

ESCAPING RURAL IMPOVERISHMENT TO URBAN POVERTY, DELTA TOKER MIGRANT FARMERS SQUAT PORT SUDAN TOWN, EASTERN SUDAN

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ABSTRACT

This paper is based on data provided by fieldwork conducted in the squatter area of Walia' in north Port Sudan town during March 2010. The paper objects to investigate urban poverty by using demographic, socioeconomic and nutritional characteristics of the migrants to argue on causes of rural impoverishment. The main findings revealed that 30% of the respondents were born in Port Sudan town, 15% outside eastern Sudan while 55% of them were born inside Delta Toker agricultural scheme. Failure of agricultural production there has driven 65% of them to move to Port Sudan town while drought as a pushing factor constitutes 30%. Average family size is 8.16 persons, mean age is 22.5 years and younger age groups of 5-9, 15-19 and 20-24 constitute the majority of the population. Average monthly income is 120 USD or 4 USD per day. More than 1/3 of the population are far below the mean monthly income. Percentage of students in basic education is 34.6% while for those in secondary education it is 31.9%. Average household daily intake of cereals; bread; meat; sugar; milk; vegetables and vegetable oils are 3420 grams; 158.4 grams; 270 grams; 444.5 grams; 520.4 grams; 420 grams and 209.2 respectively. The per caput per day intake of these basic food items are respectively 419.1 grams for cereals; 19.4 grams for bread; 33.0 grams for meat; 54.5 grams for sugar; 63.8 grams for milk; 51.5 grams for vegetables and for vegetable oil amounts to 25.6 grams. The per caput per day intake of nutrients is 56.8 grams of protein; 379.8 grams of carbohydrates; 50.3 grams of fats; 44.8 grams of Iron; 15.8 mg of vitamin A and 13.9 mg of vitamin C. These values confirm failure to meet international standards concerning food intake, as well as the per capita consumption of nutrients per day for population in Africa. People reduce number of meals, substitute expensive food types by cheaper items, use alternative food types, transfer food between households and borrow money to cope with food unaffordability. The author proposes rural – urban territory development model to contribute into the alleviation of rural impoverishment and consequently urban poverty.

Keywords: rural impoverishment, urban poverty, migration, squatter areas, agricultural failure, drought, high fertility, low income, food deficiency, rural development

Abbreviations and acronyms: FSU, Food Security Unit; PPS, Probability Proportional to Size; SD, Standard Deviation; SDG, Sudanese Gene; UNDP, United Nations Development Program; USD, United States Dollars; WFP, World Food Program; FAO, Food and Agriculture Organization

INTRODUCTION

In rural Africa, poor living conditions, poverty, decline of the standard of living and critical natural hazards of drought, flood and famine push many people to move in search of better livelihood opportunities in urban areas (Adepoju 1990; Oucho 1998). Due to these factors rural communities have been Impoverished, that they were reduced to poverty (Free Dictionary, 2011). The relationship between the rate of increase of agricultural output and changes in the incidence of rural poverty, using Indian data (Keith, 1979) has shown little reason to believe that poverty will diminish significantly merely by accelerating the growth of production. The causes of impoverishment have more to do with the pattern of growth than with its rate. The problems of poverty and impoverishment in Indian rural society are social, economical, psychological and ecological factors affect the nature and course of

impoverishment and deprivation in village communities (Keith, 1979). Impoverished rural places, according to Matt et al. (2004) are often depicted as immobile communities populated by less skilled, less educated non-movers who have been left behind by selective out-migrants. Factors associated with high rates of geographic mobility in impoverished rural localities in Illinois have implications for policies for tackling rural development, housing, and poverty issues (Matt et al., 2004).

It is projected that more than a half of the population in developing countries will live in urban areas by 2025 which is a 43 % increase in 25 years (UN-Habitat,1996). Although urban growth in sub-Saharan Africa's is higher than the World average (Bocquier 2005), this region had experienced declining urban growth during 1990s and 2000s (Bocquier 2003; Bocquier and Traoré 2000). This suggests that migration has contributed even less to urban growth in the recent past in Africa (Potts 2006). According to the life cycle approach, interactions of an individual life events shape the decision to migrate over the lifetime (Kulu and Milewski 2006). Rapid urbanization has led to increase of low income squatter settlements which receive rural migrants and intra-urban movements from other slum areas (Muindi et al. 2009). In the year 2003, nearly one sixth of the world's total population is slums dwellers and is likely to be double in next 30 years (UN-Habitat, 2003). Squatter settlements provide the essential labor-force to work in the industrial and commercial sectors of the cities, have population below the poverty line, overcrowding and lack of access to facilities (Ali et al., 2004).

There is growing concentration of poverty in third world cities. Conventional economic use income or consumption complemented by a range of indicators such as nutrition, infant mortality, the proportion of household budget spent on food, literacy and school enrollment rates for the definition of urban poverty (Rachel et al., 1997). On the other hand, rural anthropologists and social planners working with rural communities in the third world allow for local variation in the meaning of poverty, and expand the definition to encompass perceptions of non-material deprivation and social differentiation (Rachel et al., 1997). Demographic indicators have sometimes shown better life outcomes for rural dwellers than for urban dwellers (WFP, 2002). In the year 2001 more than ¼ the world's urban population is estimated to live in absolute poverty (UN-Habitat, 2001). Poverty and vulnerability are closely intertwined. The poor are more vulnerable socially, economically and environmentally. Vulnerability stems from location and social disadvantage such as lack of power and often manifested as income poverty (Cutter, 1996). Many poor urban dwellers live on the worst quality land with high vulnerability to natural hazards (Sanderson, 2000: 94).

Access to food is not only enough in food security, while utilization of food guarantees one's capacity to absorb and utilize nutrients in food consumed. Utilization of food is determined through caring practices, eating habits, hygiene, access to health and sanitary facilities (WFP, 2002). Measurement of food security is an integration of agro-ecological, environmental, socio-economic, political and biological factors. The concept is generalized into food availability, accessibility and utilization (WFP, 2002). Food availability is examined through sufficient supply of food to satisfy domestic need and determined by supply and demand oriented approach. It is found that food availability cannot often measure what people actually obtained. In this case access to food depicts people's purchasing power to buy food. Poverty is one of the main obstacles affecting people's purchasing power.

The purpose of this paper is to investigate urban poverty in squatter areas of Port Sudan town in order to argue on that failure of agricultural production, with emphasis to Delta Toker agricultural scheme, and onsets of recurring drought are main causes of migration, growth of squatter areas and consequently rural deprivation and urban poverty. The paper used socioeconomic, demographic and nutrition indicators to investigate urban poverty through a fieldwork carried out in the squatter area of 'Walia' in north Port Sudan town. The author proposed the rural – urban territory development model to help alleviate both problems.

DATA AND METHODOLOGY

Port Sudan is the capital of Red Sea state, lies between 19° 37' N. 37° 12' E (Fig.1), was founded by the British in 1909 as the terminus of a rail linking the Red Sea to the River Nile. This is in order to transport cotton, sesame seed and sorghum from the agriculturally rich areas of the Nile valley to markets. It developed into an urban center of economic importance, immediately attracted a large

trade where in 1908 the imports and exports were valued at about £750,000 (Hohler, 1906). Population size rose from 4289 in 1906 to 10,000 in 1918 and then to more than 25,000 in 1939 and reached 49,000 in 1947 (Endre, 1996). This escalation continued steadily where by 2005 the estimated population was 1 million (Michael et al., 2007). The population is the northern Sudanese, indigenous Beja tribe, West Africans, and small minorities of Indians and Europeans. Pull factors for migration to Port Sudan included expansion of port activities and demand for manual labor in '60s and '70s while push factors are drought which led to migration in late '40s, mid '50s, early '70s, mid-'80s, '90s; Ethiopians and Eritreans refugees influx in '70s and '00 and conflict displacement in 1990s onwards (Sara, 2011).

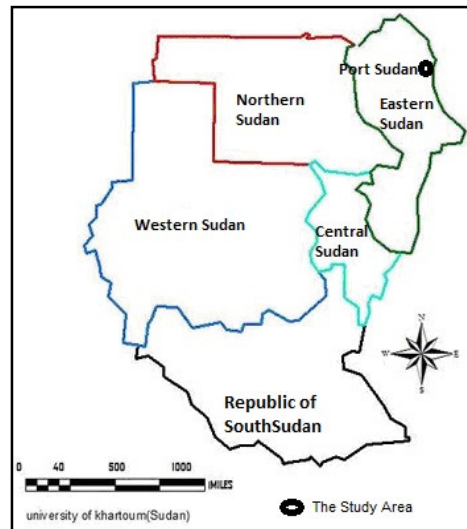


Fig.1. Location of Port Sudan Town

The fieldwork was conducted in Walia' squatter area (Fig.1), which dates back to the last ten years, because it occupies many of recent migrants from Delta Toker agricultural scheme, as being confirmed by a fieldwork carried out in the scheme (Alredaisy, 2012). Walia' lies in far north part of Port Sudan town stretching along the coastal Port Sudan – Halieb highway which goes to Egypt. It developed west of Daim Arab, an old famous squatter area in Port Sudan town. Houses are low elevation with one room on average that built with mud, straw and wood not provided by water and electricity services are not provided while roads are zigzagging and narrow. Education service is provided in nearby areas and the residents of the study area have the right to be admitted into schools everywhere in Port Sudan town.

Data was collected during 27-30 March 2011. Cluster sampling is used for selection of residential sections (clusters) by using PPS, and secondly for selection of the households from the ever selected residential sections. The residential area was divided into ten equal sections extending from north to south. From these ten sections, six sections were chosen to apply the fieldwork. The number of the household was estimated by walking around, as due to absence of registry data on population. The total number of households was estimated at 424 household. Then the sample size was calculated by the formula:

$$n = t^2 pq/d^2 \times deff.$$

Where: n is the sample size, t = 1.96, q= 0.50, p=0.05, d =0.08 and Deff. =1.5 (design effect).

$$\text{Therefore: } n = (1.96)^2 \times 0.05 \times 0.50 / (0.08)^2 \times 1.5 = 225.$$

$$\text{Clusters} = \text{sample size/desired number of households in a cluster} = 225/40 = 5.6 \text{ (all clusters).}$$

Since there are estimated 424 households, this formula gives 75 households to apply the field survey. The sample size was distributed equally regardless of concentration of households to give an average of 12.5 households per section whom were surveyed randomly.

The study covered demographic, socioeconomic and dietary assessments parameters of the population in order to judge for urban poverty. Dietary assessments determined households and individual food consumptions and nutritional status. Household food intake was recorded in domestic measures and converted to weights. Nutrients intake were calculated using food composition tables for population in Africa provided by Latham (1979). Such standards are intended as the estimate of the amount of nutrients necessary to meet needs of almost all (95.5%) healthy people in the population (Wagner, 1986). Nutrients intake standards usually assume the consumption of a varied diet consisting of foods from both plants and animal sources. Differences in nutritional needs of healthy individuals are usually not known, but there is a rather wide range of adequate and safe intake levels. Individual food intake is calculated as an average per individual since all family members eat together, and it was evaluated as energy and protein intake. Because it is difficult to apply recommended levels typical to the classification of the recommended daily intake of nutrients for population in Africa regardless of all of the population groups found in the original tables provided by FAO (Latham, 1979), only the mean was calculated in order to compare it with the intake level in the study area. Summation of carbohydrates and fats give the amount of calorie intake in the study area. Cereal consumption, including Dura and millet, the amount consumed is expressed in a measurement unit of Malwa which is calculated as equivalent to 3 kilograms (3000 grams). Summation of carbohydrates and fats give the amount of calorie intake in the study area.

Data analysis techniques used have included the midpoint method equation for calculation of the mean value:

$$\bar{X} = \frac{\sum Mpt. f}{\sum f}$$

Where: \bar{X} = mean, Mpt = midpoint for each class interval, $\sum Mpt. f$ = sum of product of midpoint and frequency for each class interval, $\sum f$ = sum of the frequency for all the class intervals).

The equation used for the calculation of the SD is:

$$\sigma = C \times \text{s.q. root of } \frac{\sum fd}{N} - \left(\frac{\sum fd}{N} \right)^2$$

where σ = SD C = class size, f= frequency of each class size, d= deviation from arbitrary point of origin which starts with the class interval with the highest frequency, N= number of cases in the distribution, $\sum fd$ = sum of product of frequency and deviation from the arbitrary point of origin for each class interval, $\sum fd^2$ = sum of product of fd and deviation from the arbitrary point of origin for each interval.

To measure the distance of raw score from the mean as measured by standard deviation units and indicate the positive or negative difference between an individual score and the mean determine the relative position and describes each particular score in terms of where it fits into the overall set of data, the T-Score equation is used. This equation states:

$$T = \left[\frac{XI - \bar{X}}{\sigma} \right] 10 + 50$$

where T = T-score, XI is a particular raw score in the distribution, \bar{X} is the mean of distribution, σ = standard deviation of the distribution. This is used for lower range values for each income group. The average household food consumption per day is divided by average household size to produce the individual share of food. Spearman's rank correlation formula: $r = 1 - \frac{6 \sum d^2}{N(N^2 - 1)}$ is used to measure correlation between amounts of basic food types consumed and their contribution into nutrients intake of the population.

RESULTS AND DISCUSSION

1-Demographic and socio-economic characteristics

Place of birth of 55% of the respondents was in Toker agricultural scheme, 30% in Port Sudan town and 15% outside eastern Sudan. Among those who were born in Delta Toker, the reasons for migration to Port Sudan town have included failure of agricultural production in the scheme (65%), drought (30%) and looking for job (5%),. These migrants have settled on the periphery of Port Sudan town because they do not have other choice since they can't afford renting a house in the town. They usually stay free with their relatives who were already settled there. However, Males constitute 48.9%

while females are 51.1% of the population. The average family size is 8.16 persons while the mean age of population is 22.5 years. The age structure of the population (Fig. 2) depicts that younger age groups of 5-9, 15-19 and 20-24 years old constitute the majority of the population. Age groups by percent declined gradually respectively after the age group 25-29 years old. Active population concentrates in age groups 20- 24, 25-29 and 30-34. Although population in the age groups 30 up to 59 is considered economically active, they are less by percent than the younger age groups. This gives a population pyramid of flat bottom and narrow top with very smooth curve at the left tail which gives sharp tip pyramid. This asymmetrical negatively skewed curve shows that most of the population is piled up at right (younger age groups) with an extension of a long tail to the left (older age groups) which confirms for youngness of the population.

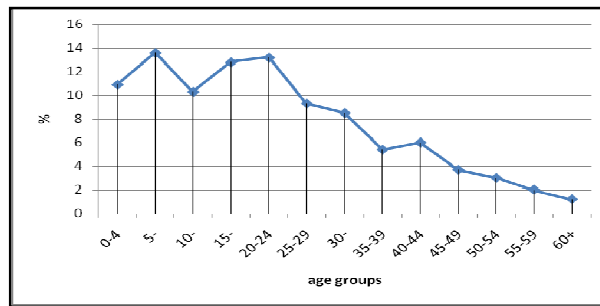


Fig. 2: Age structure of migrant farmers' community

The majority of the population surveyed (75%) works in the marginal sector of the town's economy, into jobs such small salesmen in the markets, temporal laborers in the Port and railways or house builders. Average monthly income for the population is 419 *SDG* which equals 120 USD per month (1 USD = 3.5 SG) and 4 USD per day. Division of population by monthly income groups gives 33.4% as to gain 100-300 *SDG*; 35.8% gains 300-500 *SDG*; 18.5% gains 500-700 *SDG* and 12.3% gains 700-900 *SDG* (Fig.3). Summation of the first two income groups gives 69.2% of the population as to gain between 100 and 500 *SDG* per month while 30.8% of them gains between 500 and 900 *SDG* per month. Such dispersion of monthly income indicates to more concentration of low income groups among the majority of the population. The calculated value of the standard deviation of 44.5 is far below the mean value of 419 *SDG* while there is big range value of 800 *SDG* (100 minus 900). These two values depict wide dispersion of monthly income values within and between the income groups of the population. The T-Score value of the income groups gives that the relative position of the income group of 100-300 *SDG* is far below the mean value by - 21.6 *SDG*; the income group of 300-500 *SDG* is above the mean value by 23.2 *SDG* and similarly the income group of 500-700 is above the mean value by 68.2 *SDG* while the uppermost income group of 700-900 *SDG* is above the mean value by 113.1 *SDG*. This means that more than 1/3 of the population are far below the mean monthly income of 419 *SDG* which equals a daily income of about 4 USD per household. The uppermost income group among the population earns monthly income by 25% excess above the mean which is not significantly important to provide better living conditions than the other lower income groups.

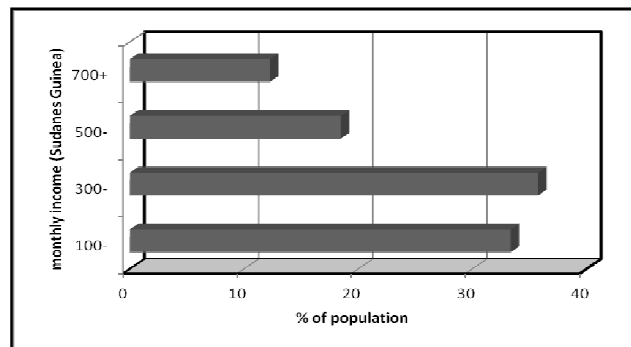


Fig.3: Average monthly income of the population

As far as educational attainment is concerned (Fig.4), considerable percentage of students are found in basic education (34.6%) and secondary education (31.9%) which reflect youngness of the population and the care to go schooling. It is noticed also that, a percent of 8.4% is preschool pupils which reflects the interest of some of these poor people to start educating their children early. Some have got religious education preceding their arrival to the study area which is more confined to older age groups of population. University students, including graduates, constitutes small percent among the population. Illiterate could be detected among both older and younger age groups, being determined by the need to go work in the marginal economy of Port Sudan town.

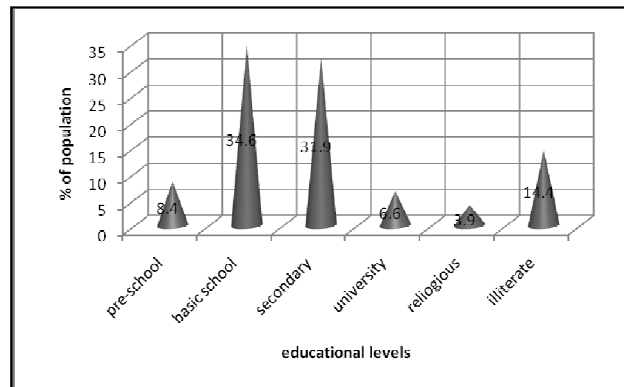


Fig. 4: Educational level of the population

2-Nutritional status of population

Food is available in the markets. Summer is the main season of vegetables scarcity in contrary to winter season. Food prices according to the surveyed population are that 1 kg of Dura is sold by 2 SDG (57 US cent), 5 pieces of bread weight 120 grams per piece is sold by 1 SDG (0.28 US cent), 1 kg of meat by 24 SDG (approximately 7 USD), 1 liter of vegetable oil is sold by 4.5 SDG (1½ USD), 1 lb of sugar by 1.5 SDG (42 US cent), 1 lb of milk by 1.5 SDG (42 US cent) while vegetables prices differ according to type where for example 1 kg of Okra is sold by 5 SDG (1.5 USD). Shortage in food types might occur occasionally in some vegetables types consistent with season of production. Because Port Sudan town is the sea port of the country, it is expected that some imported food commodities are to be cheaper than the interior parts of Sudan. Because the majority of food importers stay in Greater Khartoum, the capital of Sudan, hence, food prices are sometimes higher than in Khartoum due to double cost of transportation.

People prefer traditional food types including porridge, broad beans, Kisra (homemade thin layers of fine milled sorghum), lentils and local vegetables. 60% of the population takes two meals a day while 40% take three meals a day. The basic food types consist of kiswa, bread, meat, milk and vegetables. Meat, vegetables and vegetable oil constitute the ingredients of sauce (Mullah). Bread and Kisra are taken with sauce, milk and sugar are always mixed together to make the daily intake of tea. Meat intake is irregular within days of the week and bread intake is confined to one meal a day.

The consideration of the average consumption of basic food types by a household is important to show the per capita per day food intake in the study area (Table 1). Average household daily intake of cereals; bread; meat; sugar; milk; vegetables and vegetable oils are 3420 grams; 158.4 grams; 270 grams; 444.5 grams; 520.4 grams; 420 grams and 209.2 respectively. The per caput per day intake of these basic food items are respectively 419.1 grams for cereals; 19.4 grams for bread; 33.0 grams for meat; 54.5 grams for sugar; 63.8 grams for milk; 51.5 grams for vegetables and for vegetable oil amounts to 25.6 grams.

Table 1: Average household and per caput per day food consumption by type (amounts in grams)

Food type	Cereals (Malwa=3kg)		Bread (piece=120 g)		Meat (kg)		Sugar (Ib)		Milk (Ib)		Vegetables (kg)		Vegetable Oil (Ib)	
	mea	cas	mea	cas	mea	cas	mea	cas	mea	cas	mea	cas	mea	cas
statist	n	es	n	es	n	es	n	es	n	es	n	es	n	es
Kg/Ib	1.14	75	1.32	75	0.27	75	1.00	75	1.17	75	0.42	75	0.47	75
Gram	342	75	158.	75	270	75	444.	75	520.	75	420	75	209.	75
	0		4				5		4				2	
Per caput	419.	-	19.4	-	33.0	-	54.5	-	63.8	-	51.5	-	25.6	-
	1													

Conversion of these food amounts into nutrients shows levels of per caput per day intake of protein, calories, fats and vitamins (Table 2). Generally, an individual get as much as 56.8 grams of protein; 379.8 grams of carbohydrates; 50.3 grams of fats; 44.8 grams of Iron; 15.8 grams of vitamin A and 13.9 grams of vitamin C. Cereals contribute most into protein source which means that people generally depend on plant protein. Low levels of consumption of meat and vegetables are reflected into total budget of protein contribution. Cereals also contribute the most of carbohydrates budget followed by sugar and bread. Cereals also contribute into fats although less than that by vegetable oil. Fats contribute to the calories' intake by the population and similarly vegetable sources constitute the major input for per caput intake of fats The main source of Iron for people of the study area is cereals followed by bread while milk contributes with very low grams. An individual gets vitamin A from milk while he gets vitamin C from vegetables. Spearman's Rank Correlation Coefficient between amounts consumed of basic food types and their contribution into nutrients intake of the population in the study area gives a value of 0.71 indicating to high positive correlation between the two variables used.

Table 2: Per caput per day nutrients intake of protein, carbohydrates, fats, Iron and vitamins (in grams)

Food type	Meat (beef)	Bread (Brown)	Cereals (Dura)	Vegetables (Tomatoes with skin)	Vegetable Oil	Milk (Whole)	Sugar	Total
Protein	6.00	1.62	46.5	0.51	0.0	2.14	0.0	56.8
Carbohydrates	0.00	8.42	310.5	2.45	0.0	4.4	54.0	379.8
Fats	5.84	0.38	13.4	0.10	27.5	3.1	0.0	50.3
Iron	1.2	0.4	42.7	0.3	0.0	0.06	0.0	44.8
Vitamin A	0.0	0.0	0.0	0.0	0.0	15.8	0.0	15.8
Vitamin C	0.0	0.0	0.0	13.3	0.0	0.6	0.0	13.9

Note: All food nutrients are gram equivalent, except Iron, Vitamins C and A are in mg.

To meet these minimum daily food requirements (table 1), a household have to pay on average about 15 SDG (4 $\frac{1}{3}$ USD) per say. Since the daily household income is 4 USD, there is a deficit by $\frac{1}{3}$ USD

per day. This is regardless of other expenses on buying water, clothing, transportation, schooling and so on. Because the mean value of income and mean value of expenditure include all segments of income households, there might be some differences among them. But, the general situation confirm that expenditure on food consumes whole the income budget of households and to meet other living needs they have to look for other sources. Although levels of food consumption are inadequate to provide the whole required nutrients for individual, households have to pay much money to meet them.

To manage high food prices in situation of low monthly income, people of the study area follows various survival strategies (table 3). People are used to reduce number of meals to two major meals. Another strategy is the substitution of expensive food types by cheaper items, for example meat by dried chicken soup (maraga) or horse beans (foul) or completely eliminates meat from the food budget. This strategy is complementary with the use of alternative food types which is widely practiced in the study area. Food transfer between households represents social cooperation which is deeply rooted in the culture of the people and is a way by which rich helps poor. Generally, children leave school as a strategy of survival, to contribute into household monthly income by working in marginal jobs. In addition, their stay away for more than half of a day outside the house reduces household food consumption. Money borrowing among head of households is practiced due to low income.

Table 3. Use of survival strategies by population in the study area by percentage

Reduction of number of meals		Substitution of expensive food by cheap food		Use of alternative food types		Food transfer between households		Leaving school		Money borrowing	
No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
75	100	70	93.3	68	90.6	40	53.3	30	40	10	13.3

Migration to Port Sudan town and growth of Walia' squatter settlement agrees with the general trend of urbanization in Sudan where percentage of urban population is projected to be 46.4 in 2025 while it was 24.2 in 1994 (UN, 1994), and with general world trend of growth of squatter settlements which constitute 20 to 80 % of urban settlements in developing countries (ECOSOC, 2005). However, nearly half the households surveyed were born in Delta Toker Agricultural scheme which lies 160 km southeast Port Sudan town. It was mainly established for production of organic crops and in situ rural development. The rural community of the scheme is expected to have substantial base for rural and community development. Failure to achieve these objectives has impoverished farmers' community and forced them to squatting into Port Sudan town. The main reason for impoverishment is mesquite "Prosopis spp." occupation of 73% of the Delta area with average annual rate of expansion by 6,122 feddans, led to depletion of surface and aquifer waters and decline of agricultural production (Alredaisy, 2012). This is further supported by Abdulmagid's study (Abdulmagid, 2000) which revealed that mesquite has caused declining of cropped area; lack of job opportunities; spread of poverty due to weak income generating activities particularly among women, absence of natural renewal of local trees due to overgrazing, cutting and drought, increase of dust storms and sand creep due to lack of tree plantation and re-plantation as well as problems of food security and malnutrition. The principal reason for mesquite occupation of the Delta is the recent Government policy towards replacement of agriculture by Oil as the main income source for the Sudanese economy which had caused reduction into public national expenditure on agricultural sector that consequently aggravated problem of mesquite expansion. Because public expenditures on agriculture include short-term costs and long-term investments such as government expenditures on agricultural infrastructure, research, education and training, the Government tried to escape these responsibilities through privatization. The National Salvation Economic Program designated in 1993 as State's policy, recommended privatization of government owned agricultural schemes in Sudan, including Delta Toker Agricultural Scheme (MFEP, 1993). This policy was based on uplift of financial subsidy in situations of

deteriorating agricultural production; marketing and production problems; devaluation of the national currency and political unrest. However, government low expenditures on agriculture and forestry are similar to many African countries where between 1988 and 1993, agricultural expenditures had generally declined and constitute between 1.5 to 7.9% of total expenditure (Derrick, 1987).

Drought is also a principal cause of rural deprivation and migration to Port Sudan town as well as a principal driver of urbanization in Sudan (Sara Pavanello, 2011). The Sahel region, including some parts of eastern Sudan, has been spurred on by recurring drought and the threat of long-term land degradation (Seaquist et al. 2009, Mertz 2010). The Red Sea area is environmentally fragile. It lies within "very high risk" zone of desertification designated by the United Nations (United Nations, 1977). Its average annual rainfall values decreased markedly since early sixties (ElGamri, et al., 2009) similar to annual rainfall depletion in semi-arid central Sudan between 1921 to 1950 and 1956 to 1985 which has declined by 15%, the length of the wet season has contracted by three weeks, and rainfall zones have migrated southwards by between 50 and 100 km (Farouk et al. 1982, Hulme 1990, Ayoub 1999). Due to that total biomass gets over-exploited by grazing and browsing animals (Davies. 1987) and also due to human influence similar to environmental degradation in northern Ethiopia signifying a decrease in biomass of vegetation as a result of collecting wood for fuel and other domestic uses (Enrico et al., 2002). This agrees with the fact that much of the Sahel is now suffering of desertification causing land degradation with a reduced productive capacity (Sanders, 1986), disappearance of annual grasses which has led to decrease in productivity and that flora in some parts of the Sudanian zone show a Sahelian character (Wittig, et al., 2007).

The high fertility rate of population of the study area agrees with general demographic trends in Sudan where total fertility rate was 5.9 births per woman in 1999; annual population growth rate was 2.53 % between 2003 and 2007 and the natural rate of increase was 41.23 per 1 000 in 2006 (Ministry of Health, Sudan. 2008). Dominance of Low income groups in the study area agrees with figures in Sub-Saharan Africa where about half the population is living below the poverty line, with both numbers and percentage on the increase (Alredaisy, et al., 2001). Generally, growth of towns and cities in Sudan has been accompanied by growing numbers of poor and vulnerable urban dwellers (Sara Pavanello, 2011). Although Sudan is rich in natural and human resources, 77.5% of the households surveyed in north Sudan were on or below the poverty line (MOL and ILO, 1997]. The study by the United Nations Development Program in 2005 reported that 75% of north Sudan population as poor and the majority (80%) is concentrating in rural areas where 30% of them suffered from extreme poverty (United Nations Development Program, 2005). The majority of the urban poor are dependent upon marginal livelihood activities in the informal economy, and their access to safe and sustainable livelihoods is extremely unstable (Sara Pavanello, 2011). However, factors influencing income attainment in the study area might include those operating at the national level including absence of social development and insufficient productive capital investment (UNDP, 1998), ill-conceived development policies and armed conflicts (Zeng, 2003).

The general findings of this study depict less animal protein; vitamins; minerals and abundant cereal are consumed. They are thoroughly affected by households' income and size. In the study area, fat and carbohydrates consumed were lower than the recommended values for population in Africa which is 2041.7 calories (Latham, 1979). Furthermore, comparison between per caput per day calorie intake in the study area and the study by Ministry of Agriculture and Forestry of Sudan (FSU, 2005), puts the study area below by that there are less carbohydrates and lower energy intakes (430.1 kcal vs. 1962 kcal). In African diets, fats usually provide fewer calories than carbohydrates, perhaps only 8 or 10 percent of the total calories (Latham 1979:50). The term fat includes all fats and oils that are edible and occur in human diets. The high contribution of cereals to energy and protein intake in the study area is similar to rural Philippines where 361g/person/day are consumed there (Florentino, 1996). Animal protein sources such as meat and milk provide less in the study area than the recommended value which is 8.14 g versus 55.3 g (FSU, 2005). Iron consumed exceeds the recommended level which is 8.6 -17 gram, vitamin A is less than the recommended level of 655.6 mg and similarly vitamin C is less than the recommended level of 28.9 mg (Latham, 1979).

One of the main reasons for generally declining levels of food consumption in the study area is attributed mainly to the high living costs and high inflation rates in Sudan. The high expenditure on

food in situations of low income, big households and spreading illiteracy has many consequences. One consequence is that a low-income household's consumer surplus for food is very high, amounting to a substantial proportion of its total income. This has important consequences for the economic appraisal of food supply. With regard to affordability, households are unable to pay for food at the current cost. High proportion would be unable to pay the actual costs of food. The revenue that may realistically be expected to be recovered from these households in the future lies somewhere between what they are able to pay and what they are presently willing to pay. Another consequence is the lack of elasticity and repercussions on expenditure for food would imperatively be retarded. The high price of food in urban Sudan is probably a major cause of the malnutrition prevalent in the squatter areas (Sandy et al, 1992). Decreasing income led to marginal or sub-optimal intakes of energy and protein resulting in more prevalence of under-nutrition in rural western Kordofan of Sudan (Alredaisy and Suleiman, 2010). Many studies in Sudan referred low weight, stunting and wasting among young children to unequal income distribution, vertically between incomes and horizontally between rural and urban areas (UNDP, 2006).

Survival strategies followed by the population in the study area are real reflection of low income and poverty. This could make one to categorize the population of the study area within food insecure groups in Sudan. These groups include those whose food intake provides less than that recommended for refugees and internally displaced groups (IOM, 1995). In addition, they include rural areas of low crop and animal production; areas of low purchasing power and education and knowledge; areas of low access to health facilities and vulnerable residents who were indirectly affected by the influx of internally displaced population in their communities. But since the survey was restricted to some of the basic food types and households in Sudan consume many food types that are not considered in the consumed food budget, they might affect such categorization.

CONCLUSIONS AND RECOMMENDATIONS

The general findings of this study are as follows:

- a. Rural impoverishment is a major cause for rural – urban migration and growth of squatter settlements in Red Sea area.
- b. Urban poverty in Port Sudan town is characterized by high fertility rates, low levels of income and educational attainment as well as nutritional levels below the recommended values for population to remain healthy in Africa.
- c. Survival strategies adopted by squatter dwellers are varied and substantially influence socioeconomic status of the community.
- d. Urban poor in the study area are highly vulnerable to food insecurity and despite the inadequacy of the survey, the overwhelming evidence points to undernutrition in the study area.
- e. Integrated rural – urban development strategy is important for alleviation of both urban poverty and rural impoverishment for eastern Sudan.

Integrated rural – urban development strategy could be explained by the rural – urban territory development model (Fig. 5). Territory model is concerned with geographic place. The model is based on the argument that, since rural impoverishment is the main cause of migration to urban areas which leads to growth of squatter settlements and consequently urban poverty, therefore suppression of rural- urban migration, as indicated by X symbol in figure 5, needs an integrated development model. Rural territories could be developed through integrated sustainable rural development programs. Since they are integrated, they have to include social, economical, environmental and political sides of development with consideration to geographic characteristics and down to top approach for planning.

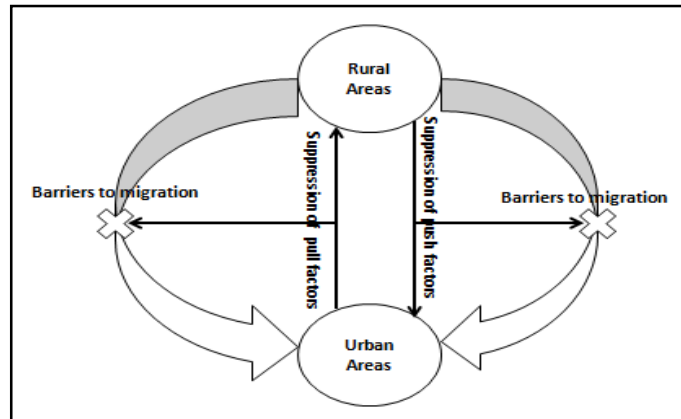


Fig.5. Rural – urban Territory Development model

Environmental sustainability issues are very important. They could include research on drought and desertification by identifying causal natural and human factors where the role of official authorities is remarkable through monitoring, aware of people and by massive injection of funding. Managing relationship between human, the environment and resource utilization have to be introduced into Sudanese environmental planning. Through comprehensive resource management policies, agricultural schemes and rangelands can further develop to cope with increasing population and animals. Environment conservation will help to improve agriculture as it includes combating desertification, reducing overgrazing and tree logging through the introduction of solar energy and reclamation of forests.

Determinations of short-term management actions and long-term strategies to improve rural economy are essential. The short term management actions mostly work to utilize physical properties of the geographic area. Long-term strategies to improve rural economy work towards Integrated Resources Management (IRM) where community education for sustainable development (ESD) is essential. Introduction of small credit finance system, agricultural co-operative societies, establishment of networks including farmers and herders for building partnerships between pastoralists and farmers, and between pastoralists and local government are also vital. In addition, introduction of new drought adapted breeding animal species producing much meat and milk to generate income for rural community. Furthermore, agricultural development could adopt crop diversification to increase cash income among peasants. Integrated family development including female education, health education as well as village development can enhance capacity building of local youth for social work and environmental awareness and awareness creation on nutrition.

It is expected that by applying rural – urban territory development model, rural territories will develop and by that way rural – urban migration will be suppressed which will ultimately alleviate rural impoverishment and urban poverty.

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