Assessment of poverty among the employees of the University of Gezira: Empirical analysis, 2006

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ABSTRACT

This study aimed at estimating an income poverty line based on calorie requirements along with the different poverty indices, by applying the estimated poverty line to income distribution data for people working at the University of Gezira. To estimate the poverty line, Annand and Nur (1988) methodology was followed using three selected consumption baskets to represent different consumption habits in Sudan. Applying the prices of 2006 on the consumption items of the selected baskets, the average cost of these baskets was obtained representing a minimum cash requirement for food consumption. Multiplying the above minimum cash requirement for food consumption by a conversion factor of 2, we obtained the poverty line for the year 2006. To estimate the poverty indices, the traditional measures of poverty such as the headcount, depth of poverty, severity of poverty, Gini Coefficient and Sen's measure were applied. Results showed that the household income poverty line for the year 2006 was equal to SD 74202.48 (approximately equivalent to $371) per month with a household size of 6.6. The head count index using expenditure and income approaches was equal to 48% and 54%, respectively. Moreover, results showed that the depth and severity of poverty using expenditure approach were equal to 17% and 8%, respectively, however, the depth and severity of poverty using income approach were equal to 24% and 13%, respectively. Regarding Sen's measure and Gini coefficient, results indicated that income was unequally distributed among the employees of the University of Gezira. In addition, results showed that the poverty indices using expenditure approach were below the poverty indices using income approach. This result may be attributed to the fact that people usually underestimate their income levels, hence, expenditure reflects the standard of living better than income.

INTRODUCTION

According to the World Bank (2005), the poor are those who do not have enough income or consumption to put them above some adequate minimum threshold. This view sees poverty largely in monetary terms. Hence, poverty arises when people lack key capabilities and so have inadequate income, education, poor health, insecurity, low self confidence and absence of rights such as freedom of speech. The broadest approach to well being and poverty is the one articulated by Sen (1987) who argued that well being comes from capabilities to function in society. According to Ravallion (1998) the poverty line is defined as the monetary cost of a given person, at a given place and time, of a reference level of welfare. People who do not attain that level of welfare are deemed poor, and those who do are not.

Applying income poverty line to income distribution data, Nur (1995) found that all poverty measures in urban and rural areas in Sudan computed from the expenditure side are smaller than the ones obtained from the income side, except the relative deprivation indices. Using expenditure and income as welfare indicators, Nur (1995) concluded that 83.7% and 87.1% of the rural people are below the poverty line using expenditure and incomes approaches, respectively. Nur results were obtained by employing an income poverty line based on the expenditure on food, cost of cooking, housing, clothing, mobility, health and education.

Annand and Nur (1988), who computed an absolute poverty line in Sudan, made the pioneering attempt towards the study of poverty. The authors adopted the food energy intake (FEI) method and the recommended daily allowance (RDA) of calories determined by FAO\WHO. They transformed these calories into food requirements and objectively determined food quantities needed by a person per day. Using March and April prices of 1984, the authors transformed these food requirements into money values to obtain an annual food poverty line for Sudan, estimated at Ls. 445 (Ls. = 0.001 SDG). Based on the assumption that the poor spend on average about one-third of their income on food, they multiplied the value of the food poverty line by three to obtain the absolute poverty line for Sudan estimated at Ls.1335.

Elgeilani (2004) attempted to analyze the trends of poverty and income inequality in Sudan across socio-economic groups, with special emphasis on a set of interrelated factors that contribute to poverty and affect human capabilities. The study found that for urban and rural areas the average absolute poverty line was equal to S.D. 742410 and S.D. 35107 (SD= 0.01 SDG) per household per year, respectively. The study also found that a reduction in the incidence of poverty as well as in its depth and severity is significantly associated with access to social services.

Elmulthum (2002) employed the viability idea embodied in Jorgenson (1961) model of the development of a backward economy which consists of only one sector, namely, agriculture. Using GDP, an estimate of a subsistence level of income necessary for food and non food consumption at the level of per capita gross domestic product necessary for population to grow at a maximum (and not the maximum) rate was obtained. The results indicated that the country was suffering from a food insecurity problem during the period 1978-1993 manifested by its inability to attain a minimal standard of living. However, these results also indicated that the rate of increase in poverty is much more pronounced during the sub-period 1978-1986, which witnessed the adoption of IMF policy package, as compared to the sub period 1986-1993.

Elmulthum (2007 a) estimated an income poverty line for the Sudan which was compared to the wage structure in the public sector in the Sudan. Results obtained indicated that the majority of the Sudanese people working in the public sector were below the poverty line.

Ali (2005) investigated the feasibility of achieving the Millennium Development Goal (MDG) of reduction of poverty by half by the year 2015 in Sudan. It is noted that poverty, in the context of the MDGs, is meant the spread of poverty as measured by the head count ratio. The major results were (a) to achieve the MDG on poverty, Sudan's GDP needs to grow by an annual rate of 7.2%, requiring an investment rate ranging from 35% to 42% of GDP, (b) given Sudan's past growth performance, and assuming that Sudan will be able to sustain a GDP per capita growth rate of 2.2 percent (equivalent to a GDP growth rate of 5 percent) a reasonable horizon for reducing poverty by half would be 28 years starting from 2001, almost double the horizon implied by the MDGs.

Mahran (2005) argued that although some controversy has surrounded the level of poverty, what is indisputable about poverty in Sudan is that it has been rising over the last three decades, with adjustment and liberalization policies contributing significantly to this upward trend. The main objective of this study was to estimate an income poverty line based on caloric requirement. In addition, the study aimed at estimating the different poverty indices for people working at the University of Gezira, by applying the estimated poverty line to data on income distribution.

METHODOLOGY

This study targeted primarily the employees of the University of Gezira with respect to measuring the poverty lines and income inequality. The total number of the employees at the University of Gezira in 2006 were equal to 2881. Their structural hierarchy included, the academic staff, academic staff equivalents (administrators), library and laboratory assistants, personnel, security personnel, technicians and laborers. The sample size was calculated using the following formula:

$$n = \frac{z^2\, p\,(1-p)}{d^2}$$

where n is sample size, z is the standardized variable that corresponds to 95% confidence level, p is the probability of prevalence of the phenomena under study, d is the desired marginal error. According to the results obtained by Elgeilani (2004), p is assumed to be equal to 0.86. Assuming that an estimated measure of the prevalence of the phenomenon falls within 95% confidence interval z and d were equal to 1.96 and 0.05, respectively. Accordingly, a sample size of 185 was set.

The study was based on primary data collected using a questionnaire designed to provide statistical information on households. A stratified random sampling was used based on the proportion of each working group out of the total working staff. The methodology adopted in calculating the income poverty line was based on Annand and Nur (1988) who constructed 12 consumption baskets from items common in poor people diets each basket would yield the recommended calories. Out of the 12 consumption baskets, three baskets were selected to represent different consumption habits in Sudan, namely, urban, rural and pastoral areas. The cost of each basket was derived using 2006 prices. The average cost of these baskets was used as the minimum cash requirements for food consumption. The minimum cash requirement (the poverty line income for the year 2006) was obtained by multiplying the minimum cash requirement for food consumption by a conversion factor of 2. It may be noted that the conversion factor 2 was based on the average percentage of income devoted for food consumption (50%) calculated from the collected data.

The data collected were tabulated and analyzed using statistical package for social science (SPSS). Applying the estimated poverty line to income data of the sampled employees, the following poverty indices were calculated:

$$H = q/n$$

Where:

H = the head count index

q = number of poor people below the poverty line.

n = total number of people in the community.

The income-gap measure denoted by (I) is defined as the aggregate short-fall of income of all the poor from the specified poverty line and is given by:

$$I = \sum(z-y_i)/qz = (1-u/z)$$

where:

z = the poverty line.

y_i = the income of the ith poor person.

$\sum(z-y_i)$ = the aggregate short fall in income.

u = the average income of the poor.

The poverty gap measure ($P_{(1)}$) which measure the depth of poverty is a combination of the head count and the income gap measures and is given by:

$$P_{(1)} = (1\backslash n) \sum_{i}^{q} [(z-y_i)/z] = q/n\ (1-u/z) = HI$$

where the variables were defined above.

Sen's measure denoted by P is defined by the following equation:

$$P = H\ [I + (1-I)\ G]$$

where (G) = the Gini Coefficient of income distribution among the poor and is calculated using the following formula:

$$G = \frac{(n+1)}{(n-1)} - \frac{2}{n(n-1)u} \sum_{i=1}^{n} S_i R_i$$

Where n is the sample size, S_i is the income share of individual i, R_i is the rank position of S_i in the income distribution Scale (with the richest having rank 1) and u is the estimated mean income.

Using Foster *et al*. (1984) poverty measure, the severity of poverty (P_2) is calculated using the following formula:

$$P_{(2)} = (1\backslash n) \sum_{i}^{q} [(z-y_i)/z]^2$$

where the variables were defined above.

RESULTS AND DISCUSSION

This section reports results related to the estimated poverty line, particularly the estimation of the recommended level of calorie consumption for the Sudanese people based on the recommended level of energy for each age group. Moreover, results pertaining to the head count index (H), depth of poverty measured by the poverty gap index $P_{(1)}$, severity of poverty measured by $P_{(2)}$ and Gini Coefficient will be discussed. Based on Elmulthum (2007 b), Table 1 shows the recommended level of calories, the population size, the total calories for each sex-age group, and the average recommended calories for Sudan. It is clear that the estimated average calories per person per day for the year 2006 was equal to 2311 kcal. Compared with the food baskets selected from Annand and Nur (1988) for the purpose of estimating the income poverty line for Sudan, it is clear from Table (2) that the average calories obtained from the three selected baskets were 99%, 95% and 95% of the average recommended level of calories for urban, rural and pastoralists.

Table 1. Average recommended level of calories for the Sudanese (2006).

Age group and sex	Recommended calories (kcal)	Population size	Total recommended calories (kcal)
0-9 children	1550	10032089	15549737950
10-19 Males	2857	4400039	12570911423
10-19 females	2383	4118437	9814235371
20+ males	3000	8518476	25555428000
20+ females	2200	8131273	17888800600
Total		35200314	81379113344
Average		2311	

Source: Own calculations based on Elmulthum (2007 b)

Table 2. Calories and percentage of recommended level of calories of three food baskets for urban, rural and pastoral areas.

	Urban	Rural	Pastoral areas
Calories	2309	2205	2205
Percentage of recommended	99	95	95

Source: Own calculations based on Annand and Nur (1988).

The per capita costs of the three food basket were equal to SD 136.7, SD 205.8 and SD 218.73 for urban, pastoral and rural areas, respectively, (Table 3). The average per capita cost of the three selected food baskets per month was equal to SD 5621.4. Multiplying this cost of the basic food items by a conversion factor of 2 based on the average expenditure on food calculated from the survey, the per capita income poverty line for the year 2006 was equal to SD 11242.8. For the purpose of calculating the income poverty line for a household, the per capita income poverty line for food and non food consumption was multiplied by average family size which was equal to 6.6, based on data collected. Hence, the calculated household income poverty line was equal to SD 74202.48.

Table 3. Per capita cost (SD) of the three food baskets for urban, rural and pastoral areas.

Food item	Average price (SD)	Urban		Rural		Pastoral areas	
		Quantity	Cost	Quantity	Cost	Quantity	Cost
Milk	181.1/ l	20.0 ml	3.6	20 ml	39.80	20 ml	3.60
Sugar	217.4/kg	30.0 g	6.5	30 g	6.50	30 g	6.50
Bread	0.0/Loaf	3.0 loaves	30.0	-	-	-	-
Ful masri	172.2/kg	100.0 g	17.2	-	-	-	-
Oil	434.8/l	15.0 ml	6.5	10 ml	4.35	15.0 ml	6.50
Dura	83.3/kg	-	-	411g	34.24	411.0 ml	34.24
Weaka	1017.5/kg	12.5 g	12.7	25 g	25.40	37.5 g	38.04
Dry meat	1000.0/kg	30.0 g	30.0	60 g	60.00	90.0 g	90.00
Onion	76.9/kg	50.0 g	3.8	100 g	7.70	150.0 g	11.54
Salt	50.0 /kg	10.0 g	0.5	20 g	1.00	30.0 g	1.50
Tea	905.8/kg	2 .0 g	1.8	2 g	1.81	2.0 g	1.81
Salad		-	25.0	-	25.00	-	50.00
Total			136.7		205.80		218.73

Source: Own calculation based on survey, SD = 0.01 SDG

By applying the estimated poverty line to the income distribution data of the employees at the University of Gezira, the indices of poverty and the Gini coefficient were estimated (Table 4).

Table 4. Head-count index (H), depth of poverty (P_1), severity of poverty (P_2), Sen's measure (P) and Gini Coefficient.

The poverty measures	Poverty index		
	Expenditure(%)	Income(%)	Income(%)
H	48	54	86
P_1	17	24	60
P_2	8	13	48
P	28	45	
Gini coefficient	0.36	0.47	

Source: Columns 2 and 3 from own calculations, column 4 from Elgeilani (2004).

The head count index using expenditure and income approaches was equal to 48%, and 54%, respectively (Table 4). The results indicated that 48% of households were below the poverty line using the expenditure approach while 54% of households were below the poverty line using income approach. Comparing the head count measure obtained by the present study using income approach with the results obtained by Elgeilani (2004), it is clear that the head count measure for the people employed at the University of Gezira was far below the result obtained by Elgeilani (2004). Moreover, results obtained showed that the depth and severity of poverty using expenditure approach were equal to 17% and 8%, respectively. However the depth and severity of poverty using income approach were equal to 24% and 13%, respectively, compared to 60% and 48% obtained by Elgeilani (2004).

From Table 4 it is clear that the headcount index, depth of poverty and severity of poverty for University of Gezira were less than indices obtained by Elgeilani (2004). In addition, the calculated head count measure for the employees at the University of Gezira is far below the head count ratio obtained by Nur (1995). The lower measures of poverty obtained here as compared to the results obtained by pervious researchers (Nur,1995; Elgeilani, 2004) may be attributed to factors related to the higher income levels for the people working at the University of Gezira that is due to the income

supports such as accommodation which is provided to some of the employees especially the staff members.In addition, health care is provided through the national health insurance. Moreover, being an urban sector, people are in a better situation to find opportunities of coping with methods or chances of having higher income levels. In fact, it was observed from the data collected that most of the people did not depend solely on their salries and they supported their living by resorting to other sources to supplement their income. It is worth noting that the income poverty line is estimated using items common in poor people diet and not the nutritionally recommended items. This may be attributed to the fact that the nutritional awareness of the Sudanese people is weak and poor people consume calories regardless of the nutritional constituents of the food they consume. This fact is clear when the high percentage of calories gained from cereal consumption for Sudanese people was considered.

The Gini coefficient of expenditure and income distribution among the poor in the University of Gezira was equal to 0.36 and 0.47, respectively. Using the above results, Sen's measure of poverty for expenditure and income was equal to 28 and 45, respectively. This result indicated that there was inequality in expenditure and income distribution in the target area. Moreover, results indicated that lower values of poverty measures were estimated in case of using expenditure approach. This result may be attributed to the fact that people usually underestimate their income levels, hence, expenditure reflects the standard of living better than income.

From the above results we concluded that almost half of the employees of the University of Gezira were below the poverty line. Based on the above conclusion we recommend that the minimum level of income to be raised at least to the level of the poverty line income to ensure that all the employees of the University of Gezira have the access to the minimum standard of living.

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تقييم الفقر في صفوف العاملين في جامعة الجزيرة : تحليل تجريبي 2006م

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الخلاصة

تهدف هذه الدراسة إلى تقدير خط الفقر على أساس الاحتياجات من السعرات الحرارية وتقدير مختلف مؤشرات الفقر وذلك من خلال تطبيق خط الفقر المقدر على توزيع الدخل لبيانات العاملين في جامعة الجزيرة. لتقدير خط الفقر اتبعت الدراسة المنهجية التي استخدمها (1988) Annand and Nur وذلك باستخدام ثلاث سلات لتمثيل مختلف العادات الاستهلاكية في السودان. بتطبيق أسعار (2006) على سلات الغذاء التي تم اختيارها تحصلنا على التكلفة المتوسطة والتي تمثل الحد الأدنى للمتطلبات النقدية لاستهلاك الغذاء. تم تقدير خط الفقر بضرب الحد الأدنى للمتطلبات النقدية لاستهلاك الغذاء بمعامل التحويل 2 . بتطبيق خط الفقر على بيانات توزيع الدخل للعاملين بجامعة الجزيرة تحصلنا على تقديرات لمؤشرات الفقر التقليدية مثل مؤشر تعداد الرؤوس، مؤشر فجوة الفقر (عمق الفقر) ، مؤشر حدة الفقر ، معامل جيني ومؤشر سن . وضحت النتائج أن خط الفقر يساوي 74202.48 دينار شهرياً ويعادل ($371) في الشهر عام 2006م للأسرة التي متوسط عدد أفرادها يساوي 6.6 . أوضحت النتائج ان مؤشر تعداد الرؤوس بالنسبة للعاملين بجامعة الجزيرة يساوي 48% و 54% باستخدام منهج الإنفاق والدخل على التوالي وأن مؤشر عمق الفقر وحدة الفقر باستخدام منهج الدخل يساويان 17% و 8% على التوالي. في حالة استخدام منهج الإنفاق وضح أن عمق وحدة الفقر يساويان 24% و 13% على التوالي. باستخدام مؤشر سن ومعامل جيني وضح أن توزيع الدخل في صفوف العاملين بجامعة الجزيرة غير عادل. كذلك أوضحت النتائج أن مؤشرات الفقر باستخدام منهج الإنفاق أقل من مؤشرات الفقر باستخدام منهج الدخل ويمكن أن تعزى هذه النتيجة إلى أن الإنفاق يعكس مستوى المعيشة بصورة أفضل من الدخل.