

## Urban vegetable production as a survival strategy in Tanzania: A case of Morogoro municipal

*Solomon Mhango, Ponsian Sewando, and Rehema Magesa*

Assistant lecturers, Gender & Development and Project Planning & Management Departments, Community Development Training Institute (CDTI) – Tengeru, P.O. Box 1006, Arusha, Tanzania

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**ABSTRACT:** Horticultural products including vegetables play potential role in generating employment and are frequently produced on small plots thus are important source of additional income for poor farmers in developing countries. Objectives of this study were to assess the contribution of urban vegetable production for livelihoods of the households, to assess the strategies used in urban vegetable production and identify factors that hinder urban vegetable production. A sample of 35 respondents was simple randomly selected from 9 wards of Morogoro Municipality. The study used an explanatory cross-sectional design in which data were collected at a single point in time. Semi-structured interviews were conducted whereby questionnaires with both closed and open ended questions were used to gather information. Observation was another method used for data collection. Collected data were analyzed by using SPSS computer analytical program. Research findings show that vegetable production in Morogoro urban contributes to generate income as well as for food security of the households. Also strategies used in producing vegetables include; intensification in vegetable production which is backed up by the use of means of improving soil fertility and pests and diseases control. It is concluded that, since majority of farmers rely on vegetable production then increased production in study area will contribute to improved people's livelihoods in terms of increased income, vegetable consumption and nutrition which will eventually contribute to improved health status. Therefore, there should be a review of present research-extension-farmers link to be more effective with a great attention that it provides knowledge, information and skills on vegetable products chain management to farmers.

**KEYWORDS:** Urban agriculture, urban vegetable production, income generation, livelihood.

### 1 BACKGROUND INFORMATION

Agriculture is the raising of crops, plants and animals. Horticulture is one of its branches concerned with growing vegetables for people's food, medicine and aesthetics. Horticulture is concerned with those plants whose cultivation bring rewards, whether monetary or personal pleasure, sufficient to warrant the expenditure of intensive effort such as large input of capital, labour and technology per unit area of land (Janick, 1979). Horticultural production in Tanzania is a timely and important topic for study given the increasing commercialization of vegetables in the domestic economy and the potential of vegetable production for export. In most Third world countries there are large numbers of poor urban citizens whose needs should not be ignored even if there are more rural poor (Hardoy, 1989).

Urban agriculture (UA) is the practice of food production within the urban and peri-urban areas. It includes the cultivation of crops, fruits and vegetables, trees, gardens, orchards, animal husbandry, fuel wood plantation, aquaculture, and related activities (yeung, 1987 cited in Mlozi, 1995). In this study UA means vegetable production. Vegetable crops, as compared to other crop commodities, are generally early maturing, have high nutritive value and are suitable in various cropping systems, such as backyard gardening, subsistence farming, cash crop production and processed vegetable food production. It is worth noting that income from vegetable crops is generally higher than most field crops (Mc Lean, 1988).

UA is practiced in most Third World societies not as a hobby but as a necessity both for subsistence food production and to earn extra income (Mlozi, 1995). In Third World societies, UA is mainly practiced by citizens of lower socio-economic status

(SES) to assist them with food production and to subsidize their income. UA is the occupation of people of the lower SES because of difficult economic conditions in their cities (Nyange, 1993). Urban and peri-urban agriculture has been gaining popularity in Tanzania in the past years. Low-income families are undertaking most of horticultural production where high income has biased towards raising dairy cattle (Nyange and Mdoe, 1995). Today, however studies suggest that, the activity is no longer the exclusive preserve of people of lower SES and wider ranges of people are engaged in urban agriculture for a variety of social, economic and cultural reasons (Mlozi, Mvena and Lupanga, 1991).

UA is a diverse, omnipresent, thriving, and profitable activity in cities all over the world, both for low-income and high income people (Smit and Ratta, 1992). These activities however vary enormously, both within and between countries, as well as throughout urban social economic status. Another benefit of urban agriculture not widely recorded is the “fungible” income. Fungibility is the ability to provide for extra income that can be spent on essentials like health care and education. This is important where over 50% of the family expenditure is for food (Mlozi et al., 1992).

A major advantage of UA is its potential to improve the socio-economic conditions of unemployed youth and low-income people. UA in developing countries in relation to rural agriculture has the following characteristics: high productivity per unit space, low capital per unit production, low energy consumption, low marketing cost, and freshness of the products (Smit, 1980). In Tanzania, the contribution of small-scale horticultural production both at household and at the national economies is unknown. Small-scale garden can be managed without agriculture subsidies, and they use less external inputs than field agriculture (Vuollet, 2000). Garden equipment can be quite simple and inexpensive. The input costs are low, the economic assistance needed is almost none, and the work is done by the household members on part-time basis (Vuollet, 2000).

Household gardens do not, traditionally compete with large agricultural activities. In fact they exist in a complementary fashion, especially since they often are limited to the production of indigenous vegetables and fruits (Opena, 1990). Horticultural products play good potential for generating employment and are frequently produced on small plots thus are important source of additional income for poor farmers in developing countries.

In recent years, there has been a great deal of interest among both policy makers and economic analysts in the role of horticultural products as a principle means of agricultural diversification and income generation in developing countries (Islam, 1990). The growth prospects for income generating activities from horticultural products are therefore favorable for developing countries. Support for household gardens as one part of a developing strategy for private and governmental organizations has fluctuated over the years (Opena, 1990). Conditions for rising production are likely to be favorable in developing countries. This is partly because horticultural products in general are labour-intensive. Developing countries with abundant labour in relation to capital or land enjoy a comparative advantage in labour-intensive horticultural products, against, for example, cereal products which require more land in relation to labour and other inputs for efficient production (Islam, 1990). The growth prospects for income generation activities from horticultural products are therefore favorable for developing countries.

This study intends to investigate the extent to which vegetable production promotes income amongst small-scale growers. Small-scale gardeners may be dealing with other activities, for example, raising livestock and other crops.

### **1.1 PROBLEM STATEMENT AND JUSTIFICATION**

In Tanzania agriculture is the mainstay of the economy and it account for over 60% of the country’s foreign exchange earnings and supports about 80% of the population (Bukuku,1993 as cited in Nyange, 1993). In spite of the large contribution of agricultural sector to the economy, the horticultural industry has remained dominant for many years and its contribution to the foreign exchange is given little attention. (Silk, 1986) says that, in the past UA was a neglected area of study, and presently, it is capturing the attention of a growing number of researchers and international bodies concerned with sustainable human development.

Horticulture involves not only the facets of production, but also the added increments of processing, service and maintenance (Janick, 1979). The prevalence of UA in cities such as Dar-es-salaam, Dodoma and Arusha clearly challenges concepts and common perceptions among mainstream urban economists and planners, which persistently assist that UA is not part of the form and function of the city. Therefore, it is not surprising that city authorities usually perceive UA to be an outmoded transitory activity appropriate only in rural areas. This perception does not concord with the need to feed the ever-increasing urban population (Sawio, 1993:1). There are so many horticultural crops, each of which has different pay back period. If they are grown during a year, the yield may differ greatly from time to time. Therefore this study will focus specifically on vegetable production.

The importance of horticulture is reflected in the national agriculture policy of 1982, which states that, there is a great potential for producing fruits, vegetables and flowers, both tropical and temperate varieties to satisfy domestic needs and for the export markets. With the changing economic conditions in Tanzania during the 1980's and the shift from home gardens and specialized growers, vegetables are coming to play a new role in the economic development strategies that are planned and implemented (Feldman *et al.*, 1990). Since people living in urban areas usually have neither space nor the time to devote to gardening, or demand for commercial horticulture. The landless, for example, may have no fields, but they often have at least a small plot or piece of homestead land which could support a kitchen garden and some small stock, used either for income generation (Gill, 1991).

In recent years, horticulture sector in Tanzania has been given more attention and a much higher priority in the allocation of resources (Nyange, 1993). Fruits and vegetables are one of the main sources of nutrients (Vitamins) for the human body. The most important of these vitamins are A and C. Vitamin A deficiency affects roughly 15% of children aged between one and four years in 16 African countries, including Tanzania (McLean, 1988). According to McLean, prevalence of vitamin deficiency is highest in low-income groups. The most serious illness related to vitamin deficiency is measles, which is the precipitating factor in roughly 0% of the cases of vitamin A blindness. It is further estimated that xerophthalmia leads to between 2,000 and 4,000 new cases of childhood blindness every year.

**Table1: Average per capita food intake in Tanzania**

<b>Food category</b>	<b>Components</b>	<b>Consumption (gms/day)</b>
Starches	Cassava, banana, other starches	479
Cereals	Rice, maize, wheat, millet, sorghum	417
Vegetables	Various vegetables	104
Animal products	Meats, eggs, milk, fish	96
Fruits	Various fruits	61
Fats and oil	Vegetable and animal origin	8

Source: United Republic of Tanzania, 1980

The observed standard levels of vitamins can be attributed to low consumption of fruits and vegetables. For example, per capital daily vegetable consumption in developed countries is 221g (McLean, 1988) compared to 104g in Tanzania (URT, 1980). Table 1 above indicates that vegetables and fruits are among the least consumed categories of food in Tanzania.

## **1.2 HYPOTHESIS**

### **1.2.1 NULL HYPOTHESIS**

Vegetable production has been carried out not purposely for generating household income.

### **1.2.2 ALTERNATIVE HYPOTHESIS**

Vegetable production has been carried out purposely as an activity for generating household income.

## **1.3 RESEARCH OBJECTIVES**

### **1.3.1 GENERAL OBJECTIVE**

To assess the contribution of the urban vegetable production to the household's livelihood.

### **1.3.2 SPECIFIC OBJECTIVES**

- To assess the contribution of urban vegetable production for livelihoods of the households.
- To assess the strategies used in urban vegetable production
- To identify factors that hinder urban vegetable production

## **2 LITERATURE REVIEW**

### **2.1 STRUCTURES AFFECTING AGRICULTURE IN THE TROPICS**

#### **2.1.1 POPULATION PRESSURE**

Despite some uncertainty as to the precise rate of growth, it is common knowledge that the population of most tropical countries has grown rapidly during this century and must be expected to continue to do so at least for some years ahead. The emergence of urban farming in most cities of developing countries has been mainly due to the desire of alleviating poverty and satisfying the nutrition needs of the urban population. The Food Agriculture Organization (FAO) estimated that in 1969 that the population of developing countries as a whole was growing at a rate of 2.5 to 3.5 percent per annum, which indicated that it would be more than doubled by the end of the century (FAO, 1969). To feed this expanding population vastly more food will be needed and much of this will have to come by way of larger yields from land already in cultivation. Unfortunately, however, population pressure has already caused a decline in the productivity of much land farmed by indigenous methods. In Africa, traditional shifting cultivation was formerly capable of providing indefinitely for the subsistence of a sparse population, but in many places increased population pressure has rendered restorative fallow impracticable, or too short to be effective, with the result that soil fertility and crop yields have greatly declined and the land is no longer capable of adequately supporting the people.

#### **2.1.2 FARM EQUIPMENT AND OTHER INPUTS**

The widespread demonstration of substantial and economic responses to fertilizers until recently, led to some increase in their use by small farmers, although it was still on a very limited scale. Pesticides have also only been used to a relatively small extent. It is difficult to see how good yields can be obtained in permanent farming systems on the majority of tropical soils without the regular and general use of fertilizers and unless much more resistant crop varieties are bred, insecticides and fungicides will also be needed to avoid loss from pests and diseases. The recent large increases in the cost of these materials therefore poses a serious problem as it makes it doubtful whether small farmers will be able to afford to buy enough of them unless food prices are set or subsidies provided, at levels unlikely to be accepted to governments (Vuollet, 2000).

#### **2.1.3 VEGETABLE FARMING**

Vegetable production in Tanzania has had growing importance as a complement to diets and consumption practices as well as for sale in the domestic and export market (Feldman *et al.*, 1990). It is the one of the most important sources of farm income and their cultivation as such occupies an important place in the agricultural development. Urban agriculture is a socio-economic survival strategy for urban poor residents, providing food and employment (Sawio, 1993).

In Tanzania vegetable farming has had a rapid expansion over the last few years since the country started its transition into market economy. This has been accompanied by a marketable changeover in agriculture from traditional and largely subsistence vegetable cultivation towards commercial production for urban sale and export. In spite of a large and expanding market in urban areas to absorb vegetables produced market functions such as assembling, grading, transport and others seem to lag behind production and the expanding demand for vegetables. This problem has been further magnified by the uncertainty of supply and prices of vegetables in the market risks which in turn affect the decision making process of producers and other market participants (McLean, 1988).

#### **2.1.4 PRODUCTION AND MARKETING OF VEGETABLES**

According to Ashimogo (1996), agricultural marketing refers to all the activities associated with agricultural production and with food, feed and fibre assembly, processing, storage and distribution to consumers, including analysis of consumer needs, motivation, and purchasing and consumption behaviour. Agricultural marketing increases the values of horticultural products through the application of the marketing functions i.e exchange, physical and facilitating (Janick, 1972). The Morogoro rural and urban districts are potential for vegetables and fruits production (Mlambiti, 1975). But like other potential vegetables producing areas in Tanzania, currently the vegetables production is mainly subsistence under small scale and is carried out in three spatial environment systems: the peri-urban, open spaces and home gardens (Mlozi, 1998). In Dar es Salaam, UA takes place in small open spaces, in valleys, vacant land; land around residential areas and in the institutions and in the peri-urban areas.

The Mount Uluguru slopes are some major producers and suppliers of vegetables (Mlambiti, 1975). The main vegetables include spinach, amaranths, pumpkins (leaves), cabbage, eggplants, tomatoes and Chinese cabbage. These crops are here referred to as major ones because of their relatively large supply and volume; and frequency of availability at the markets.

### **3 METHODOLOGY**

#### **3.1 STUDY AREA**

This study was conducted in Morogoro Municipal in Morogoro region. The region lies between latitude 5°58' and 10°0' to the south of equator and longitude 35°25' and 35°30' to the east. It occupies a total area of 72,939 square km which is approximately 8.2% of the total area of Tanzania mainland. Morogoro region covers an extensive area which is well endowed with fertile land, numerous water sources, irrigable areas and low population density (Morogoro region Socio-economic profile, 1997). All these factors make it an attractive area for horticultural investment.

#### **3.2 RESEARCH DESIGN**

This research employed a cross-sectional design whereby data were collected at a single point in time from a sample to represent some larger population (Babie, 1994). The design is suitable for data collected through cross-section for description and determination of relationship between variables.

#### **3.3 SAMPLE AND SAMPLING TECHNIQUES**

A sampling unit was a household. A total of 35 respondents were sampled to generate required data by using simple random sampling technique.

#### **3.4 DATA COLLECTION METHODS AND INSTRUMENTATION**

Interview was the main method used to gather relevant information from 35 vegetable growers in Morogoro Municipal. Semi-structured interview was conducted by using questionnaires with both closed and open ended questions. Observation was another method used to collect information like land size used for cultivating vegetables, cultivation methods used, types of fertilizers used to improve soil fertility etc.

#### **3.5 DATA PROCESSING AND ANALYSIS**

The questionnaires were designed in English, but interviews were conducted in Kiswahili for easy data collection due to respondents being conversant in Kiswahili language. The collected data in Kiswahili were then translated in English for coding exercise and analysis.

The translated data in English were then verified, summarized, coded, and analyzed by using Statistical Package for Social Science (SPSS/PC+) version 9.0 for windows, whereby descriptive statistics like frequencies, percentage and coefficient of variability were determined.

### **4 RESULTS AND DISCUSSION**

#### **4.1 FARMERS CHARACTERISTICS**

Table 2 shows that of the 35 interviewees, 5.7%, 60%, 28.6% and 5.7% had age between 21-25, 26-35, 36-45 and above 45 years respectively. Most of respondents were found in the age category of 26-35 years. This is the most active group in farming activities. Of all respondents, 80% were male and 20% were female. This implies that, males contributed more to farm production activities than females. In a generalized assumption, it can be said that female labor may be different from male labor in various activities such as building the houses, cleaning the compound and weeding. In farm labor estimation, quasi-farm tasks were ignored that is fetching water, cooking and other domestic chores. However, these activities have some consequences of decreasing amount of female labor available for farm work yet, they are just important as other tasks in the farm. They facilitate pleasure and comfort for family life and welfare.

Results in terms of marital status show that, 20% were single, 65.7% were marriage, 2.9% were widows and 11.4% were divorced. This implies that married people had more access to vegetable production activities than the rest, but this should

not be a surprise since a couple has a great impact in decision making in regard to vegetable production. However, production activities are not only by married people but other groups have to be encouraged to undertake production.

Also table 2 shows that of all respondents, 2.9% had no formal education, 8.6% attended adult education, 71.4% attained primary education, 11.4% had secondary education, 2.9% had standard eight and 2.9% was a diploma holder. This indicates that most of farmers were educated enough to solve their problems and could prioritize allocation of resources pertaining vegetable production in order to make sure that enough income was generated for the households. Therefore, farmers in Morogoro urban and peri-urban stand a better chance in adopting recommended packages/innovations in relation to vegetable production. It should be noted that education is a key factor in making decisions; it is education which influences individual's perception of an innovation before making adoption decision. However, literate farmers are more accessible to technical information like those related to agricultural inputs application than illiterate farmers.

**Table 2: Farmers characteristics (n=35)**

Variable	Parameter	Frequency	%
Age (years)	21 – 25	2	5.7
	26 – 35	21	60
	36 – 45	10	28.6
	Above 45	2	5.7
Sex	Male	28	80
	Female	7	20
Marital status	Single	7	20
	Married	23	65.7
	Widowed	1	2.9
	Divorced/separated	4	11.4
Education level	None	1	2.9
	Adult	3	8.6
	Primary	25	71.4
	Secondary	4	11.4
	Standard eight	1	2.9
	Diploma	1	2.9

#### 4.2 CONTRIBUTION OF URBAN VEGETABLE PRODUCTION FOR LIVELIHOOD OF HOUSEHOLDS

##### 4.2.1 EARNED INCOME FROM VEGETABLE PRODUCTION PER GROWING SEASON

Results show that 66.7% of the respondents earned income ranging from 36,000.00 - 400,000.00 Tsh, 16.7% of the respondents earned income between 400,001.00 – 800,000.00, 12.5% of the respondents earned income ranging from 800,001.00 – 1,200,000.00 Tsh and 4.2% of the respondents earned income between 1,200,001 – 1,600,000 Tsh. This finding suggests that majority of vegetable growers in Morogoro municipal earn low income per growing season, this might be due to the fact that majority of farmers grow vegetables in relatively small plots (supported in table 13 below).

**Table 3: Earned income per growing season**

Variable	Category	Frequency	%
Income range	36,000-400,000	16	66.7
	400,001-800,000	4	16.7
	800,001-1,200,000	3	12.5
	1,200,001-1,600,000	1	4.2

##### 4.2.2 CONTRIBUTION OF VEGETABLE PRODUCTION FOR FOOD SECURITY

Table 4 below gives findings that show that 42.9% of all respondents spend between Tshs 191,001 – 282,000 per year to buy food, while 28.6% of respondents spend Tshs 100,001 – 191,000 per year for food, 14.3% of the respondents spend Tshs 9,000 – 100,000 per year, also 14.3% of all respondents spend about Tshs 282,001 – 373,000 yearly for buying food. The

results show no great variations among the frequencies. This implies that, there exist various categories of people among vegetable farmers (employed, livestock keepers and food crops producers). To some extent this integration of activities help farmers to use little amount of money accrued from vegetable production for buying food but those who rely on vegetable production only had to draw much in order to buy food.

**Table 4: Amount of money spend to buy food per year**

Variable	Category	Frequency	%
Amount (Tshs) spent for food per year	9,000-100,000	1	14.3
	100,001-191,000	2	28.6
	191,001-282,000	3	42.9
	282,001-373,000	1	14.3

### 4.3 VEGETABLE PRODUCTION STRATEGIES IN URBAN SET UP.

#### 4.3.1 USE OF MEANS TO IMPROVE SOIL FERTILITY

It is observed from the results table 5 below that, most of the respondents (85.7%) accepted to use some means of improving soil fertility, while 14.3% of the respondents did not accept to use any means of improving soil fertility. This indicates that majority of respondents were aware about nutrients recycling whereby exhausted land were fertilized to make sure that productivity per unit land is maintained.

**Table 5: Acceptance of using any means of improving soil fertility**

Variable	Category	Frequency	%
Acceptance	Yes	30	85.7
	No	5	14.3

#### 4.3.2 USE OF PESTS AND DISEASES CONTROL

Research findings (table 6) show that 74.3% of the respondents accepted to use some means pests and diseases control while 25.7% proved to be in a position of not using any means to control pests and diseases. This result concurs with the principles of improved agricultural technologies which support application of agricultural inputs (fertilizers, pesticides) towards increased and improved production. Application of pesticides tends to add to cost of production but at the same time once carelessly applied can end up polluting environment and leading to little revenue as well.

**Table 6: Acceptance of using any means of pests and diseases control**

Variable	Category	Frequency	%
Acceptance of using any means for controlling pests and diseases	Yes	26	74.3
	No	9	25.7

#### 4.3.3 INTENSIFICATION IN VEGETABLE PRODUCTION

Vegetable farming is one of the most important sources of farm income. Table 7 below shows that most of the respondents (77.1%) earned income from vegetable production, 5.7% of all respondents accrued income from paid employment, 5.7% of respondents derived income from both vegetable production and livestock farming, 2.9% of respondents were self employed and another 2.9% of the respondents derived income from vegetable production, livestock farming and self employment. Findings suggest that most of respondents concentrated on vegetable production as a major earning activity. This in turn connotes that, owing to hard life and increased unemployment, most urban dwellers do conduct vegetable production in order to supplement income they get from other sources to sustain their life.

Table 7: Major sources of income

Variable	Category	n	%
Major source of income	Paid employment	2	5.7
	Self employment	1	2.9
	Crop production	27	77.1
	Paid employment, crop production and livestock keeping	2	5.7
	Self employment, crop production and livestock keeping	1	2.9
	Crop production and livestock keeping	2	5.7

#### 4.3.4 ADOPTED MEANS OF ACCESS TO LAND RESOURCE

Results on table 8 below show that 34.3% of the respondents acquired land through renting, 42.9% owned land through inheritance, 5.7% of the respondents acquired land by purchasing, 2.9% acquired land after getting permission from the railway authority and 14.3% of the respondents acquired land by both renting and inheritance. This indicates that majority of respondents acquired land by inheritance from preceded generation and implies if they would rent land then could add to the production costs, so it would be difficult to realize income.

Table 8: Means of access to land

Variable	Category	Frequency	%
Means of acquiring the land	Rented	12	34.3
	Inherited	15	42.9
	Purchased	2	5.7
	Permission from railway authority	1	2.9
	Rented and inherited	5	14.3

#### 4.3.5 USING MONEY TO RENTING LAND FOR VEGETABLE GROWING

Table 9 below shows that, most of the respondents (88.2%) were renting land by 2,000-20,000Tsh per season in order to grow vegetable production, 5.9% of respondents paid 21,000-39,000Tsh seasonally for the use of land and also 5.9% rented land by above 39,000Tsh for growing vegetables. This indicates that majority of vegetable farmers in the study area use small (pieces of) plots to grow vegetables (see table 13 below) and this lead farmers to spend small amount of money for renting land.

Table 9: Money paid seasonally to rent land (n=17)

Variable	Category	Frequency	%
Rent	2,000 – 20,000	15	88.2
	21,000 – 39,000	1	5.9
	Above 39,000	1	5.9

#### 4.3.6 REASONABLE EXPERIENCE IN PRODUCING VEGETABLES

Table 10 below shows that 20% of the respondents had below 5 years of experience in growing vegetables, 80% of the respondents had above 5 years of growing vegetables, This finding shows that, majority of farmers in Morogoro Municipal had a substantial experience in growing vegetables. This implies that, since long time ago people in study area have been practicing vegetable production as a livelihood generating source.

Table 10: Experience in growing vegetables

Variable	Category (years)	Frequency	%
No years used by farmers to grow vegetables	<5	7	20
	>5	28	80

#### 4.3.7 SOURCE OF KNOWLEDGE OF VEGETABLE PRODUCTION

Results from table 11 show that, 51.4% of the respondents acquired knowledge of vegetable production from their neighbors, 42.8% of all respondents used their indigenous knowledge to produce vegetables, 2.9% of all respondents derived knowledge from agricultural extension workers and another 2.9% of all respondents were using knowledge of vegetable production which they were taught from primary school gardening. This finding implies that, extension staffs that to a great extent are responsible in dissemination of agricultural packages had least impact to farmers except that farmers rely knowledge which they copy from how their neighbors do as well as their indigenous knowledge.

*Table 11: Source of knowledge of vegetable production*

Variable	Description of variable	n	%
Source of knowledge of vegetable production	Neighbors	18	51.4
	Indigenous knowledge	15	42.8
	Extension workers	1	2.9
	Primary school gardening	1	2.9

#### 4.3.8 DIVERSITY OF SEASONS USED FOR CULTIVATING VEGETABLES

Research findings (table 12) show that 48.6% of the respondents grow vegetables throughout a year, 28.6% of the respondents grow vegetables once a year, while 14.3% of the respondents grow vegetables twice a year, and 8.6% of the respondents grow only amaranths throughout a year but other types of vegetables are grown once a year. This finding implies that, farmers in Morogoro municipal are able to produce vegetables throughout a year due to the fact that existence of river Kikundi that originates from Uluguru mountains supplies water which is useful in irrigation of vegetables and it was discovered above that farmers apply means to control pests and diseases.

*Table 12: Number of seasons per year used for cultivating vegetables*

Variable	Description of variable	Frequency	%
Number of seasons	Amaranths throughout but others once a year	3	8.6
	Once	10	28.6
	Throughout	17	48.6
	Twice	5	14.3

#### 4.4 CONSTRAINING FACTORS FOR VEGETABLE PRODUCTION

##### 4.4.1 CLIMATIC AND MARKETS RELATED FACTORS

Generally, pests and diseases, market and insufficient water supply are problems that hinder Morogoro urban vegetable production to the extent that producers fail to produce throughout a year. Table below shows that lack of markets whereby 40% of all respondents gave this information that in the area is a great problem for vegetable producers. This may be due to the fact that, now days-large number of people engage themselves in vegetable production and hence influence supply-demand structure. However market is important to farmers as it can assure them to sell their products. Good and stable market stimulates high level of production and therefore high income. Also pests and diseases outbreak (37.1%) had a substantial effect on vegetable production and productivity. This indicates that there was a need to control them since they influence production and quality of produces that eventually lead to low income to farmers.

##### 4.4.2 ECONOMIC RELATED FACTORS

###### a) Land size (acres) used for vegetable production

Vegetable growing is often an alternative to farmers whose acreage is too small to provide an adequate income from field crops. From the results in table below, 25.7% of the respondents had land area ranging from 1.10-4.00 acres, 2.9% of respondents had land area between 4.10-6.0 acres and 2.9% of the respondents had land area ranging from 6.10-8.0 acres. However, the majority (68.5%) of all respondents had land area ranging from 0.05-1.0 acres. This finding indicates that, vegetable growers in Morogoro municipal had small plots being pieces of homestead land available for agricultural

(vegetable) production in order to augment their livelihood. However this implies that, major part of land spaces in Morogoro municipal is being used for other activities like residential housing leaving little pieces of land for agriculture (vegetable) growing.

**Table 13: Constraining factors for vegetable production**

Variable	Category	Frequency	%
<b>Problems that hinder vegetable production</b>	Lack of markets	14	40
	Pests and diseases outbreak	13	37.1
	Insufficient water supply	5	14.3
	Water insufficiency, pests and diseases outbreak	3	8.6
<b>Land size (acres) used to grow vegetables</b>	0.05 – 1.00	24	68.5
	1.10 – 4.00	9	25.7
	4.10 – 6.00	1	2.9
	6.10 – 8.00	1	2.9
<b>Support provision to vegetable growers</b>	Supported	1	2.9
	Not supported	5	97.1

**b) Support provision to urban vegetable growers**

Also table 13 below indicates that 97.1% of all respondents were not supported and 2.9% were receiving support for vegetable production. This implies that, there were almost no supporting systems amongst Morogoro urban vegetable growers. The reason behind may be due to the fact that, majority do conduct production under individual basis and therefore it becomes difficult for donor agencies to provide support/fund basing on individual basis. Opena (1990) says support for household gardens as one part of a development strategy for private and governmental organization has fluctuated over the years. Technological changes in agriculture, such as the use of mechanization, fertilizers, improved seeds, pests and disease control measures require greater capital investment at the farm level, however under these conditions, and support is an essential factor for a poor resource-farmer to achieve high production and productivity.

**4.5 CORRELATION RESULTS**

Pearson’s product moment correlation coefficients (r) between the income and some independent variables are given in table below.

**Table 16: Correlation coefficients with income generated**

Independent variable	Correlation coefficient (r)	Coefficient of determination r <sup>2</sup> (%)	Significant levels (P-value)
Age of respondents	-0.926	86	0.123 ns
Area used for vegetable production	+1.000	100	0.001 **
Money paid to rent land per year	+1.000	100	0.007 **
No years used by farmers to grow vegetables	+0.994	99	0.036*
Amount of money spent to buy food per year	+0.482	23	0.340 ns

Key: \*\* = Highly significant, \* = Significant, ns = none significant. At confidence interval 5% ( P < 0.05)

According to Cohen and Holliday (1982), cited in Bryman and Gramer (1992) correlation coefficients are interpreted as follow: below 0.19 is very low, 0.20 - 0.39 is low, 0.40 - 0.69 is modest, 0.70 – 0.89 is high and 0.90 – 1.00 is very high. In a tentative explanation, it can be observed from the results that vegetable production in urban areas contributes significantly to income generation.

Age of respondents had a negative correlation ( $r = -0.926$ ) with income generated. This is a stronger relationship between these variables, meaning that higher incomes were associated with lower levels of age and the vice versa is true. Its coefficient of determination is 86% that means 86% of variation in income generated may be due to differences in age of respondents.

Area (acres) used for vegetable production showed perfect relationship ( $r = 1.000$ ) with income generated. This means that as area used for producing vegetables increased, the income generated also increased. Its coefficient of determination was 100% meaning that area that was used explained 100% of the variation in income generated.

Amount of money paid for hiring land (rent) indicated perfect relation ( $r = 1.000$ ) with income generated. This implies that the amount of money paid to the owner of land increased as the earned income increased, It can mean that land utilization was under an agreement between the owners and users (vegetable growers), that is coefficient of determination of 100% meant that 100% of the variation in income generated might be due to amount of money paid per season for the use of land.

Time (years), the farmers started growing vegetables showed strong relationship ( $r = 0.994$ ) with the income generated. This finding shows that higher incomes from vegetable production were associated with long time/many years that farmers were producing vegetables. This means 99% of the variation in income was substantially caused by number of years that farmers grew vegetables.

Amount of money spent per year for buying food seemed to have weak relation ( $r = 0.482$ ) with income generated. This finding shows that income generated increased with decreased amount of money spent yearly for buying food. This may be due to the fact that probably farmers had other sources of getting food other than relying on incomes from vegetable production. Thus any increase in income seemed to have little or lower supplement towards buying food. Coefficient of determination was 23%, which means 23% of the variance in income generated, could be attributed to amount of money spent per year for buying food.

#### 4.6 T – TEST RESULTS

t – test was carried out in order to test the hypothesis of the research that vegetable production has been carried out not purposely for generating household income (null hypothesis) and vegetable production has been carried out purposely as an activity for income generation (alternative hypothesis).

A t-test gave significant results between the dependent variable and the following independent variables: area used for vegetable production ( $P = 0.001$ ), it is very likely that significance has been expressed because different farmers possessed different land sizes. Amount of money spent for hiring land ( $P = 0.007$ ), the significance may be due to income generated per unit area that means higher rent was a result of higher income generated. Also number of years used by farmer to grow vegetables had significant impact ( $P = 0.036$ ) on income generated. This implies that farmers with many years in growing vegetables were more liable to get higher income than the other group of producers. The reason behind is the experience built on vegetable production.

Other independent variables showed non significance, these are age of respondents ( $P = 0.123$ ) and the amount of money spent for buying food ( $P = 0.034$ ). The latter implies that probably farmers had other means or sources of getting foods for instance production of food crops instead of relying on income earned from vegetable production.

## 5 CONCLUSION AND RECOMMENDATIONS

### 5.1 CONCLUSION

Study in Morogoro Municipal shows that majority of respondents depend on vegetable production as the only source of their income meaning that profitability of vegetable production is substantially attained. Increased production in study area will contribute to improved people's livelihoods in terms of increased income, vegetable consumption and nutrition which will eventually contribute to improved health status.

The study highlighted a number of significant constraints which limit productive capacity. Among the constraints was a market for vegetables. Lack access to market inhibit farmers to attain higher production and productivity as they are not sure of market, this situation affects vegetable produces due to their perishability nature.

The study has revealed that, most of farmers acquired knowledge of producing vegetables from their neighbours as well as they have indigenous knowledge. These sources of knowledge have been transferred successful from one generation to another with negligible impact of extension services. Even if innovations can be available at affordable costs in Morogoro Municipal, it can not reach majority of farmers at a greatest need of technical assistance and advice.

Despite of the vegetable production in study area contributes to income generation, but limited land holdings - where majority of households (68.5%) own 0.05 – 1.00 acres – inhibit expanding productive capacity. Small size of most farm units plus persistent poverty of a large proportion of vegetable growers limit adoption of technology that could increase labour efficiency and urban income.

Farmers produce vegetables under individual basis, the situation which makes it difficult to overcome barriers in vegetable product chain management.

## **5.2 RECOMMENDATIONS**

This research suggests that, there should be a review of present research-extension-farmers link to be more effective with a great attention that it provides knowledge, information and skills on vegetable products chain management to farmers. This will help respective farmers to know the importance of improving vegetable management practices for higher productivity and subsequently more profitability.

There is a need for growers to form or to be mobilized into groups. Such networking can help to inform each others on various matters pertaining to vegetable products chain management including improved production technology and marketing. However, there is a need for an effective system of market information collection and management.

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