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Family Poultry as a Tool in Alleviating Environmental Hazards in Settled Areas of Transhumant Families in Gezira Scheme Sudan

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ABSTRACT

A study was conducted to evaluate the family poultry status with reference to all management practices, marketing and the socio-economic on some villages of transhumant people who settled in Gezira Scheme in cut-out areas. Results revealed that women constitute the highest chickens' care takers (70%), all the flocks are from local breeds. The average flock size (including chicks) was 40. The housing and feeding system is scavenging; small backyard house (25%) is used. Chickens were offered waste household and some grains. Proper feeders and drinkers rarely used and were not usually cleaned. No proper safe place for egg laying and hatching. Hatchability was around 71-80% and the best hatchability was during winter (70% of chicks were hatched during winter). The sitting hens very rarely offered feed and water. Newly hatched chicks were not confined in a proper house neither provided with and water (70%), but left scavenging with their mothers. Chicks' mortality was 50% in early ages which is mainly due to predators and diseases (35 and 15% for predators and diseases, respectively). Vaccination against Newcastle Disease (ND) and other infectious diseases was not undertaken. Seventy percent of farmers are willing to have their flocks vaccinated. The villages were not visited by extension officer, 77.5% of farmers agree to have extension programmes. In spite of this poor management and production, these farmers feel happy, because they gain some money that help in covering some expenses of important life's needs.

Key words: Transhumant, chickens, flock size, mortality, vaccination

INTRODUCTION

Settled transhumant people are seasonal labours who originate from Western Sudan or from West and Central Sahelian African. They were settled near villages or in cut-out agricultural land, their population was found to be 13.5% of the total people of the Gezira irrigated area, out of them 41% were at working age (Barnett and Abdelkarim, 1991) and Hausa tribe resembles the majority.

Family poultry production has been a traditional component of small farms throughout the developing world. In Africa it is estimated that 80% of the poultry population is found in these production systems and contribute up to 90% of the chickens reared and they supply the bulk of the national requirements of eggs and meat for the urban populations. Attempts are being made to raise the productivity of family chickens in developing countries, by improving housing, nutrition and health programmes. Also research had been adopted in Sudan to increase egg production potentialities of local breeds (Eltayeb *et al.*, 2010).

The major constraints of household poultry keeping and traditional open house producers are inadequate health care since, their major problem is the high incidence of Newcastle disease, poor productivity and inappropriate housing. The small open house producers cease production during summer as a result of high temperature which negatively affects productivity. The hot weather of

Sudan can have a severe impact on poultry performance. Production efficiency can be affected long before the temperature reaches a level at which survival becomes a concern. Heat stress begins when the ambient temperature climbs above 80°F and is readily apparent above 85°F. Temperature in combination with humidity and wind play an important role in the design of buildings and poultry houses. They also affect the chickens' general performance.

A common phenomenon in the Sudanese poultry market is the fluctuations in supply of chicken. During the hot season there is a substantial drawback in supply. This is mainly due to the unfavourable circumstances for broilers in an open housing system which causes bad growth results and high mortality. Like many countries in Africa and Asia local fowl or village chickens supports Sudanese families in rural areas with eggs and poultry meat, where commercial poultry products are not attainable. However, village fowl or family poultry constitute an important component of the agricultural and household economy in the developing world. Its contribution goes beyond direct food production as well as employment and income generation for small farmers, especially women (Gueye, 2002b). They also serve as a mean of capital accumulation and as a barter product in societies where there is no circulation of currency. These birds which make up to 80% of poultry stocks in many developing countries (Gueye, 1998, 2002a; Goodger *et al.*, 2002; Pym *et al.*, 2006), are also of value in the religious and socio-cultural lives of local communities. They need very little care and the cost of feeding them is little, because they rely on themselves and scavenge for food and, above all, they tolerate harsh climate and poor health conditions that prevail in the areas of breeding. In spite of this low-input by rural farmers on their production, free-range birds play many socio-economic roles.

Ownership of rural poultry in western areas of Kenya is shared among the family members but is predominantly by women 63% and children 18% (Okitoi *et al.*, 2007). Village chicken production systems have not been included in the mainstream agricultural and economic activities of most African countries (Kitalyi, 1998). Family poultry meaning traditional, low-input husbandry of domestic chickens, turkeys, ducks and geese, plus guinea fowl, pigeons, pheasants and quail, is vital to food security in much of the developing world. According to recent estimates, backyard and free-range poultry accounts for as much as 70% of total egg and bird meat production in low-income, food-deficit countries. Rural people are generally characterized by being poor. As reported by Eneh (2011a) poverty is a challenge to development. Its presence anywhere is a threat to development. It manifests in household lack and denial, unemployment, illiteracy, water and sanitation crises, inadequate medical services, poor child welfare and health and gender issues.

In environmentally fragile and economically marginal rural areas, family poultry is an ideal component of mixed farming systems-domestic birds are small, reproduce easily, require no large investments and thrive on kitchen waste, broken grains, worms, insects and vegetation (FAO/WFS, 2002). FAO points out that the productivity of most family poultry is very low compared to that of high input systems. A scavenging hen, for example, lays only 30 to 50 eggs a year or up to 90 eggs a year with improved feeding and husbandry while a commercial hen will produce 280 eggs under "optimal conditions". An experiment targeting rural poultry production in four settled camps in South Gezira District was carried out with the overall objective of studying the appropriate managerial aspects undertaken and to solve the problem that are facing them.

MATERIALS AND METHODS

Study site: This research work was conducted in four villages (campus) of settled casual (seasonal) labours in cut-out areas of Gezira Scheme, Sudan. The target groups were the local or indigenous or hybrids fowl owners, the farmers' numbers were 80 (20 farmer/village).

Data collection

Questionnaire survey: Information related to chicken management practices were recorded by interviewing the farmers or stakeholders in their homes, using a structured questionnaire. The information included more than 44 parameters. The questions considered the sex of stakeholder and the flock size (hens, cocks, pullets and chicks). The managerial aspects include housing system, feeders and drinkers and their cleaning. The feeding system of chickens was considered, care and feeding of hens sitting on hatching eggs. Selection of hatching eggs, the best season of hatching, the number of days the hen sits on eggs and chicks brooding. The birds' health was considered (mortality, vaccination, medication against diseases and their willingness to vaccinate). Also some socioeconomic aspects were covered (purpose of chicken keeping, the most preferred product for consumption, sale and the marketing availability etc.).

Remarks: Farmers are given opportunities to tell their problems and suggest solutions.

Data analysis: The data obtained were managed, collated and analysed using SPSS version-15 statistical software (SPSS Inc. Chicago). A descriptive analysis was used to describe the sampled population in the study. The differences between the proportions were tested using the chi-square (χ^2) analysis at the significance level of $\alpha = 0.05$. Also cross tabulation was done.

RESULTS AND DISCUSSION

Characteristic of the family poultry: Family poultry production in all villages is practiced by free-range management system (Table 1), being the case in all African and Asian countries as reported by Kitalyi (1998). This study results gave consideration to the effect of stakeholders in the four villages (Table 1). The effects of farmers' gender on the different managerial aspects of poultry are shown in Table 2, females constituted 70% of the total poultry owners. All farmers are illiterate (Table 1), as reported by Eneh (2011b) there is upward trend of poverty in the rural areas, where both the majority of the poor and the poorest of the poor reside. Literacy rate is discouragingly low and health, income size and nutritional status are far from being encouraging. The vulnerable groups, especially women and children, continue to suffer extreme deprivations which severely limit their chances of growth and fulfilment as well as optimal contribution to national development.

The major poultry management activities identified in the four villages namely, shelter construction, house cleaning, supplementary feeding, watering, sale of chickens and disease control. These activities as indicated through level of labour division among rural households in these areas underlining the major roles women played in rural poultry production. These results coincide with Sani and Danwanka (2011) who recommended that small-scale agric-business women entrepreneurs should be involved in development planning and policies at both the design and implementation stages. These results as well confirm that of Eneh and Nkamnebe (2011) who stated that the role women and children play in development should be considered to operationalise equal opportunities for the enhancement of sustainable human development.

Flock size: Wide variations were noted in the flocks' sizes with a range of 3-65. This is a common observation in many rural areas of Africa (Kitalyi, 1998). The flock size variation in rural areas has been attributed to the farming systems practiced and local factors such as diseases and predators (Kuit *et al.*, 1986). The mean household flock size in these villages differ significantly ($p < 0.05$) and was higher in village (D), where 80% of stakeholders were women. However, in this village most

Table 1: Effect of stakeholders' village on different managerial aspects of poultry keeping in settled areas of transhumant families in Gezira scheme Sudan (%)

Parameters	Village				Total%	p-value
	A	B	C	D		
Farmers gender						
Females	17.5	15.0	17.5	20.0	70.0	*
Males	7.5	10.0	7.5	5.0	30.0	
Farmers literacy						
Literate	0.0	0.0	0.0	0.0	0.0	a
Illiterate	25.0	25.0	25.0	25.0	100.0	
Total flock size						
Less than 30	2.5	5.0	0.0	5.0	12.5	
31-50	15.0	12.5	12.5	7.5	47.5	
51-70	7.5	7.5	12.5	12.5	40.0	
System of housing						
No housing	0.0	0.0	0.0	5.0	5.0	*
In yard small pen	20.0	15.0	22.5	12.5	70.0	
Backyard large pen	5.0	10.0	2.5	7.5	25.0	
System of feeding						
No proper feeding	0.0	0.0	0.0	0.0	0.0	*
Household withdrawal and grains	25.0	25.0	25.0	25.0	100.0	
Commercial poultry ration	0.0	0.0	0.00	0.0	0.0	
The most preferred product						
Eggs	5.0	10.0	5.0	2.5	22.5	*
Cockerels	5.0	50.0	5.0	5.0	20.0	
Pullets	12.5	10.0	12.5	17.5	52.5	
Purpose of poultry keeping						
Family consumption	12.5	5.0	15.0	17.5	50.0	*
Income	7.5	10.0	0.0	0.0	17.5	
Both of them	5.0	10.0	10.0	7.5	32.5	
Marketing preference						
Eggs only	5.0	0.0	0.0	0.0	5.0	*
Meat only	7.5	0.0	0.0	0.0	7.5	
Both eggs and meat	12.5	25.0	25.0	25.0	87.5	
Willingness to vaccinate against Newcastle disease						
Yes	20.0	20.0	25.0	25.0	90.0	*
No	5.0	5.0	0.0	0.0	10.0	

a: No statistics are computed because illiteracy level is a constant (0%)

of the managing practices were done more properly. The average flock size in these villages was 37 chickens/stakeholder, including the newly hatched chicks (Table 1). These records were well above the national mean estimate of 10 birds/rural household in other rural areas of Sudan (Khalafalla *et al.*, 2002). In any poultry set up, the proportion of hens in the flocks is an indication of egg and chick production (Wilson *et al.*, 1987; Abdou and Bell, 1992; Mwalusanya, 1999). However, the higher flock size is owned by females who reported the higher percentage of stakeholder compared to men (70% versus 30). In general the flock size is small because of the broodiness of the hens undergoing after each laying period this result is supported by Eltayeb *et al.* (2010) who reported that native Sudanese fowl is characterized by broodiness which affect some production traits and the plasma prolactin hormone levels during production,

Table 2: Effect of farmers' gender on different managerial aspects of poultry keeping in settled areas of transhumant families in Gezira scheme Sudan

Parameters	Farmers' sex		Total	p-value
	Females	Males		
Total flock size				
Less than 30	7.5	5.0	12.5	**
31-50	35.0	12.5	47.5	
51-70	27.5	12.5	40.0	
System of housing				
No housing	5.0	0.0	5.0	**
Small inside yard pen	45.0	25.0	65.0	
Large back yard poultry house	25.0	5.0	30.0	
System of feeding				
No proper feeding	0.0	0.0	0.0	**
Household withdrawal and grains	70.0	30.0	100.0	
Commercial poultry ration	0.0	0.0	0.0	
Regular cleaning of feeders and drinkers				
Yes	50.0	20.0	70.0	**
No	20.0	10.0	30.0	
Materials used as laying nest				
Dry grasses	2.5	0.0	2.5	**
Sand	67.5	30.0	97.5	
Mortality rate (%)				
Less than 25	15.0	5.0	20.0	*
26-50	25.0	5.0	30.0	
51-75	20.0	10.0	30.0	
More than 75	10.0	10.0	20.0	
Causes of chickens mortality				
Predators	60.0	25.0	85.0	**
Diseases	10.0	5.0	15.0	
Lack of feed	0.0	0.0	0.0	
Vaccination against Newcastle disease				
Yes	0.0	0.0	0.0	a
No	70.0	30.0	100.0	
Willingness to vaccinate against disease				
Yes	62.5	7.5	70.0	**
No	25.0	5.0	30.0	
Farmers asking for extension visits				
Yes	47.5	30.0		***
No	22.5	0.0		
Feeding of newly hatched chicks				
Scavenging with mothers	57.5	12.5	70.0	**
Kept closed and offered feed and water	20.0	10.0	30.0	
Chicks protection against rains and hot environment				
Yes	62.5	30.0	92.5	**
No	7.5	0.0	7.5	

a: No statistics are computed because vaccination level is a constant (0%)

incubation and rearing periods. They concluded that broodiness can be alleviated by managerial practice to improve egg production potential of the local flock.

Poultry performance

Housing: House construction and treatment of birds were predominantly done by men while women and to a lesser extent children were involved in the major management activities. In these areas proper poultry housing provided to chicken was by 25% of all farmers on the backyard of the house. Some birds had to perch on trees at night (5%) and the majority (70%) was confined in a small house constructed inside the farmer’s home yard (Table 1, 2). Female constitute the highest percentage of farmers having small houses constructed in home and more than 7% of females have no access to poultry house. However, all men constructed poultry houses (5/6) of men have small houses constructed in home 1/6 have large houses constructed in the backyard of their home. It is possible that this lack of proper housing contributed to the relatively higher chick mortality of 50%.

Feeding: Lack of feed supplementation is one of the characteristics of a free-range system, in this study all farmers reported that they don’t offer balanced or standard diets, instead they provide feed supplements of grains and food residues (Table 1, 2). No proper feeders and drinkers were used or either cleaned. Rural people lack knowledge on how to store cereal grains leading to health hazard from being infected by mycotoxins that is dangerous to animal and consumers. Also the productivity and nutritive values of infected grains and cereals drop after contamination by mould. Animals may have varying susceptibilities to mycotoxins depending on physiological, genetic and environmental factors (Iheshiulor *et al.*, 2011).

Health: However, it was found that chick mortality in all villages was in averages of 50% and the main cause of chick mortality is mostly predators and diseases (85 and 15% for predators and disease, respectively), these results agree with Dipeolu *et al.* (1998). In all the villages Newcastle Disease (ND) is the most prevalent poultry disease and it causes high mortality during hot season that may account to more than 90% of the total flock. Vaccination against ND and other diseases like Infectious Bursal Disease (IBD) or Gumboro and Marek Disease (MD) was not undertaken although most of farmers (90%) are willing to have programmes of vaccination (Table 1). This is also true in other African countries (Bell *et al.*, 1990).

Socioeconomic status: In this study most of the interviewed farmers were females; with regard to flock ownership, 70% of the flocks were looked after by females (Table 3). Females stay at home doing all house works besides poultry keeping and they were responsible of undertaking other decision of selling products, these findings are on accord with Bogalle (2010). Unfortunately, all women were illiterate; no extension officers are visiting them, although 85% of the farmers like to be visited by extension officers (Table 3). They lack the knowledge of poultry keeping and even though their children don’t go to school. The girls stay at home to help mothers and boys go to field with their fathers for agricultural activities (cropping, weeding, harvest etc). The most preferred

Table 3: Livestock and fishery statistics

Livestock production and fishery	Estimate	Unit	Reference period	Source
Cattle	38 183 000	No. of heads	2002	FAO
Sheep and Goats	89 621 000	No. of heads	2002	FAO
Poultry Birds	37 000	Thousands	2002	FAO
Fish catch and aquaculture	59 600	Tons	2002	FAO

FAO/WFS (2002) Estimate World Food summit

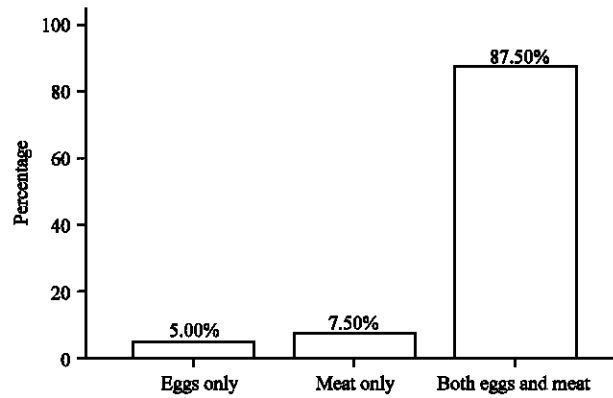


Fig. 1: Products of marketing preference

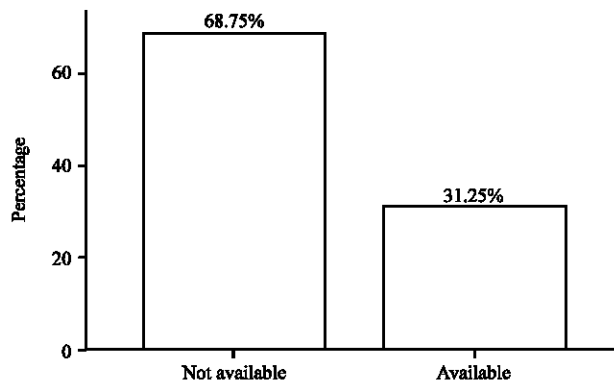


Fig. 2: Marketing availability in the settled areas of transhumant families

products were pullets, cockerels and egg production (Fig. 1) and they account for (52.5, 20 and 27.5%, for pullets, cockerels and egg, respectively). Although the ownership of chicken was small, it is of value in the religious and socio-cultural lives of local communities as in other African and Asian countries (Gueye, 1998, 2002b; Goodger *et al.*, 2002; Pym *et al.*, 2006).

Marketing: Marketing is available (70.0%) in nearby urban areas (Fig. 2), but products were cheap and during rainy days marketing is not attainable. The farmers prefer to use the old hens and cocks as meat source (Fig. 3) and this is because they consider them as culls and can't be sold and that they are a good source for meat soup. They also slaughter old hens and cocks if they were visited by relatives or other guest from far distance (a good welcoming attitude). Concerning the solution to be undertaken all farmers suggested to have a cooperative that may help them in improving their managerial aspect and help in purchasing important inputs and in marketing their products. However, 50% suggested having a cooperative society for production only and 50% suggested having a cooperative society for production, consumption and marketing (Fig. 4).

The contribution of poultry and their products to the household cash income are generally difficult to assess. Nevertheless, the sub-sector is considered as a viable and promising alternative source of income for rural households in developing countries (Oh, 1990). This small income contribution can help in solving problems of learning to their children, medication and to improve their social status (furniture, clothes, kitchen equipments etc.).

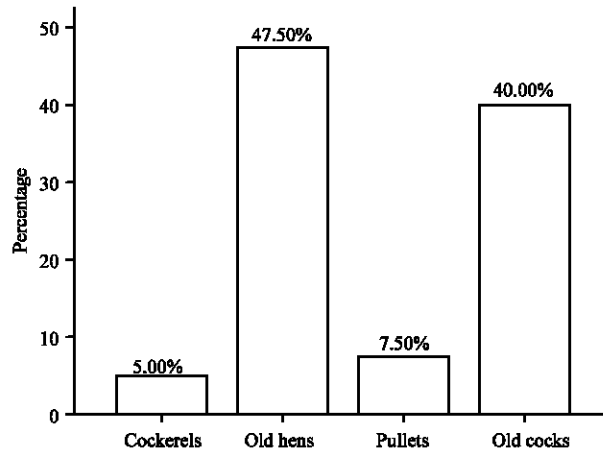


Fig. 3: Types of meat preferred by farmers

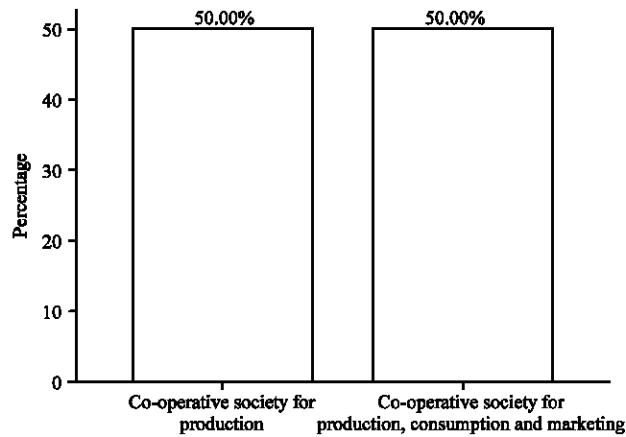


Fig. 4: Suggested criteria for group services

Egg production in these areas was low; but it was better than that recorded in other studies in Sudan. The mean egg production per hen per year was 55 egg year⁻¹ (4.6 month⁻¹), in Gedarif State (Eastern Sudan) was only 3.1 egg/hen/month (Sulieman, 1996).

CONCLUSIONS

- These farmers are the mainstream of the indigenous fowl
- Poultry production subsidizes them with animal protein (meat and egg)
- Help in empowering women in production and to use money properly
- Farmers by selling poultry product gain money that help in purchasing life needs

RECOMMENDATIONS

Multifaceted approaches are required for successful development and the adoption of improvement technologies for village chicken production systems. Development assistance to rural poultry accompanied by strong institutional support through research work is required. The improvements should consider the following:

Housing: Housing is one of the most important factors that help in facing environmental hazards. It should be planned carefully to build a house that must be strong enough to protect the poultry from the weather hazards (rains, floods, winds and sun rays), predators and thieves. It can be made of local materials and must allow in plenty of light and air movement. The roof should have good overhang. It should be built in a shady, dry, flat and raised ground to keep the floor dry. It should be close to the farmer's house to prevent stealing. The size will depend on the size of the flock. It should be tall enough to enter in comfortably. It should have space for nest boxes. Nest boxes should be off the floor with dried grass leaves as nesting material and in a safe place. The floor should be easy to clean and manure can be collected and used as natural fertilizer to other crops and this will help in avoiding its conversion to other materials of unpleasant smell (air emission). The houses should be equipped with feeders and drinkers for holding clean and fresh water.

Feeding: Feed is the major constraint (drawback) to raising village chickens. The scavenging area is limited and usually over-scavenged so it is not expected to get normal chickens growth and many eggs. Feeding newly hatched chicks helps them to achieve a good start in life. Each chick is to be offered only 50-100 grams in the first 10-15 days and it will get a good start to life and grow fast. Feeding chickens will help in getting more eggs and meat. Laying hens need to be supplemented with calcium and phosphorous to lay more eggs with sound shells. An old egg shells and chicken bones (boiled and crushed before use) will help in fulfilling some of the calcium requirement. Kitchen scraps, fish and fish waste (cooked) may also help. Some nonconventional feed ingredient can be offered like onion and garlic.

Health: Healthy birds grow normally and produce more eggs. When birds are confined this will help to check the flock at night and in the morning and remove and bury dead birds immediately. Sick birds should be isolated and given feed and water and if they don't improve, they should be killed and buried. Feeders, drinkers and the poultry house should be cleaned.

During a disease outbreak in the village it may be necessary to call in an expert for advice. It is advised to vaccinate the flock or give them medication. There are government organisations that can be called on for advice (Veterinarian officers in near district). ND is endemic in many countries and becomes active particularly at the start of the wet season. It can wipe out entire village flocks although a few individual birds often do survive. Now there are ND vaccines that will withstand the heat for a short period (thermo-stable). Vaccination is mostly effective by eye drop and birds should be vaccinated a month before the expected outbreaks by a trained person. There is also a need to treat the birds at intervals throughout their life. This is a specialised area and the poultry keeper will need help from experts. Sick birds must be quarantined or destroyed. Avian influenza (H5N1 strain) which is highly pathogenic and is particularly dangerous because it can infect different poultry species and wild birds and it can also kill humans. Village poultry are especially at risk because they are outside and may be in contact with wild birds and other poultry species (ducks, geese). The virus can spread by eating infected birds and can infect and kill the consumer. Household poultry keepers should keep themselves informed about the situation in relation to bird flu as it often appears at particular times in the year.

Extension: These farmers lack knowledge and information about good poultry farming, so they need an extension packages dealing with all improved managerial practices. These extension

packages can help them to get better results in terms of high poultry products. As emphasized by Ogungbile *et al.* (1991) the various rural development programmes are to create cottage industries in the rural areas aiming to generate employment for rural production and income and consequently reducing poverty incidence on rural households.

Socioeconomic status: These farmers are illiterate, there are no schools in their campus, although in nearby villages there are enough schools and there is no restriction to study. The main problem is that they need the manpower, besides getting rid of other expenses of travelling to school and purchase of other school needs. Socioeconomic status can be improved by illiteracy eradication by the Ministry of General Education of Gezira State. Also as reported by Aiyedun *et al.* (2008) enhanced income from enterprises go a long way in empowering an entrepreneur to play both economic and social roles which may have a far-reaching multiplier effect in the areas of decision-making, raising funds and self-respect. Balisacan (1996) revealed that apart from the factors of production, some socio-economic factors determine the women enterprises. The role of technological change in entrepreneurial development has been established to be positive with regards to level and distribution of women welfare within the households. To solve problem of finance, co-operative societies of production and marketing can be established as stated by farmers. The farmers through indemnity of co-operative societies can get loans from the family bank. As reported by Nkamnebe (2009) that women are proven to be more useful to their families, better team players and more faithful in repayment when granted microcredit than men.

Marketing: As suggested by the farmer cooperative societies can be initiated to help in overcoming the problems of production and marketing of product. After selling the products they can purchase other important inputs, help in contact with other authorities such as veterinary centres for chicken vaccination and extension packages. Concurring with this finding, Lopez-Claros (2008) opined that, the economy is not only a function of adequate levels of available finance, a reasonably open trade regime for goods and services, but more and more, is also dependent on our ability to tap into a society's reservoir of talents and skills. According to Sani and Sani (2005), a well defined market outlet contributes to easy access of consumers for basic food needs and easy disposal of finished produce by the producers. It was further revealed that women's contribution to economic life and share in the labour force continues to rise as they are becoming more involved in small-scale enterprise such as the soap enterprises. Their income is also becoming increasingly necessary to all aspects of family sustenance.

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