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# Analysis and Study of the Socio Economic and Nutritional Status of Farmers Selected Under DST-SARTHI Project of District Hoshiarpur, Punjab

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***Authors' contributions***

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

The present study was carried out in the department of Floriculture and Landscaping, Punjab Agricultural University, Ludhiana under DST- SARTHI project, New Delhi to analyse the socio economic and nutritional status of beneficiaries selected under the project. Moreover, nutritional status of farmers recorded to also assess the association between FVS, DDS and socioeconomic status at household level. The Data on vegetable production, selling, buying and socio-economic status were collected using questionnaire developed by PAU Ludhiana. A total 100 beneficiaries from three landholding categories viz small (<5 acre), medium (5-10 acre) and large (>10 acres) in Hoshiarpur were selected. The data have been collected to check the difference in the nutrition intake of beneficiaries during the interventional period and before the intervention. Correlation of

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both years (before and during intervention) calculated as 0.892243. It is concluded that the previous year diet was not healthier integration of both quality and quantity in the scores but both scores (DDS& FVS) increased during intervention period through DST Project.

*Keywords: Beneficiaries; vegetable; DDS; FVS; Hoshiarpur; Punjab.*

## 1. INTRODUCTION

*Kandi* region of Punjab includes part of Shivalik ranges of the lower hills which extends across the whole of Northern India. This area lies within administrative districts of Hoshiarpur, Pathankot, Shaheed Bhagat Singh Nagar (Nawanshahar), Roop Nagar (Ropar) and SAS Nagar (Mohali) as mentioned in Gazetteer of India (2000). It covers an area of 4600 $km^2$ covering about 9 % of Punjab State, out of total Punjab's area (50,000 $Km^2$) and has 6% population of the Punjab. Most of the agricultural land in *Kandi* area of Punjab is rainfed i.e. dependent on rains. The requirement of water for Rabi and Kharif crops cannot be met as most of the rainfall occurs in 2-3 months only and 40% of this water also gets wasted and might cause floods. Extended period of drought, small land holding and deep water table militate against advanced agricultural techniques. Consequently, less crop diversification is prevalent in same area that directly affects the socioeconomic status and nutrient intake of the residents. With the existing cropping pattern, nutrient intake and socio economic status cannot be improved, hence there is need to implement horticulture based nutrition sensitive interventions to curb the problems.

The relationship between dietary and crop diversity has become a major area of research in the past decade [1]. Rural people do not have proper access to markets and low purchasing powers are the major barrier to buy and consume fresh vegetables results in decline of dietary diversity and poor nutritional intake [2]. The food and horticulture interventions (nutritional gardens) contribute in improving the consumption of fresh vegetables at home on regular basis and enhance dietary diversity as well. Consequently, this analysis establishes the relationship between dietary diversity and socio-economic status.

In this project, more and more hands on training awareness camps , demonstrations and field days were being organized to motivate and encourage to grow vegetables throughout the year in their nutritional garden for fresh as well as their value addition to improve their family income, standard of living, purchasing power as well as nutritional and livelihood security. In addition to this, the selected beneficiaries were also motivated for flower cultivation (desi rose) for fresh as well as their value addition like Gulkand and Rose water/Sharbat.. The household's food security mainly depends per capita income, education, family size, participation in income generating activities in addition to their regular job and time spent on food preparation [3].

Nutritional security does not only define the availability of the food and also an important factor to estimate diversification in the available food with its macro- and micronutrients [4,5]. While the causes of malnutrition are complex, a leading cause is suggested to be a general simplification of diet and its associated low nutrient intake in short reduced diversity may lead to a decline in nutrition quality. Vegetable nutrition gardens will have a direct and positive impact on dietary diversity, the dietary quality and nutrient intake of the respondents [6]. Besides this, little efforts has been made to use agricultural programs to improve and create awareness among beneficiaries about the importance of nutrition intake and vegetable production. However, production includes both vegetable cultivation in their own gardens/ fields and vegetable collection from the markets. Dietary diversity and food variety consumed by farmers was assessed in order to investigate the nutritional quality of their diets. The last can be improved with consumption of a large number of food groups. Dietary diversity is, therefore, an important component of nutritional quality [7,8].T he main objective of this study was to test whether high vegetable diversity, available through cultivation in fields/ gardens and collection from the wild, resulted in high nutritional intake in district.

## 2. MATERIALS AND METHODS

Baseline data were collected from two blocks of District Hoshiarpur namely Mahilpur (village Maili & Kangar Kothi) & Hoshiarpur II (Village Chaggran & Jatpur) during 2014-2015 and 2015-2016 through a structured questionnaire

developed by the Department of Food & nutrition college of Home Science PAU. During 2014-15, data were recorded from selected beneficiaries to check their nutritional uptake and socio economic status and second year data was recorded to check the improved nutritional status during intervention period.

In block Mahilpur (villages Maili and Kangar Kothi) and Hoshiarpur II(Village Chaggran and Jatpur ) have sandy loam soil and pH is more than 8.0. During intervention period, a total 100 of families i.e. 28, 59 and 13 each from three categories respectively based on their operational land holding viz small (<5 acre), medium (5-8 acre ) and Large (>10 acres) from the both blocks of the district Hoshiarpur were selected to collect data on the socioeconomic status and dietary diversity. The socioeconomic survey included, household , demographic characteristic, land used for agriculture , vegetable production, Livestock and purchasing powers to buy vegetables and other food groups from market. The information on respondent's food consumption was collected using 24-hour recall for consecutive three days. Dietary diversity questionnaire which includes 12 groups of food like Cereals, Pulses, Green leafy vegetables, Roots ,Tubers, Fruits, vegetables, Milk & milk products, Egg, Fat, Sugar, Meat and Miscellaneous. The 24-hour recall was used to quantify the food amount consumed and recalled more precisely than food frequency questionnaire, because the method had already been successfully applied to DDS calculation [9]. Questions concerning socioeconomic status included ethnic origin of participants and occupation status within the household [10] regarding vegetable production in terms of vegetables cultivation in their own gardens or fields or vegetables purchased from the market.

**DIETARY DIVERSITY SCORE (DDS**): It represents the number of different food groups consumed over a given reference period and calculated using a set of 12 . The choice of 12 food groups was based on outcomes of Food and Nutrition Technical Assistance (FANTA) project [11].

**FOOD VARIETY SCORE (FVS):** Food variety score is number of food items consumed over period of seven days. A list of 49 food items commonly consumed by the selected community was prepared. Scores were given to each food category eaten either once or throughout a week and each food category scored only once. Scores were added and the resultant score represented FVS of the respondent. Average FVS of three categories was calculated separately by dividing the sum of FVS with total number of respondents [12]. Information on respondent's food consumption was collected using the previous 24-hours as a reference period. Consumption of food like vegetables by female in home prepared in home and outside the home were included. Code '1'was given for food group consumed during the previous 24-hour and '0' code was given to food items not consumed in last 24 hour. DDS was calculated by adding the number of different food groups consumed. Average DDS for three categories was calculated separately by dividing the sum of DDS with total number of respondents. Analysis of variance was employed to access the difference of expenditure, food variety score (FVS) and dietary diversity score (DDS) in the three groups the value for critical difference (CD (p=0.05) were calculated where variance ratio was significant. Coefficient of correlation were derived between socio-economic factor, DDS & FVS.

**Table 1. Project site selected under the project**

| District: Hoshiarpur | Village | Total Population | SC Population | BC | General | Area under Agriculture (acre) | Male : Female |
|---|---|---|---|---|---|---|---|
| Block: Mahilpur | Maili | 1938 | 417 | 1446 | 75 | 890 | 970: 968 |
| | Kangan Kothi | 537 | 289 | 182 | 66 | 450 | 274: 263 |
| Block: Hoshiarpur II | Chaggran | 1630 | 537 | 160 | 933 | 280 | 824: 806 |
| | Jatpur | 302 | 20 | 254 | 28 | 148 | 154:148 |

## 3. RESULTS AND DISCUSSION

Households were characterized as having an equal number of males and females (Table 1), The household size (between 5-7 members) was among majority of the group I farm households (57%) while house hold size between 4 and less members were in Group II (47%).The lesser percentage Group I, II & III farmhouse hold had family size larger than 8 members. The education status of respondent Group I & Group III household studied up to 10th grade. Percentage of graduates was higher in Group III followed by Group I. Education of family like illiterate, middle, metric, intermediate; graduates were in percent 5, 23, 34, 24, and 14%, respectively as observed in Fig. 1. The selected families were grouped into nuclear and joint family were 69 % respondents belonging to nuclear family and rest of them belonging to joint family in Fig. 2. Moreover, 100% households held self-cultivated lands. 30% Group I, 15% Group III and 10% Group II had their lands taken on lease. Moreover, 20% Group III had land given on lease as compared to less than 5% in Groups I and II (see Fig. 2). A significant higher agricultural income was observed in group III (>10 acres) in compariosn to group II (5-8 acres) & group I (<5 acres) (see Fig. 3). all households were engaged in agriculture while 51.2%, 25.5% and 4.9% had dairy as additional occupation service and business, respectively. It is evident from the Fig. 3 that dairy was an important contributor to enhance the socio economic status of farm households. It is noticed that's agriculture and dairy occupation contributes to high Total and per capita income in group III compared to group I and II. Kashish et al. [13] observed that farmers generally depend upon the income from dairy because dairying contributes more than 38.70 % of the family income.

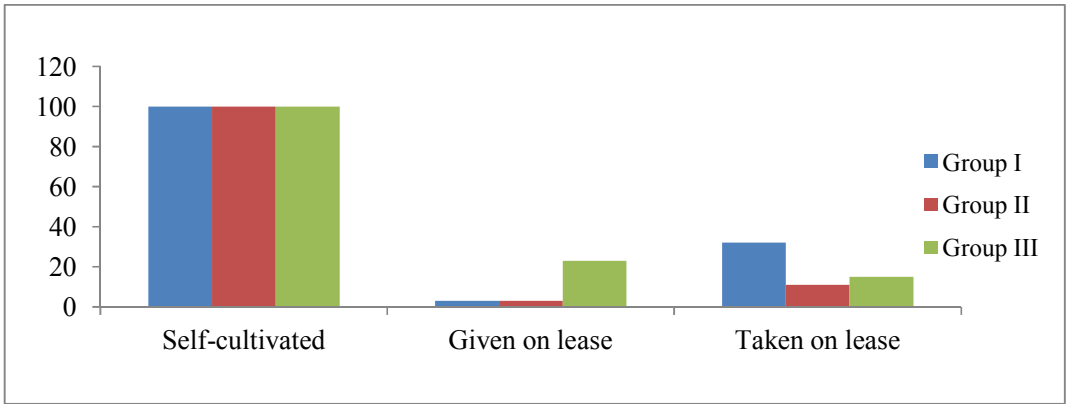


**Fig. 1. Land holding in small (Group I), semi medium (Group II) and medium (Group III) farm households**

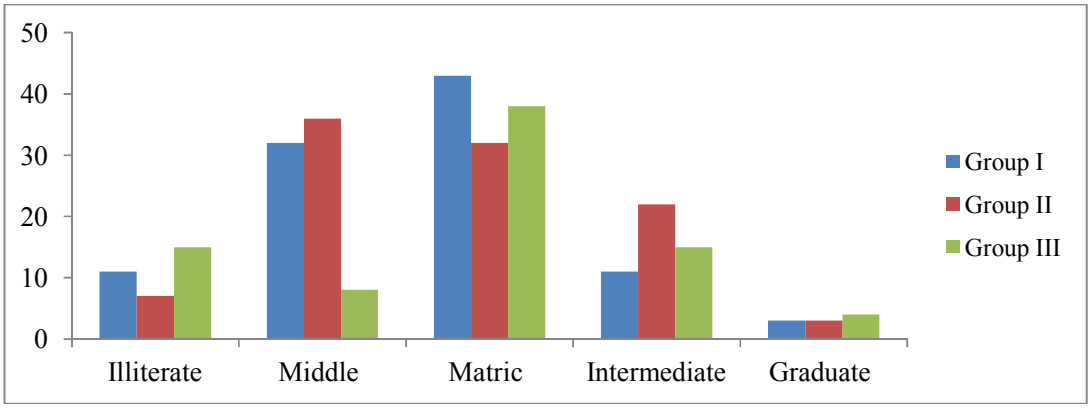


**Fig. 2. Education status of small (Group I), semi medium (Group II) and medium (Group III) farm households**

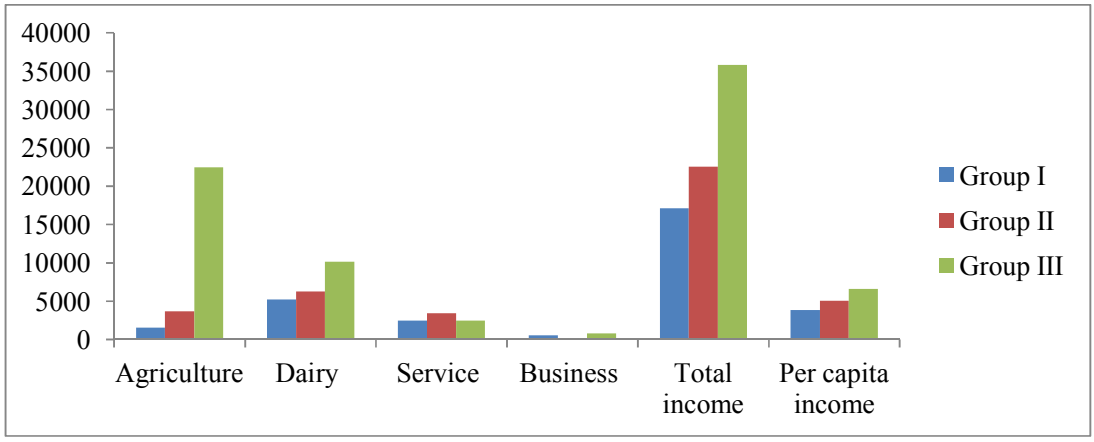


**Fig. 3. Economic Status of small (Group I), semi medium (Group II) and medium (Group III) of farm households**

The significant higher expenditure on cereals was observed in all groups group I, II and III. Group III spent more on pulses as compared to group II and group I before intervention, while group I had highest expenditure when compared to group II and group III during intervention. The expenditure on vegetable was significantly higher in group II as compared to group III and groups I before intervention and also spent more during intervention. The expenditure on fruit was higher in group III than group II and group I before intervention and group II spent maximum expenditure in comparison to group III and group I during intervention. Expenditure on milk and milk products was maximum in group II as compared to group III and group I before intervention and also more spent during intervention. The expenditure on egg as higher in group III as compared to group II and group I before intervention and group II spent more when compared to group III and group I during intervention. The expenditure on fat and oil was higher in group I when compared to group III and group II before intervention and group III higher than group II and group I during intervention. The expenditure on sugar higher in group II as compared group III and group I during intervention and also more during intervention. The expenditure on meat & chicken higher in group III as compared to group II and group I before intervention while group I higher than group II and group III during intervention. As household income increases the total food consumption also increases, but share of the total food consumption in total expenditure decreases. The similar observation was also recommended by Akbay [14].

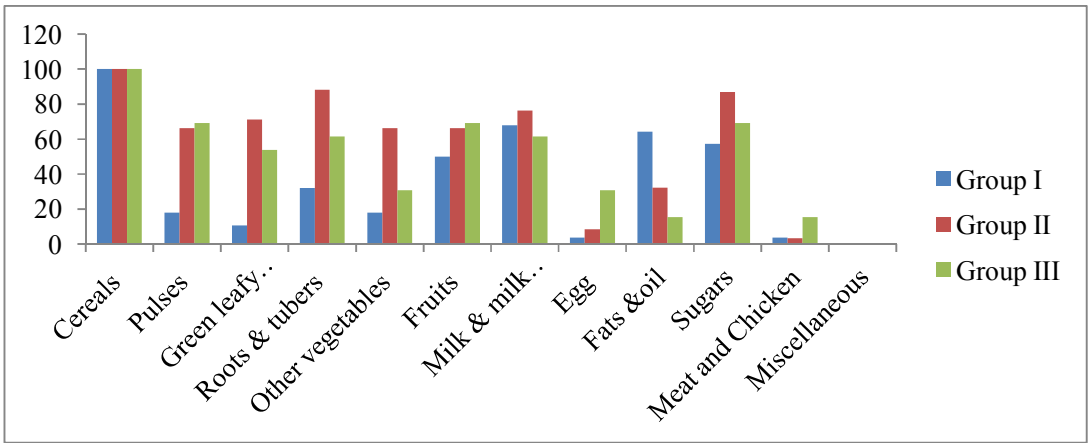


**Fig. 4. Daily food intake of small (Group I), semi medium (Group II) and medium (Group III) farm households (before intervention)**

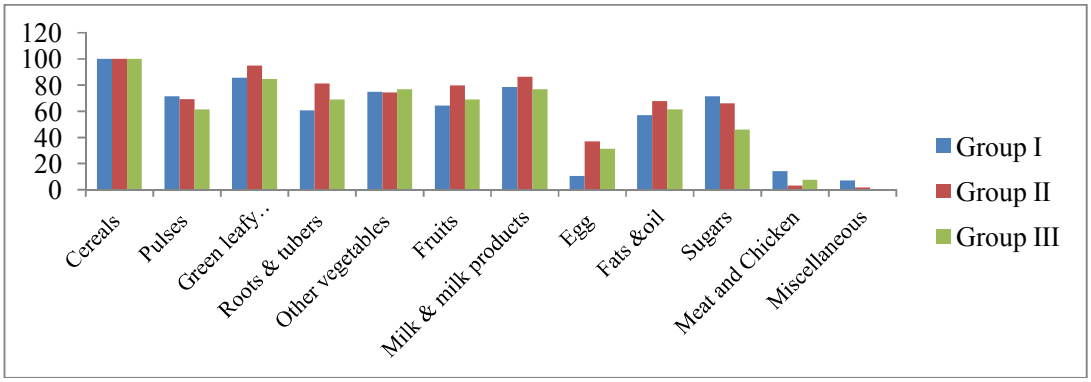


**Fig. 5. Daily food intake of small (Group I), semi medium (Group II) and medium (Group III) farm households (during intervention)**

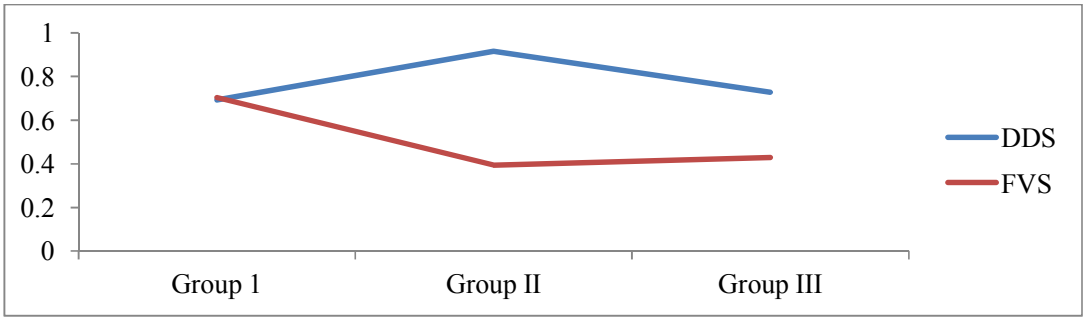


**Fig. 6. Correlation of food score (Dietary Diversity Score & Food Variety Score) of farmers between before and after intervention**

Majority of respondents achieved minimum dietary diversity and they are more likely to have higher (more adequate) micronutrient intake during the intervention period (Fig. 5). Shashikantha et al. [15] and Singh et al. [16,17] found the same result in their study.

**DIETARY DIVERSITY SCORE (DDS):** In the present study, it was observed that, there is lack of dietary diversity before the intervention as selected beneficiaries predominantly depend on starch containing diets in comparison to other food groups. Previous studies of Bhagowalia et al. [18]; Chinnadurai et al. [19]; Kavitha et al. [20]; Gupta et al. [21] Singh et al. [16,17] and Dizon et al. [1] have shown that dietary diversity is directly influenced by the agriculture diversification and there is positive association between dietary diversity and crop diversity. The households consumed 12 different food groups on single day. The percentage adequacy of food groups namely Cereals, Pulses, Green leafy vegetables, Roots& Tubers, Fruits, Other vegetable, Milk & milk products, Egg, Fat, Sugar Meat and miscellaneous were 100, 53, 52, 69, 48, 62, 72, 10, 28, 78, 5, 0% respectively followed by interventional period as 100, 69, 91, 74, 75, 74, 83, 15, 64, 65 ,7 ,3% respectively. Correlation of FVS & DDS for both years (before and during intervention) calculated as 0.892243. The highest score can be attributed to higher income leading to diversified diet. Ramachandran [22] reported that Indian diet continue to be mainly cereals based. Kennedy et al. [23] found that increasing dietary diversity is associated with increased household food access. The proportion of participant grouped into small, medium and large the DDS were distributed over the different number of food group. The DDS increases during interventional period as compared to initial year. The food groups consumed by participants either low, semi medium or medium with DDS differed. The cereals were consumed by all the selected beneficiaries while rest of food groups were not or partially consumed by all participants. The consumption of green vegetables were higher i.e. 91% followed by Milk and milk products with 83% consumption. On the other hand, only 69% of people consume pulses. However, consumption of Miscellaneous food items, Egg, Meat &

Chicken was very less i.e.3%, 15 % 7% respectively in Figs 4 and 5.

As per the classification given by Savige et al. [12] dietary adequacy categorized as 'good' was observed in 30.76 % in group III during the intervention period. Dietary adequacy categorized as ' fair' was highest in group II( 7.4 %) followed by group I and group II before intervention and show maximum in group I (61.1 %) followed by group II and group III during intervention. FVS considered 'poor' was highest in group II (39.28%) as compared group I and group III before intervention and show maximum in group (32.28%) during intervention. FVS regarded 'very poor' was observed in group II (53 %) followed by group I and group III intervention and highest in group I (28%) during intervention in Figs 6 & 7. The occupation of participant related to both DDS. The farmers involved in business & service besides the farming tend to having high DDS and FVS shown in Fig. 3.

The significant positive relationship between DDS and FVS can be used effectively as indicator of food security. Guthrie and Scheer [24] also suggested that dietary score can substitute more complex dietary analysis. Among the socio-economic variable local income of the household showed positive and significant correlation with DDS and FVS as given in Fig. 8. The income from agriculture showed positive correlation with DDS and FVS indicating that the diversity of diet can be achieved through improved incomes and crop diversity. Total land owned by household showed positive correlation with DDS and FVS. Operational land holding of the household also showed positive correlation with DDS and FVS indicating that farmers belonging to larger land holding and higher income had more diversity in their diet. Income from diary shows positive correlation with DDS whereas education of family did not show any significant correlation. Museb and Kumar [25] reported that under nourished population was highest among the landless and households with illiterate heads. Agrahar- et al. [26] reported that farming played a significant role in the consumption of cereals and fruits. Shariff and Khor [27] reported that land ownership may not be important prediction of food security but its utilization may be protective against household food security. In addition to this, Farmers having large landholding can improve household dietary and crop diversity suggested by Sibhatu et al. [28].

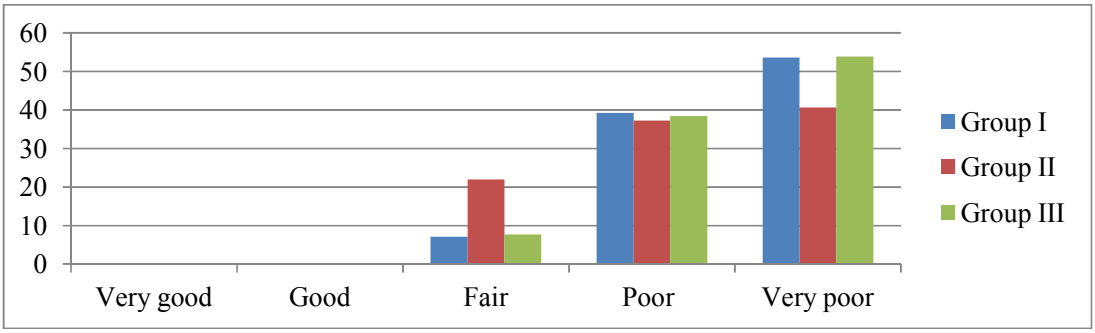


**Fig. 7. Classification of farmers belonging to small (Group I), semi medium (Group II) and medium (Group III) farm households for their dietary adequacy (Before intervention)**

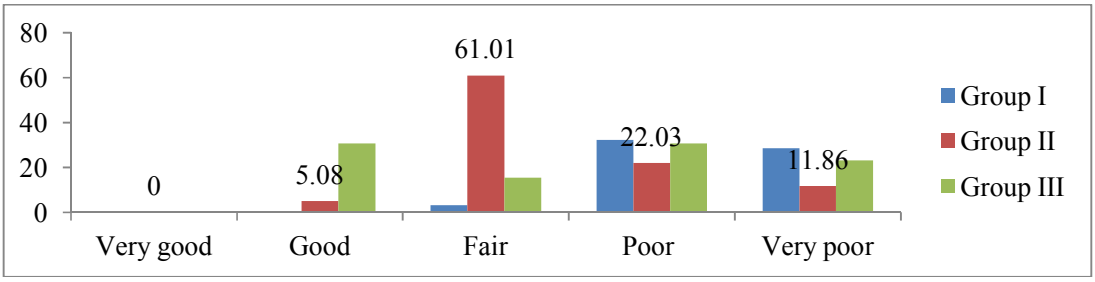


**Fig. 8. Classification of farmers belonging to small (Group I), semi medium (Group II) and medium (Group III) farm households for their dietary adequacy (during intervention)**

On the other hand, Ahn et al. [29] found that among less educated the diet variety depends more an income than it does not among higher educated. Hatleiy et al. [30] reported that dietary diversity increases with socio- economic status both in rural and urban areas and irrespective of the diversity indicator used (FVS or DDS). Establishment of nutritional garden ensure the regular supply of vegetables that led to increase in the consumption of vegetable consumption and the dietary diversity.

## 4. CONCLUSION

The study concluded that nutrition based horticulture interventions helps to enhance the nutritional security and dietary diversity and establish relationship between DDS and FVS indicating that both can used effectively as indicator of food security. Total income, income from both agriculture and dairy, total landholding and education level of respondent is crucial for balanced nutritional intake and dietary diversity of the beneficiaries.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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