent of CG-WI and SG families respectively. Significant difference in size of land holding was seen when classified under different land holdings. Thus the CG-I families by virtue

**Table 3: Living Conditions and Material Possessions of the Three Farming Groups**

Criteria / Characteristics	Farming Group		
	CG-I	CG-WI	SG
Mean Total dryland (acres)	7.7 <sup>b</sup>	2.4 <sup>a</sup>	2.2 <sup>a</sup>
SD	±5.7	±2.0	±1.9
<i>Size of land holding (acres)</i>			
<2.5	14 <sup>a</sup> (11)	51 <sup>b</sup> (69)	53 <sup>b</sup> (73)
> 2.5-5	39 <sup>b</sup> (31)	16 <sup>a</sup> (22)	19 <sup>a</sup> (22)
>5	72 <sup>c</sup> (58)	7 <sup>b</sup> (9)	4 <sup>a</sup> (5)
Mean milching cows (Nos)	1.2 <sup>a</sup>	1.1 <sup>a</sup>	1.2 <sup>a</sup>
<i>Housing Condition :</i>			
Low	5 <sup>a</sup> (4)	16 <sup>ab</sup> (22)	38 <sup>b</sup> (44)
Medium	75 <sup>c</sup> (60)	49 <sup>b</sup> (66)	46 <sup>b</sup> (54)
High	43 <sup>b</sup> (36)	9 <sup>a</sup> (12)	2 <sup>a</sup> (2)
<i>Sanitation :</i>			
Low	3 <sup>b</sup> (2)	4 <sup>a</sup> (5)	19 <sup>b</sup> (22)
Medium	72 <sup>a</sup> (58)	60 <sup>b</sup> (81)	65 <sup>b</sup> (76)
High	50 <sup>b</sup> (40)	10 <sup>a</sup> (14)	2 <sup>a</sup> (2)
<i>Household Equipments :</i>			
Low	81 <sup>a</sup> (65)	50 <sup>a</sup> (69)	65 <sup>b</sup> (76)
Medium	5 <sup>a</sup> (7)	11 <sup>b</sup> (13)	
High	45 <sup>b</sup> (35)	18 <sup>ab</sup> (24)	10 <sup>a</sup> (11)
<i>Farm Implements :</i>			
Low	88 <sup>b</sup> (71)	64 <sup>b</sup> (35)	59 <sup>a</sup> (69)
Medium	169 (13)	3 (4)	14 (16)
High	21 (16)	7 (10)	13 (15)

Figures in paranthesis indicate percentaes.

Any two means in rows carrying different superscripts a,b..... differ significantly ( $P \leq 0.05$ ).

of their own irrigation facilities were able to engage in cash cropping on a large scale than the other groups.

The average number of ownership of milching cows was similar in all the farming groups with no significant difference in the possession of milching cows among the farming groups (Table 3).

The mean resource levels (Table 3) revealed that families belonging to CG-WI and SG were low in terms of housing conditions, sanitation and household material possessions compared to families belonging to CG-I receiving significantly higher ranking in their living conditions.

Ownership of equipments and implements which is an indication of their involvement in cash economy was found to be significantly higher in CG-I when compared to SG, who were almost totally dependent on subsistence farming combined with paid agricultural labour. However, no significant difference was observed regarding the possession of farm equipments and implements between CG-I and CG-WI groups.

The mean income from different sources of the selected households in the three farming groups

is shown in table 4. Net farm income is calculated from gross farm income less farm costs (By convention nonmonetary inputs such as family labour is not included while calculating the farm cost). The data indicated that households depend on a wide range of sources for their livelihood. It is also indicative of the fact that wide variations in income exist among the farming families.

CG-I families were found to be deriving 8 per cent of total net farm income from subsistence production of staple crop ragi. Crop diversification based on cash crops increased substantially for families belonging to CG-I. The income derived from cash crops other than animal husbandry was found to be 69 per cent and with a total net farm income of 91 per cent including 14 per cent received from animal husbandry enterprise. Contribution towards family income from sources like agriculture and non-agricultural wages, salary and business were found to be low for this group.

Animal husbandry enterprises contributed significantly towards the income (33%) for families belonging to CG-WI, followed by other cash crops (25%). Income derived from agricultural wages and salary amounted to 13 per cent each.

Table 4 : Sources of Annual Income of the Farming Households

Source (Rupees)	Farming group					
	No.	CG-I Mean % (Rs.)	No.	CG-WI Mean % (Rs.)	No.	SG Mean % (Rs.)
Staple crop	125	2734 <sup>b</sup> (8)	74	105 <sup>ab</sup> (7)	86	1422 <sup>a</sup> (14)
SD		± 2555		± 240		± 221
Cash crops other than animal husbandry	125	21074 <sup>c</sup> (69)	40	675 <sup>b</sup> (25)	11	1982 <sup>a</sup> (3)
		± 17963		± 5654		± 834
Animal husbandry	101	5214 <sup>b</sup> (14)	65	5465 <sup>b</sup> (25)	19	1798 <sup>a</sup> (4)
		± 5682		± 4813		± 1037
Total net farm income	125	28013 <sup>c</sup> (91)	74	9478 <sup>b</sup> (65)	86	2073 <sup>a</sup> (21)
		± 21155		± 6964		± 2251
Agriculture wages (men + women)	8	3236 <sup>a</sup> (1)	35	4108 <sup>a</sup> (13)	62	5817 <sup>b</sup> (42)
		± 896		± 2477		± 4333
Non Agriculture Wages	4	8450 <sup>a</sup> (1)	7	10371 <sup>a</sup> (7)	13	7341 <sup>a</sup> (11)
		± 1807		± 3353		± 3055
Salary	9	26960 <sup>b</sup> (6)	9	15667 <sup>a</sup> (13)	8	16650 <sup>a</sup> (15)
		± 7860		± 6580		± 5649
Business	11	7127 <sup>a</sup> (1)	5	3504 <sup>a</sup> (2)	9	10444 <sup>a</sup> (11)
		± 2291		± 889		± 4580
Total family income	125	31193 <sup>c</sup> (100)	74	14530 <sup>b</sup> (10)	86	10061 <sup>a</sup> (100)
		± 21090		± 10998		± 7380

Figures in parathesis indicate the percentage of total income. Any two means in rows carrying different suepscripts a,b,..... differ significantly ( $P \leq 0.05$ )

For the SG, the major means of income was through agricultural wages (42%). Staple and grain crop ragi provided the major share of net farm income (14%). Income derived from cash including animal husbandry was meagre (7%).

While comparing the total income from different sources between farming families, income derived from ragi was significantly higher in CG-I as compared to CG-WI and SG. So also the income from commercial crop sale particularly from sericulture which was significantly higher for CG-I when compared to other groups. Income from dairying appeared to have significantly contributed to the total income of the respondents belonging to CG-WI and CG-I as compared to SG. The mean total net farm income was significantly higher in CG-I when compared to the other two groups.

Income received as agricultural wages was significantly higher among SG families when compared to others. Income derived exclusively by men from salary for the outside job was significantly higher in CG-I. This could be due to members of this farming group occupying better position and getting better salaries attributable to higher education.

The pattern of expenditure on food and non-food categories needed for daily living is shown in table 5. The expenditure on food amounted to 62 per cent in CG-I, and 66 per cent both in the CG-WI and SG families.

The pattern of expenditure on different categories needed for daily living is shown in table 6.

**Table 5: Mean Monthly Expenditure on Food and Nonfood Items of Different Farm Groups**

Items / Expenditure (Rupees)	Farm Group		
	CG-I	CG-WI	SG
<i>Food:</i>			
Household	1932 <sup>c</sup> ± 948*	1301 <sup>b</sup> ± 554	1093 <sup>a</sup> ± 494
Percapita	215 <sup>c</sup>	183 <sup>b</sup>	173 <sup>a</sup>
Percent	62	66	66
<i>Non-food:</i>			
Household	1163 <sup>c</sup> ± 711	675 <sup>b</sup> ± 340	558 <sup>a</sup> ± 275
Percapita	130 <sup>c</sup>	95 <sup>b</sup>	89 <sup>a</sup>
Percent	38	34	34
<i>Total:</i>			
Household	3095 <sup>c</sup> ± 1579	1976 <sup>b</sup> ± 845	1641 <sup>a</sup> ± 720
Percapita	345 <sup>c</sup>	278 <sup>b</sup>	262 <sup>a</sup>
Percent	100	100	100

Any two means in row carrying different superscripts a,b,c... differ significantly ( $P \leq 0.05$ ).

\*SD

There appeared to be a high propensity to spend on clothing, education and transport by CG-I families. Also, less money was spent on non-nutritional items like betel leaves, tobacco, alcohol and beedi.

**Table 6: Monthly Nonfood Expenditures in the Three Farming Families**

Items	Mean and Percentage of Total Nonfood Expenditure					
	Farm Group					
	CG-I		CG-WI		SG	
	Mean (Rs) (%)	Mean (Rs) (%)	Mean (Rs) (%)	Mean (Rs) (%)	Mean (Rs) (%)	
Clothing	463 <sup>c</sup>	41	233 <sup>b</sup>	35	170 <sup>a</sup>	32
SD	± 315		± 167		± 116	
Fuel	19 <sup>b</sup>	1	14 <sup>a</sup>	2	14 <sup>a</sup>	2
	± 16		± 13		± 13	
Electricity	53 <sup>b</sup>	5	32 <sup>a</sup>	4	25 <sup>a</sup>	3
	± 47		± 22		± 17	
Education	129 <sup>b</sup>	7	29 <sup>a</sup>	2	43 <sup>a</sup>	2
	± 190		± 22		± 32	
Medical care	109 <sup>b</sup>	9	70 <sup>a</sup>	10	73 <sup>a</sup>	12
	± 127		± 61		± 50	
Recreation	65 <sup>b</sup>	2	53 <sup>b</sup>	2	34 <sup>a</sup>	1
	± 44		± 30		± 15	
Transport	164 <sup>c</sup>	14	86 <sup>b</sup>	12	60 <sup>a</sup>	11
	± 144		± 111		± 58	
Soaps	96 <sup>c</sup>	9	61 <sup>b</sup>	9	52 <sup>a</sup>	10
	± 51		± 39		± 30	
Better leaves, tobacco	127 <sup>b</sup>	9	110 <sup>ab</sup>	14	101 <sup>a</sup>	15
	97		82		78	
Alcohol	58 <sup>a</sup>		181 <sup>b</sup>		173 <sup>b</sup>	6
	± 14		± 63		± 97	
Beedi	95 <sup>a</sup>	3	86 <sup>a</sup>	6	76 <sup>a</sup>	6
	± 60		± 73		± 42	
Total		100		100		100

Any two means in rows carrying different superscripts a, b, c.... differ significantly ( $P \leq 0.05$ ).

On the other hand, CG-WI and SG families were found to spend higher percentage of their income on undesirable items such as alcohol, beedi and tobacco despite having a lower total income. Significant differences in expenditure pattern for items such as clothing, transport and toilet materials like soaps were observed between the three groups. It was noted that despite the percentage of total non-food expenditure being the same, the actual amount spent among the three groups was significantly different. For example, in case of soaps the percentage of total non-food expenditure was found to be the same (9%) in all the groups. However, significant difference was observed in the actual amount spent for items like soaps by CG-I families.

Expenditure pattern for items such as education and medical care was significantly higher among CG-I families. However, there was no significant difference for the same items between CG-WI and SG families.

On the other hand, the SG and CG-WI were found to spend higher percentage of their income on undesirable items (alcohol, beedi and tobacco) but the difference was not significant between farming groups. However, the amount spent on betel leaves and tobacco by the families of SG was found to be significant when compared to CG-I but not when compared with CG-WI.

### 3. Health Care Practices and Use of Community Health Services

The general practices of health care, awareness and use of community health services by the farming families are presented in table 7.

All children (100%) were found to have been immunized against diphtheria, pertussis and tetanus in CG-I families. Also, 96 per cent of mothers reported to have taken the antitetanus injection during pregnancy. Higher percentage of the mothers (94%) had also taken iron and folic acid tablets obtained through the primary health centre. However, only 42 per cent of the mothers were aware of the nutrition and health care programmes existing in their villages. Percentage of participation of children and mothers in school feeding was also low (41% and 10%).

It was observed among CG-I families that 90 per cent preferred to seek medical assistance from the private practitioners rather than visiting the government hospitals. As high as 63 per cent of deliveries had taken place in the hospital (Table 7). Tubectomy was the most popular family planning method accounting for 57 per cent of all responses among CG-I families.

Likewise, higher percentage of children and mothers belonging to CG-WI also had availed the health benefits like immunizing their children and mothers and also had utilized the antenatal care services. While awareness of the existing nutrition and health care programme was low (20%) participation in supplementary feeding by children and mother was higher (60% and 15%).

In case of SG families most of the children (99%) had been immunized and availed the medical care during pregnancy. Participation in supplementary feeding was comparatively higher in this group as 76 per cent of children and 34 per cent of mothers had availed the facility. Unlike the other groups hospital maternity services were not availed as 69 per cent had deliveries conducted at home. Fortyseven per cent of them had undergone tubectomy.

Thus, in all the three groups most of the children had been immunized (Table 7). Also, it was encouraging to note that in all the three groups most of the mothers had taken antitetanus injections during pregnancy. Majority of the families did not have the practice of undergoing periodical health checkup. It was observed that the households in all farming groups preferred to seek medical assistance from private practitioners than visiting the government hospitals with the expectation of better treatment and saving of time.

The percentage of women who were aware of the existing health and nutrition programmes was the highest among CG-I (42%) and least in CG-WI (20%). Nevertheless, the findings indicated

Table 7: Health care Practices in Selected Farming Households

Items	Farm Groups		
	CG-I	CG-WI	SG
<i>Immunization Status:</i>			
Children	125 (100)	70 (95)	85 (99)
Mothers	120 (96)	67 (91)	81 (94)
Antenatal care	117 (94)	67 (91)	77 (90)
Awareness of nutrition and health programme	53 (42)	15 (20)	26 (30)
<i>Participation in Supplementary Feeding:</i>			
Children	51 (41)	44 (60)	65 (76)
Mothers	12 (10)	11 (15)	29 (34)
<i>Place of Delivery:</i>			
Home	46 <sup>a</sup> (37)	46 <sup>b</sup> (62)	59 <sup>b</sup> (69)
Hospital	79 <sup>b</sup> (63)	28 <sup>a</sup> (38)	27 <sup>a</sup> (31)
<i>Family Planning:</i>			
Never	46 (37)	26 (35)	40 (47)
Tubectomy	71 (57)	43 (58)	41 (47)
Others	8 (6)	7 (7)	3 (6)
	$\chi^2 = 4.8718$ NS		
<i>Ideal Size of the Family:</i>			
One child	3 (2)	2 (3)	1 (1)
Two	84 (67)	55 (74)	52 (60)
Three	37 (30)	16 (22)	32 (37)
>Three	1 (1)	1 (1)	1 (1)
	$\chi^2 = 5.0735$ NS		

Figures in paranthesis indicate percentage. Any two means in rows carrying different superscripts a, b, ... differ significantly ( $P \leq 0.05$ ).

NS = Non significant

that most of the women irrespective of the farming groups did not make use of the available benefits of the welfare programmes. The results also revealed that the percentage of children and mothers participating in the supplementary feeding programme was the highest in SG families. The working status of the mother, and other household time and income constraints also affect the use of health, nutrition and other welfare related social services.

There was a striking difference in the percentage of infants delivered at home and in hospital between the three groups and this difference was found to be significantly higher in CG-I. The reason for the high percentage of infants being delivered in the hospital in CG-I could be due to a combination of different factors, such as better economic condition, better attainment of educational level and relatively easier availability of transport which facilitated the pregnant mothers to reach faster to the nearby hospitals.

When asked regarding the ideal size of family more than 60 per cent of the mothers expressed the wish that "it was best to have 2 children irrespective of the gender". This is indicative of a healthy attitude prevailing in the population group.

#### 4. Health Related Practices

At the time of interview the women appeared to be fairly "clean" in terms of personal toilet and appearance. Though there was awareness regarding the benefits of bathing daily, the practice was to bathe only one or twice a week mainly attributable to non-availability of water and to limit the expenditure on fuel and cleaning agents.

Other health related practices of the farming groups are shown in table 8. In case of CG-I, 26 per cent of household heads and 11 per cent of their family members were found to be smokers. Other habits like chewing tobacco, betel leaves/nuts were also found to be practised as 66 per cent of families were indulging in this habit.

7 per cent of CG-WI families were found to be addicted to alcohol in the form of toddy. While none of the women smoked a significant number (31%) of men were smokers. However, more women were found to be chewing tobacco (38%) and betel leaves (45%) than men (11% and 9%).

Toddy consumption was found to be excessively by the household male heads in SG (15%),

while 30 per cent of the men were smokers, 17 and 42 per cent of men and women respectively were in the habit of chewing tobacco. More women (49%) were in the habit of chewing betel leaves/nuts than men (17%).

The data indicated that while drinking "toddy" was significantly higher in SG than in CG-I or CG-WI, smoking appeared to be indulged by all the men irrespective of the farming groups. Women belonging to SG significantly found to be chewing tobacco and betel leaves and nuts more than other two groups.

**Table 8 : Health Related Practices in Selected Farming Groups**

Habits	Farm Group (%)		
	CG-I	CG-WI	SG
* Alcoholism			
Men	2 <sup>a</sup>	1 <sup>a</sup>	15 <sup>b</sup>
** Family as a whole	—	7 <sup>b</sup>	3 <sup>a</sup>
*Smoking			
Men	26 <sup>a</sup>	31 <sup>a</sup>	30 <sup>a</sup>
Family as a whole	11 <sup>a</sup>	18 <sup>a</sup>	7 <sup>a</sup>
Chewing Tobacco			
Men	15 <sup>ab</sup>	11 <sup>a</sup>	17 <sup>b</sup>
Women	30 <sup>a</sup>	38 <sup>b</sup>	42 <sup>b</sup>
Family as a whole	62 <sup>b</sup>	52 <sup>b</sup>	44 <sup>a</sup>
Chewing Betel Leaves and Nuts			
Men	15 <sup>b</sup>	9 <sup>a</sup>	17 <sup>b</sup>
Women	28 <sup>a</sup>	45 <sup>b</sup>	49 <sup>b</sup>
Family as a whole	66 <sup>b</sup>	50 <sup>ab</sup>	47 <sup>a</sup>

\* Since none of the women members were in the habits of drinking or smoking data given pertain to men only.

\*\* Adult only  
Any two means in rows carrying different superscripts a,b,++differ significantly (P ≤ 0.05).

These practices reflected in the type of leisure time activities of the farming groups. While families engaged in cash cropping, i.e. CG-I and CG-WI, particularly women were found to be lacking leisure time, it was found to vary for SG depending on the seasonal agricultural labour. Since all the families were involved in agricultural labour, the physical activities particularly in case of women appeared to be heavy. Thus, there was little scope for having any leisure time for recreational activities. Moreover, as these villages were inaccessible to the city area with minimum transport facilities, recreational facilities were restricted to television viewing in some households and occasional visit to the theatre. Lack of time also limited their social activities to a minimum. The only community activity which was common



to all the farming families was found to be their participation in yearly temple festival and activities related to general election once in a way.

## B. DIETARY CHARACTERISTICS

### 1. Dietary Pattern-Food Related Practices

Rural households in the study area spent most of their available income on food, whether from their own farm production resources or through cash income from outside labour. Thus the current expenditure on food incurred by these households was higher than non-food items (Table 5). According to Engel's law (58) the proportion of income spent on food declines as income rises and this trend was apparent from the results of the present study. The CG-I families with higher income were found to spend lesser proportion of the income for food (62%) when compared to other two groups (66%). The mean family monthly food expenditure was significantly higher in CG-I when compared to other two groups.

The pattern of food expenditure under different categories of food items is shown in table 9. Families belonging to CG-I spent on an average 45 per cent of total household food expenditure including the value of food produced for own consumption on basic food items such as cereals, pulses, green leafy and other vegetables. Expenditure on cereal and substitutes amounted to nearly 32 per cent. Families belonging to CG-I with higher income spent on items like fine cereals (rice).

**Table 9 : Distribution of Mean Monthly Total Expenditure of Different Food Items**

Items/Categories	Farming Group		
	CG-I	CG-WI	SG
	Mean (%) (Rs.)	Mean (%) (Rs.)	Mean (%) (Rs.)
Cereals	788 <sup>c</sup> 32	500 <sup>b</sup> 38	435 <sup>a</sup> 39
Pulses	117 <sup>c</sup> 6	83 <sup>b</sup> 6	66 <sup>a</sup> 6
Green leafy vegetable and other vegetables	154 <sup>b</sup> 7	111 <sup>a</sup> 8	107 <sup>a</sup> 9
Fruits	86 <sup>a</sup> 4	109 <sup>a</sup> 8	76 <sup>a</sup> 5
Animal foods	304 <sup>b</sup> 12	158 <sup>b</sup> 10	140 <sup>a</sup> 12
Nuts and oil seeds	84 <sup>c</sup> 3	65 <sup>b</sup> 3	43 <sup>a</sup> 2
Fats and oils	267 <sup>c</sup> 5	67 <sup>b</sup> 5	53 <sup>a</sup> 3
Sugar and jaggery	90 <sup>c</sup> 7	62 <sup>b</sup> 6	39 <sup>a</sup> 5
Snack foods	103 <sup>b</sup> 8	55 <sup>a</sup> 8	77 <sup>a</sup> 10
Species and condiments	98 <sup>b</sup> 5	60 <sup>a</sup> 5	54 <sup>a</sup> 5

Any two means in row carrying different superscripts a,b,c, differ significantly ( $P \leq 0.05$ ).

A greater share of the food budget was allocated to a variety of foods (pulses, fruits, milk and milk products) with increased income as observed in CG-I families. Families belonging to CG-WI spent on an average 52 per cent of their total income towards purchase of cereals, pulses, green leafy vegetables and other vegetables. Out of the total expenditure the amount spent for cereals and substitutes amounted to 38 per cent. A small share of the budget was allocated to milk and other animal foods, fats and oils, and snack foods.

Families belonging to SG spent least amount for cereal items. However, the percentage was similar to that of CG-WI (Table 9). The expenditure on animal foods except milk was found to be high (12%). The families were also found to spend a higher amount on snack foods. However, the amount spent for items such as fats and oils, and sugar and jaggery was low.

All families were found to spend higher proportion of their total food expenditure on cereal items, ragi and a small quantity of rice in their two meals. The amount spent for ragi was found to be significantly higher among CG-I but was not significantly different between CG-WI and SG. The CG-I families were also spending significantly higher amount on fine cereal grains (rice) and a lesser amount on wheat. Likewise, the CG-WI families were also found to spend significantly higher amount towards rice and wheat when compared to SG.

Significant difference in the allocation of income towards purchase of pulses, vegetables and tubers was seen among families belonging to CG-I. However, the amount spent on these items in CG-WI and SG was not different.

Budget allocated to different protective foods such as vegetables, fruits, milk and milk products and animal foods was found to be significant in families belonging to CG-I. However, for the same items the expenditure was not found to be significant in case of families belonging to CG-WI and SG. It was also observed that CG-I families were spending higher amounts on items such as nuts and oil seeds, fats and oils, sugar and jaggery, snack foods, spices and condiments. But, the proportion of the amount allocated for different items appeared to be similar for all the farming groups. Significant differences in the amount spent for different items were noted between the farming groups.

Despite a significant difference in the total income between CG-WI and SG, the expenditure on food items like green leafy and other vegetables, milk, animal foods, snack foods, fats and oils, and sugar was similar in these groups.

The results are indicative of the fact that with higher income levels, farm families tend to spend more on milk and other foods like snacks, sugar and fats. However, marginal increase in the income levels as in case of CG-WI does not appear to encourage expenditure on foods other than staples.

The meal and menu pattern was similar to that is prevalent in rural areas of South Karnataka (Table 10). It was observed, while two meal a day pattern was being followed by 79 and 68 per cent families belonging to CG-I were following three meal pattern. The food habits of families were simple and conforming to an almost uniform pattern in all households in the selected villages.

Though more than 90 per cent of the women reported that they were non-vegetarians by habit, these foods were being consumed once a week by 26, 11 and 23 per cent of families belonging to CG-I, CG-WI and SG respectively. The remaining families were consuming meat products only occasionally (once or twice in a month). Thus, the dietaries were predominantly of vegetarian type.

The cereals were the predominant items of the daily menu. Majority of CG-I families, particularly those who were following a 3 meal pattern used unleavened bread (*roti*) (Table 10) made out of ragi flour at breakfast, or at times *idly* (steam cooked cake) or *dosa* (pan cake) using combination of rice with blackgram dhal. These preparations were consumed with *chutney* or any cooked vegetables. Common preparations like seasoned rice and semolina (*uppittu*) were also the most widely used items in the morning meal.

Table 10 : Meal Pattern of the Selected Families

Time	Meal Pattern	Preparation
6 - 7 A.M.	—	Bed Coffe/Tea
8 - A.M.	Breakfast	*Idli, dosai, ragi, or rice roti, chutney, chapathi, palya, lime or tamarind bath, rava uppittu.
12 - 2 Noon	Lunch	Ragi dumplings, rice, curry, buttermilk
3 - 9.30 P.M.	Dinner	Ragi dumplings, curry, rice, buttermilk.

\*Any one cereal preparation along with a side dish such as curry/palya/chutney.

Other than these items the menu (Table 10) commonly eaten by all families consisted of staple cereals or millet ragi with or without small quantity of rice cooked during both meal times. Ragi dumplings which was the main entree was being served with curry having vegetable and pulse. Thus, the cereals commonly used each day were ragi and rice and occasionally wheat.

Since tender field beans (*Dolichos lablab*) preparation was used both as a pulse and a vegetable, the other pluses were not being used during this period. The vegetables such as brinjal, tomato and potato were being used mainly in the preparation of curry.

Those who possessed milch cows particularly among CG-I and WI families, used butter-milk and milk in the form of coffee or tea in their daily meal.

## 2. Frequency of Food Use

Frequency of use of food by families is shown in table 11. Cereals were the predominant items of the daily menu. The cereals commonly used every day were ragi (100 %) and rice (99%) by the families belonging to CG-I. 20 per cent of families used wheat either once, twice or thrice a week. Higher expenditure on pulses and milk reflected in the use of the same daily by majority of these families. More than 70 per cent of the families used the items such as roots and tubers, sugar and jaggery daily. Very few used green leafy vegetables, fruits, eggs, and groundnut daily. Meat was being used only occasionally.

Likewise families belonging to CG-I, CG-WI families used ragi daily (99%) and rice (93%). Daily usage of pulses was seen among 86 per cent of the families. Milk was being used by 95 per cent in the form of coffee/tea and butter-milk daily. So also sugar and jaggery by 84 per cent. Animal foods like eggs, meat and poultry were used only occasionally. The use of vegetables including green leafy, and roots and tubers was seen more than thrice in a week.

Among SG families the staple cereal most commonly and more frequently used (100%) was ragi followed by rice (93%). Only 79 of the families used pulses and 71 per cent used milk respectively in the form of coffee daily.

Thus, the pattern and type of cereal used was almost uniform among all families. More number of families with higher income belonging to CG-I

used food items like pulses, other vegetables, roots and tubers, milk, sugar and jaggery more frequently. However, fruits and animal foods such as eggs, meat and poultry were being used occasionally irrespective of the farming group.

The most commonly used oil by all families was found to be groundnut oil. However, the daily usage of oil by CG-I was found to be as high as 67 per cent as compared to 32 and 20 per cent belonging to CG-WI and SG. It was observed that oil was being used in the latter two groups for seasoning purpose only.

### 3. Food Behaviour Characteristics

The women, generally the mothers (female heads) were the providers of the family meal. They reported using simple preparation method such as boiling. No other methods of cooking was commonly seen. This could be attributed to lack of basic amenities required for food preparation. In spite of dual role as "income earner" and "providers of food", time and labour saving equipments were totally lacking in majority of rural homes. All household female heads surveyed were in the habit of preparing the cereal foods (rice or ragi dumplings) twice a day and other dishes or accompaniments like curry/*sambar/gojju* once only irrespective of farming group.

The most commonly used fuel for cooking purpose among all households was "firewood". Few women belonging to CG-I used a combination of fuels like gas and wood. Women reported walking long distances to gather firewood from the surrounding ecological area, although it may erode the ecology in the long run causing distortion in the soil chemistry affecting the agricultural output.

The data indicated that there were no unequal or preferential food distribution among the farming families irrespective of the group. However, the preferential treatment in serving protective foods to men was observed. Women were found to serve larger share of protective foods such as eggs, meat, etc. though prepared occasionally, and coffee or tea prepared daily, to the male members in the family. This behaviour pattern of giving preferential treatment in serving foods considered special to male members (heads) followed by other male members (including chil-

dren) was the common picture in the study group. The sharing of food to other members in the family, and at times denying food for self, perhaps arises out of both inherent (psyche) and concern for their offspring. This shows that improvement in the food intake of women is possible only when the basic needs of the family are satisfied.

Though there were no specific likes and dislikes associated with foods in all farming groups, majority of the women expressed preference for a variety of foods although all of them indicated their inability to use them due to limited income.

The food behaviour pattern revealed a change during festive times and on the arrival of relatives who were visiting occasionally. Foods most frequently consumed during festival days were purely vegetarian. These were mandatory because of special *poojas* being offered both at home and in the local temples. The most commonly prepared dishes were varieties of vegetables, *payasam*\* and *obbattu*\*\* . Visiting relatives were being given special treatment by way of preparing "non-vegetarian dishes" at the cost of spending additional income set apart for other needs irrespective of the farming group.

Foods/diets given during sickness or to any particular groups of family members like children and the elderly were also found to have been influenced by both the inherited tradition (food beliefs) and income. Foods preferred during sickness like fever, cold, etc. to the family members included bread, *ganji* (rice), tender coconut and avoiding foods like buttermilk. It was encouraging to note that all the farming families were aware of the oral rehydration solution (ORS) and the same was being given to treat diarrhoeal conditions in addition to tender coconut water and butter-milk which were the foods given for diarrhoea.

The data revealed that no special attention was being given to the diet of the elderly. They appeared to be the most neglected group in the community. In an attempt to determine why the elderly were being given least attention with regard to diet and health, most of the respondents irrespective of the farming group expressed that the

\* *Payasam*—A mixture of dal, cereal with jaggery boiled to a semi liquid consistency.

\*\* *Obbattu*—Pancake made of refined wheat having a filling made up of dal, coconut and jaggery.

elderly members did not show interest in changing their diet, either in quantity or quality. This could also be attributed to general neglect of health over a period of years which might have resulted in poor appetite and lack of interest in living.

There were no specific food beliefs or taboos that were significant to the nutrition of household among the families. However, as prevalent elsewhere in India, in the present study groups also some specific preferences/restrictions regarding foods are given during pregnancy and lactation. Various reasons for their inclusion or restrictions could be attributed to the existing beliefs and taboos which are the outcome of tradition stated to have more pronounced influence particularly among rural homes. The main reason for inclusion or restriction was based on the belief that they may promote well being of the mother/child or they may be harmful if consumed resulting in an ill effect.

## DISCUSSION

The present study covering a total of 17 villages indicated an increase in the cash income due to commercialization over a period of 15 years. The important feature was the substantial involvement of women in cash economy.

The ready access to irrigated land was found to be the key factor affecting the economic status of the farming families. It was apparent that for the CG-I families who were having the privilege of having their own irrigation system, the major source of revenue was from horticulture (vegetable and fruit production) and sericulture (mulberry cultivation) in addition to subsistence crops. In case of CG-WI families dairying (animal husbandry enterprise) along with the subsistence crops were found to be the main sources of income. SG families lacking basic resources were also dependent on seasonal wage employment. It is reported that farming families tend to change over to the process of commercialization depending on the sources available, viz. land, capital and labour as observed in case of both CG-WI and SG with smaller farm holdings, and lack of water facilities for irrigation were the limiting factors for not adopting cash cropping system. In case of SG employment stability was also a ma-

ajor constraint. It is a well established fact that income for the paid labour is dependent on either demand or health of the labourers. In addition, the displacement of human labour by machinery in cash crop system also reduces the labour sources. Thus, instability of labour resulted in a lower income for SG inspite of involvement in subsistence production.

A close relationship has been shown between the commercialization of agriculture and a higher household income. The findings of the present study indicated a positive increase in the household income of most of the CG-I families. Thus, cash crop production significantly increased the average income of the CG-I. Here, it is suggested that commercialization can be the major factor in alleviating poverty leading to improved quality of life.

However, while the findings indicated a positive effect in terms of improved housing conditions leading to better sanitary system, increased material possessions and access to health care, it did not appear to affect the household size, educational level or the dietary practices and food behaviour characteristics of the farming families.

Environmental assessment of all the households irrespective of the farming group indicated a smaller household size in terms of a family unit. However, the significant feature observed was that all the households involved in cash cropping were following a joint family system leading to a larger household size having more than 50 per cent of adults in their prime (25-35 years of age). This appears to be a common characteristic among families self employed in agriculture.

By and large, literacy rate and level of education were low among both male and female heads in all the households irrespective of the income group particularly among women. It was also seen that more number of male heads in CG-I had 5-10 years of formal education. However, it was not clear whether the educational level induced them to venture into cash cropping or the increase in income permitted them to acquire education. Research findings indicate a positive correlation between health and nutrition and the extent of formal education. Reasons postulated for this positive correlation are better awareness of hygienic practices, improved diet and child rearing practices. However, it is also indicated in case of

women the absence of autonomy in decision making, education may fail to positively influence household nutrition. Since literacy and educational level of women in the farming families was low irrespective of level of income, it is unlikely that they could have influenced the household nutrition even with increasing affluence.

A comparison of housing characteristics between the three farming groups indicated better housing condition for CG-I having possession of household goods — indicators of household wealth. CG-I families were also found to be spending a higher proportion of their income for education and on health related services of their children. Though increased income was being diverted to non-food items such as housing, health and education, it may still prove to be beneficial in the long run as it is likely to positively influence the household nutrition. On the other hand, despite having a lower income CG-WI and SG were found to spend higher proportion of their income on undesirable components like smoking (beedi), alcoholism, tobacco chewing, etc. Also, sanitary conditions were found to be unsatisfactory among these households.

Increasing income did not influence the dietary pattern and food behaviour characteristics of the farming households though it promoted a greater food security in terms of staple food crops in CG-I households. It is expected that changes in the food frequencies and food preferences occur only when there is a substantial increase in the income on hand sufficient to satisfy all other basic needs. Similarly, the findings indicated an upward trend in the use of milk, vegetables and other fleshy foods among the CG-I families having increased affluence due to cash cropping. However, as evident by the food expenditure pattern CG-WI did not differ from SG in their use of milk, vegetables, etc. despite having a higher income. It was also evident that the food behaviour characteristics of the farming families were still being more influenced by "tradition" irrespective of the income level. Hence, the dietary practices being followed during special occasions (festivals, etc.) and physiological conditions (pregnancy, lactation and infancy) were found to be similar in all the farming groups. The food distribution pattern in the households revealed no discrimination

between the male and female members with regard to the staple diet though preference to "male" was being practiced in serving of special foods like meat, sweets, etc. NNMB report also indicates no discrimination in food distribution between the male and female members of the same households in India.

In summary, change in farming system or cash cropping conferred economic advantages for CG-I families as compared to other groups with respect to improved housing condition, possession of goods leading to better facilities and easy access to basic health care services. While both CG-WI and SG were having the constraints of resources, and animal husbandry did not substantially increase the income of CG-WI, instability of labour reduced the income of the SG. In addition, dietary characteristics being dictated in part by tradition were similar in all the farming groups regardless of income. Moreover, participation of these households, particularly of the women members, in the community health and nutrition programmes was low. Hence, in the absence of education and nutritional awareness it is unlikely that income alone might have influenced the household nutrition.

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