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POVERTY AND FAMILY SIZE PATTERNS: Comparison Across African Countries

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Research Report No. 01.3

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Contents

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Abstract

The study was prompted by two earlier survey-based studies in Tanzania that showed less poverty with higher household size. The availability of data from Demographic and Health Surveys of the 1990s in many countries provided an opportunity to explore the finding on a varying spectrum across Africa, and Tanzania is explored widely by region, looking out for variation of the pattern by development level. Poverty level is measured by a possessions index and housing quality, as they are closely associated with income and general standard of living. They also provide welfare and thus good indicators of the level of living. Both bivariate and multivariate methods are used.

The pattern of less poverty with higher household size is overwhelmingly borne out by the data, even in cases when control is not made for intervening factors of poverty. It is only in 3 countries, out of a total of 21 used, that the relationship is there but not significant while two countries reported the converse, namely less poverty with smaller household size. However these appear to have either higher per capita income or exposed to modern life styles, an indication of change of the pattern along these developments. Tanzania regions show similar groupings.

Implications are drawn for both (a) population policy: to provide reproductive service but leaving people choose the size of their families, and (b) the population debate: the empirical school is on the right track that there is no or little evidence that high population growth has deleterious effects.

1.0 Introduction

The study was prompted by coincidental findings of a 1996 investigation of sources of rural poverty in Bukoba District, Tanzania (Kamuzora and Gwalema 1998): which observed higher proportion of less poor households with higher household size. A follow-up study of a homogeneous sample of 320 'normal' households, with both husband and wife present, confirmed the earlier observation. Investigation of factors causing this phenomenon pointed first and foremost to labour supply, understandable in a labour intensive African socio-economy. Important also were Kingsley Davis multiple and multi-phasic reponses to population pressure: from out-migration and diversification of activities that keep families afloat without necessarily resorting to fertility limitation outright, though by no means negating the latter malthusian response at later stages (Kamuzora and Mkanta, 2000).

Preliminary investigation of the Tanzania Demographic and Health Survey (TDHS) 1996 data shows pervasion of the pattern in almost all regions. However, in developed Kilimanjaro Region, although labour availability is still a significant factor, the less poverty/higher household size no longer holds. The region has had over time a diversification of economic activities from peasant agriculture, and it is in the middle of a demographic, notably fertility transition from 7 in the 1960's to about 5.7 live-births in the 1990's, a little below the national average (Tanzania, 1997: 30).

A basic question is to what extent the less poverty with higher household size pattern is pervasive of the African scene, and whether, *a'la* Kilimanjaro, the relation is changing with development or modernisation. The countries of the east, west and southern Africa region, certainly varying in development levels, are investigated, taking advantage of availability of vast data from the DHSs of the 1990's.

The significance of this study is, in the first instance, bringing out the extent of poverty that is talked about in Africa, and associated factors. Secondly implications of findings will be drawn, on, first, a possible 'theory' of pattern of population trends with development, thus enhancing the population debate on the effect of population growth on development. For all intents and purposes the debate has been protracted: it is to date still in a stalemate of controversy.

Notable sides to the debate are seen in their conclusions: unclear relationship (Kuznets, 1965 in Ahlburgh, 1998: 324-25, footnote 1; Easterlin, 1967, 1985; Lee, 1985; McNicoll, 1995; Ahlburgh, 1998); positive, with population pressure as mother of invention (Boserup, 1965, 1981) as high prices due to shortages in the short-run attract development of alternative cheaper substitutes in the long-run (Simon, 1981, 1996); population as an important resource (African Academy of Sciences, 1994); a youth-full population ultimate resource for Africa (Kamuzora, 1999). Another aspect is the contraceptive practice where in spite of family planning programmes since the

late 1970's the question still remains whether the findings have serious implications for the need for dynamic interpretation of fertility behaviour that will help focus both policy and programmes effectively.

The paper defines measurement of poverty level with the (wealth) possession items available in the data sets, with the resulting country poverty levels in the region presented. An analysis of the relation of poverty level with household size, looking out for varying patterns thereof, but taking into account (i.e. controlling for) correlates of poverty is made. Finally interpretation of the findings in view of low contraceptive level in the region is made with implications for effective population policies, importantly drawing approach of programmes and extension to enhancement of the protracted population debate.

1.1 Definitions

Poverty is a condition of living below a defined poverty line or standard of living (Bagachwa, 1994; Mtatifikolo, 1994; Semboja, 1994); thus the line is subject to variation by socio-politico-economic-cultural set up. Its measurement in this study is by a possessions index, a composite of household possessions, mainly that of the head, and quality of housing and sanitation. The justification and construction of the index is detailed later under Section 1.2: Data and Methods, and in Kamuzora and Gwalema (1998) and Kamuzora and Mkanta (2001). In brief, possessions are generally found to correlate with income, and level of living (Sender and Smith, 1990).

Household size consists of the number of persons usually residing in the household (*de jure*) and sharing household expenses ('common' kitchen). The welfare of a household is also drawn from a larger network of relationships (outlay too to others) and data limits us to this. Nevertheless the given variable is of members that are practically involved in the day to day welfare of the household, therefore not significantly far from the ideal. Indeed relations other than children of the head would need to be included, but practically impossible to be enumerated in a survey.

1.2 Data and methods

1.2.1 Data

The study utilises country-wide Demographic and Health Surveys (DHS) of the 1990's: 10 countries from eastern and southern Africa and 11 from the western region. From northern Africa only one data set, that of Egypt was available; there is also one from Turkey. They will enrich the observations on the subject.

1.2.2 Measurement of poverty

Poverty level, as stated above, was measured by a possessions index and quality of housing and sanitation. Construction of the index is detailed in Appendix 1. Justification of these items as indicators of poverty level can be made. As argued convincingly and used successfully in a study in Lushoto by Sender and Smith (1990: 28-29), and in Bukoba District by Kamuzora and Gwalema (*op. cit.*), and Kamuzora and Mkanta (*op. cit.*), this index of material well-being, is: (i) not only simple but importantly, its inputs, through stocks, have generally been observed to be closely correlated with current well-being (from flows of income) and shows overall economic status of respondents as measured by other indicators e.g. landholding, cropping patterns, use of productive inputs, and access to education and health services; the Tanzania Demographic and Health Survey collected also degree of a household's food security (flows): its correlation with the possession index (stocks) has been observed and ascertained in the data by Kamuzora and Mkanta (*op. cit.*); (ii) it is not distorted by memory lapse, nor subject to ability of respondents to distort or mislead, and exaggerate or underestimate as for example, income; (iii) questions require definite *versus* arbitrary or estimated answers; (iv) information is both easily collected by research assistants with little training, and its elements are physically seen e.g. housing. Furthermore, these items provide welfare, possessions and housing and sanitation quality and are clear indicators of poverty level.

There are alternative methods of identifying the poor, but as can be briefly discussed here they suffer some basic drawbacks. As income is difficult to measure, expenditure is often measured through the conventional household budget survey (HBS). Two measures of poverty can be derived thereof: relative poverty (household expenditure below the average), and the Engel index (over 60 % of expenditure/income spent on food). In there, adjustment is made for household structure by calculating adult equivalent expenditure (and production), with especially young children given less weight than adults. In a particular study applying these methods on the early 1990's HBSs of Tanzania and Uganda, Mwisomba and Kiilu (2001) show smaller families to be less poor. The methods and the data have inherent drawbacks especially in the African situation and cast doubts on the validity of the results. As will also be observed in discussion of the results, relation to logic and what is seen on the ground and theoretical backing, will show which method shows reality.

In the HBS expenditure is recorded. Data collection is by a household keeping or an interviewer visitor filling a logbook. This has a host of quality problems: with subsistence economy there are problems of valuation of own produced consumed goods; illiteracy and non-numeracy (even if using an interviewer, recall errors and mistatements depending on what the respondent thinks of potential benefits/prestige of a type of answer).

Adult equivalents, while sounding logical cannot be well conceived in the African

context which is largely peasant (traditional) socio-economy. When there is division of labour not only among adults, say by gender, but and importantly also between adults and children (those old enough, by age six, to do some work), the idea of adult equivalents becomes meaningless.

Even in consumption, when one contemplates all that a single child of any age consumes and what is spent including the opportunity cost of the attention, it is uncertain that children consume less than adults.

A possessions index is easier to use compared to income and expenditure. Possessions reflect income level, especially and directly showing the items providing welfare. Implicitly the Mwisomba-Kiilu criticism would like *per caput* use/access of the possessions. This is thought as not being necessary, for two reasons. One is practical, for example: one radio in a household can be listened to by either one person or more to the same effect; even a six-member household with a good quality house is certainly better off than a one-person one living in a shack! Thus the possessions indicator, explicitly discriminates between poor and less poor households which is different from a total income one, which Mwisomba and Kiilu wrongly equate with.

In this study, because logistic regression will be used with poverty level as a dependent variable, a household is identified in either of two categories, poor and less poor as follows:

Poor=1: poor housing (earth walls/floor or thatch roof, or improved housing but with only minimal possessions of up to a bicycle or radio, crowding above 4 person per room, unsafe water source, or poor or no toilet facility).

Less poor=0: improved housing (cement walls/floor and corrugated iron sheets or tile roof) and housing and possessions beyond that of the poor (i.e. any or all of, electricity, refrigerator, television, motorcycle/car/lorry).

1.3 Analysis

Statistical methods are used. First simple bivariate patterns of percent less poor by household size will be looked at and country poverty levels across Africa will also be observed. Second, analysis of these patterns is done by logistic regression: controlling for intervening factors of poverty, contrast of poverty level by household size with the largest is made. Attention will be paid to odds ratios: with the above coding an odds ratio above one will indicate a household is poorer than the largest and the converse. Further variation of this pattern by level of development will be made.

2.0 Levels and patterns of poverty by household size

Poverty levels and patterns by household size in the East, Southern and Western Africa region, as per above definition can be observed in Tables 1.1 and 1.2. Shown are percentages of households that are less poor by household size (the difference from 100 percent is the poor percent). The totals row shows a country's poverty incidence, again, by subtracting from 100 (%).

Table 1.1 Percent of households in less poor category by household size in the countries of the eastern and southern Africa region, 1990's.

H/hold size	UGANDA		RWANDA		ZAMBIA		TANZANIA		MOZAMBIQUE		KENYA		NAMIBIA		ZIMBABWE	
	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
1	26.4	855	21.1	351	20.1	437	27.8	698	14.5	795	42.6	1197	46.0	298	65.9	675
2	26.0	962	16.7	633	22.7	724	26.7	924	13.5	1174	35.9	999	54.0	404	56.3	646
3	22.8	1077	11.5	875	22.4	967	26.8	1084	14.7	1388	32.4	1084	45.3	397	54.6	722
4	21.9	1068	12.0	955	24.0	1013	21.0	1104	16.8	1478	30.9	1209	46.5	473	47.9	785
5	18.2	935	11.8	888	27.2	1023	19.4	1121	20.9	1233	24.2	1113	38.5	436	40.3	775
6	20.2	805	12.2	863	28.9	831	18.3	956	23.9	1080	25.2	936	34.2	406	39.6	667
7	20.9	608	14.2	655	35.8	746	19.8	737	29.3	703	22.4	691	34.8	339	34.1	539
8+	22.7	1098	21.0	991	40.1	1428	22.0	1211	35.6	1332	23.5	1002	29.3	1212	31.5	951
Total	**22.5**	**7408**	**14.5**	**6131**	**28.9**	**7169**	**22.6**	**7835**	**20.9**	**9183**	**30.2**	**8231**	**38.7**	**3965**	**45.8**	**5760**

	COMOROS		MADAGASCAR	
	%	n	%	n
1	32.7	52	15.0	500
2	29.3	147	16.5	818
3	27.8	216	16.7	1059
4	28.8	257	21.9	1212
5	26.9	294	19.2	1008
6	22.8	281	16.2	868
7	28.0	261	15.8	601
8+	26.6	728	14.0	1019
Total	**27.0**	**2236**	**17.3**	**7085**

Table 1.2 Percent of households in less poor category by household size in the countries of the western Africa region, 1990's.

Household Size	**Cameroon**		**Cote d'Ivoire**		**Togo**		**Ghana**		**Benin**	
	%	n	%	n	%	n	%	n	%	n
1	42.4	476	58.0	790	36.4	771	46.6	1398	22.7	366
2	40.9	340	57.7	548	38.4	666	48.4	771	19.8	365
3	40.2	341	62.7	542	33.5	835	45.0	835	18.2	494
4	38.9	352	55.2	578	29.8	870	39.6	810	17.2	587
5	36.4	349	49.0	567	20.0	886	27.2	670	19.3	524
6	46.1	360	48.7	522	20.8	828	33.5	513	16.1	460
7	45.5	286	52.5	432	23.4	642	30.1	319	21.4	398
8+	48.9	927	53.9	1778	20.4	1905	24.6	460	17.3	1255
Total	**43.5**	**3431**	**54.7**	**5757**	**26.5**	**7403**	**39.6**	**5776**	**18.5**	**4447**

Household Size	Burkina		**Senegal**		**Mali**		**Tchad**		**Niger**	
	%	n	%	n	%	n	%	n	%	n
1	50.2	323	59.4	170	34.5	447	5.1	664	18.9	270
2	35.5	465	47.5	160	23.6	893	5.5	785	11.2	511
3	37.6	545	39.8	216	26.1	1179	6.4	856	12.4	716
4	35.7	510	39.6	298	27.8	1200	5.3	876	12.2	722
5	35.1	572	31.1	392	25.2	1130	6.2	874	13.0	733
6	34.5	525	33.5	460	28.3	960	7.1	706	11.4	691
7	42.0	450	38.0	424	28.2	762	7.6	577	13.3	623
8+	45.7	1682	41.9	2590	39.0	2059	14.9	1399	20.1	1609
Total	**40.5**	**5072**	**40.4**	**4710**	**29.9**	**8630**	**7.9**	**6737**	**14.7**	**5875**

Wide variation of poverty levels can be observed in both regions. The proportion of households that are less poor ranges, in eastern and southern Africa, from a low of 14.5 percent in Rwanda to almost 46.0 in Zimbabwe, averaging at 26.9 percent; for west Africa it is 8 percent in Tchad to 55 in Cote d'Ivoire, averaging at 28.7 percent. The complement, proportions living in poverty, are then between 53 percent in Zimbabwe and 85 in Rwanda, and 45 in Cote d'Ivoire and up to 92 in Tchad; this is on average, 73.1 percent and 71.3 respectively. It is a deep pervasion of poverty. Looking at it from the actual indicators used in this study, one sees low standards of living of poor housing, unsanitary conditions, and having no or just a few household items as the main ones.

Before observations on the pattern of poverty by household size is done there is need to control for intervening correlates of poverty. Three basic groupings emerge from these data, even without control for the intervening factors as can be observed in Charts in Appendix 2.

The first group is of countries which show the rising proportion of less poor with higher household size: Zambia and Mozambique in eastern-southern Africa, and Tchad and Central African Republic (CAR) in the west. In contrast are those with a converse pattern of less poverty with smaller household size: Zimbabwe, Namibia, Kenya and Comoros in eastern-southern Africa, and Ghana and Togo in the west. Most of the remaining countries (11) have mostly declining proportions of less poor, but rising near the highest household size. Four of these however, have a U-shape: fluctuating at the bottom over a distinct wide range of household size, 3 to 6; with Madagascar rising a bit then falling.

An additional variable 'pattern' is therefore created as per these groupings: that of higher proportions of less poor with higher household size.

Table 2.1 shows results of logistic regressions, showing odds of a household of a certain size being in the poor category in contrast to the largest of size 8 persons and over, while controlling for correlates (intervening variables) of poverty. A value above 1.0 indicates higher odds (in effect number of times) of being poor compared to the reference size. All odds are statistically significant at $p < .01$ or $< .05$ except where indicated by a minus sign. For the controlled variables, with poverty category coded 0 for less poverty and 1 for being poor, an odds value less than one means a higher value of a variable is associated with less poverty.

It can be seen for both areas, first from the totals, that, now with control for other correlates, the pattern of less poverty with higher household size comes out clearly, and it is overwhelming as is shown by high statistical significance, mostly at less than .01 level (of error). For example in the eastern-southern Africa region the odds of being poor decrease monotonically with higher household size: compared to largest households of eight members and above, a one-member household is nearly three times poorer, 2.3 times for the two-member, 1.7 for the three member, and so on; similarly in western Africa. Although not shown, within urban and rural areas in each region this pattern holds. Thus almost all countries, except four (out of the ten) in eastern and southern Africa, and two (out of eleven) in western Africa, generally show this pattern. Even the exceptions, if not for not being significant statistically, show a tendency of the largest households as being less poor. However, two countries in the western region, Ghana and Togo show the converse pattern: here smaller households show to be less poor than larger ones at high statistical significance ($p < .01$).

Table 2.1: Odds ratios of a household of a certain size being poor compared to the largest by poverty/household size pattern grouping in Eastern, Southern and Western Africa.

	TOTAL	ZAMBIA MZQ	UGANDA TNZ	RWANDA	KENYA	NAMIBIA ZMW	COMOROS	MADAGASCAR
Household size / **Odds Ratios****								
1	2.802	4.149	2.102	7.528	2.145	1.238-	1.600-	2.480
2	2.334	3.150	1.565	6.161	1.883	1.327+	1.525-	1.778+
3	1.704	2.254	1.257+	4.445	1.312+	.941-	1.219-	1.189-
4	1.558	2.019	1.265	3.111	1.149-	1.040-	1.051-	0.826-
5	1.576	1.521	1.515	2.733	1.489	1.143-	1.123-	0.902-
6	1.322	1.454	1.176-	2.077	1.061-	1.099-	1.358-	1.062-
7	1.178	1.143-	1.063-	1.595	1.158-	1.119	0.882-	0.857-
8+ (Ref.)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Sex of head	0.870	0.892-	0.673	1.358	0.923-	1.082-	0.717	0.962-
Age of head	0.990	0 .989	0.989	1.004	0.990	0.990	1.000+	0.976
Location	10.408	9.327	11.034	7.783	5.871	27.289	4.362	29.093
Education of head	0.811	0.829	0.789	0.801	0.817	0.816	0.876	0.728
Prop. in labour force	0.208	0.250	0.323	0.099	0.151	0.285	0.477	1.112
Husb./wife pres.	1.373	1.341	1.157	1.590	1.674	1.281	854+	0.040-
Pattern	1.211	-	-	-	-	1.534	-	
Sample	53,998	15,692	14,858	5,955	8,130	9,363		
Per caput GNP,	-	330	310	230	350	1,940	400	250
1998 (US $)		210	220			620		

MZQ=MOZAMBIQU, ZMW=ZIMBABWE, TNZ=TANZANIA, MGC=MADAGASCAR

	TOTAL	TCHAD CAR	MALI NIGER BURKINA	CAMEROON COTE D'IV SENEGAL	GHANA TOGO	BENIN
Household size **/ Odds Radio****						
1	1.99	7.54	2.78	2.15	.65	1.58
2	2.07	6.00	3.19	2.04	.59	1.77
3	1.72	4.40	2.47	1.49	.58	1.60
4	1.64	3.75	2.12	1.42	.64	1.36
5	1.91	2.54	2.06	1.86	1.23	1.36
6	1.61	2.15	1.91	1.48	.92-	1.24-
7	1.45	2.19	1.72	1.24+	.91-	.98-
8+ (Ref.)	1.00	1.00	1.00	1.00	1.00	1.00
Sex of head	.95-	1.44	1.33	.86-	.57	.57
Age of head	1.00	1.01	1.01	1.00-	.99	.99-
Location	7.94	14.67	8.18	12.74	6.77	6.90
Education of head	.91	.96	.85	.89	.87	.80
Prop. in labour force	.47	.33	.49	.42	.57	.51
Husb./Wife Pres.	.96-	1.00	.90-	1.23	.96-	1.10-
Pattern	.22	-	-	-	-	-
Sample	57,586	11,978	19,136	9,060	13,074	4,338
Per caput GNP, 1998 (US $)	-	230 300	250 200 240	610 700 520	390 330	380

NB: Depend.var.: poverty category: Less poor=0, Poor=1; Sex: Male=1, Female=2; Education=years attended school; Location: Urban=1, Rural=2. HUSBWIFE (Husband and Wife present): No=0, Yes=1.

** All significant at $p < .01$ level, except where stated: + Significant at $p < .05$; - Not significant.

Thus real groupings emerging are three, replacing earlier ones when no control for intervening factors was done. The first is of less poverty with higher household size, that is pervasive of the region; second is where this pattern is only a tendency, i.e. not significant; and third is where smaller households are less poor.

Important observations can also be made for the correlates of poverty, i.e. the variables other than household size. All have the expected odds values, and importantly they are statistically significant (mostly with $p < .01$) in all countries, confirming their importance as intervening factors of poverty. Thus less poverty is associated with older age (a life cycle trend), though in eastern-southern Africa education also counts. Abject poverty conditions in rural areas can be observed clearly: over 10 times poorer than urban areas. Notable is higher proportion of household members in labour force at ages 15 years and over, where it is everywhere related to less poverty; together with higher household size, these two are important explanatory variables of less poverty on which the focus is.

It is worth noting here that these findings do not by any means indicate that every individual big household is less poor than small ones or the converse. As can be seen in the bivariate case in Tables 1.1 and 1.2, one still observes high proportions in the poor category at all levels of household size in all countries. It is a phenomenon that needs further study, but beyond the data available. However, this does not negate what the data and further analysis show: proportions of less poor significantly increase with higher household size in most of Africa.

Supporting evidence can be drawn from the Egyptian and Turkish DHSs shown in Tables 2.2 and 2.3 respectively. Contrasts of poverty in the Egyptian case rivals those of many other African countries.

The finding of less poverty with higher household size raises a lot of scepticism. It is therefore imperative to cast the methodology net wider for more information. Stepwise regression is employed to see which factors are drawn into the equation, i.e. are more associated with poverty level. Here the number of factors are increased: those identified above, and interaction among them (two-way interactions). This will be done watching out for hypothesized factors: not only household size but its coming into the equation as per groupings of poverty/household pattern identified earlier.

Tables 3.1 and 3.2 show results of this stepwise logistic regression for the two regions and country groupings observed.

Table 2.2: Egypt: logistic regression of poverty with household size (contrast with largest), controlling for intervening variables

Variable	(n)	B	S.E.	Df	Sign.	R	Exp (B) (odds ratio)
Household size				7	.0000	.1064	-
1	(715)	1.6964	.1141	1	.0000	.1021	5.4545
2	(1247)	.6854	.0825	1	.0000	.0565	1.9846
3	(1598)	.6612	.0714	1	.0000	.0631	1.9372
4	(2155)	.4181	.0626	1	.0000	.0450	1.5190
5	(2523)	.3078	.0578	1	.0000	.0354	1.3604
6	(2125)	.1841	.0590	1	.0018	.0192	1.2022
7	(1640)	.1289	.0628	1	.0401	.0103	1.1376
8+ (Ref.)	(3199)	-	-	-	-	-	1.0000
Sex of head		-.0937	.0891	1	.2929	.0000	.9106
Age of head		-.0190	.0015	1	.0000	-.0855	.9812
Location of house		-.2709	.0369	1	.0000	-.0497	.7627
Education of head		-.0811	.0033	1	.0000	-.1685	.9221
Prop. Labour force		-1555	.0975	1	.1106	-.0051	.8560
Husb/Wife Present		-.0703	.0797	1	3776	.0000	.9321

Table 2.3: Turkey: logistic regression of poverty with household size (contrast with largest), controlling for intervening variables

Variable	(n)	B	S.E.	Df	Sign.	R	Exp (B) (odds ratio)
Household size				7	.0000	.1048	-
1	(335)	1.1622	.1141	1		.1706	3.1968
2	(1089)	.5058	.0825	1	.0000	.0418	1.6582
3	(1218)	.1765	.0714	1	.0000	.0074	1.1930
4	(1753)	.1252	.0626	1	.1120	.0000	.8823
5	(1391)	.2510	.0578	1	.2137	.0207	.7780
6	(881)	.2783	.590	1	.0120	.0213	.7591
7	(575)	.1440	.0628	1	.2307	.0000	.8659
8+ (Ref.)	(843)	-	-	-	-	-	-
Sex of head		-.0935	.1331	1	.4826	.0000	.9108
Age of head		-.0058	.0023	1	.0103	.0220	1.0058
Location of house		-.0579	.0555	1	.0000	.0869	1.6106
Education of head		-.7004	.0080	1	.0000	-.0727	.9438
Prop. Labour force		-0681	.01585	1	.0000	-.0429	.4964
Husb/Wife Present		-.0703	.01163	1	05581	.0000	.9342

Table 3.1: Coefficients of stepwise multiple logistic regression of poverty category with household size, correlates and their interactions in the East and Southern and Western Africa: total and rural/urban location

	Coefficients**		
East and Southern Africa	**Total**	**Urban**	**Rural**
HOUSEHOLD SIZE, PROP. LABOUR, PATTERN			
Pattern (Poverty/Household size)	.1884	.2468	-.1565
Household size	.0609	-	-
Household size, Prop. Labour	-.2239	-.2524	-.1284
Household size, Husb./wife present	-.0617	-	-.0691
Household size, education of head	-	-.0053	-
PropLabour, education	-.0965	-	-.1351
PropLabour, sex of head of household		-.3149	-
PropLabour, age of head of household	-	-	-.0063
OTHER CO-RELATES			
Age (of head of household)	-.0106	-.0084	-
Education (of head of household)	-.1033	-.2358	-.0628
Location of household	2.1401	-	-
Sex, husband/wife present	-.0330	-	-.0328
Age, husband/wife present	-	-	-.0101
Education, husband/wife present	-	-	-.0231+
Location, husband/wife present	.3373	-	-
Husband and wife present	-	.1570	1.2580
Western Africa			
Household Size	.0820+		.1062
Household Size, Age	-.0031		-.0027
Household Size, Location	.0417		
Household Size, Education	-.0067	-.0052	
Household Size, PropLabour	-.0703	-.1415	
Household Size, Husband/Wife Present	-.0771	-.0491	-.0972
Pattern	.2134	-.3065	.111
PropLabour	-1.3023	-1.0111	
PropLabour, Location	.5763		
PropLabour, Education	-.0435	-.0325+	-.0551
PropLabour, Age		-.0117	
PropLabour, Sex			-.2632

OTHER CORRELATES			
Age (of head of household)	.0263		.0069
Age, Location	-.0089		
Age, Education	-.0017	-.0015	-.0019
Age, Husband/wife present	.0114	.0042	.0091
Location	1,7661		
Location, Education	-.0381		
Location, Husband/Wife Present	.3646		
Education of the Head	.1202	.1210	
Education, Husband/wife Present	.0404		.0598
Husband/wife Present	-1.3397		
Sex of Head		.3348	
Sex of Head, Education	-.0553	-.0773	-.0536
Sex, Husband/wife Present	.4994		

NOTES:

1. ** All variables are significant at $p < .01$ level, except where stated.
2. + Significant at $p < .05$.
3. Coding:

Dependent var: poverty category: Less poor=0, Poor=1;

Sex (of Head): Male =1, Female =2;

Education: years attended;

Location of household): Urban =1, Rural =2;

PropLabor: proportion of household members 15 years and above.

4. Negative coefficient: The higher the value of a variable, or interaction, the less poor a household is.

Table 3.2: Coefficients (B) of stepwise multiple logistic regression of poverty category with household size, correlates and their interactions in the countries of East and Southern Africa region

(a) Eastern and Southern Africa

	ZAMBIA MZQ	TANZANIA UGANDA	RWANDA	KENYA	NAMIBIA ZMW	COMORO	MGC
Variables in he Equation / Coefficients**							
HOUSEHOLD SIZE, PROP. LABOUR							
Pattern (Poverty/Household size)	-	-	-	-	.4073		
Household size, PropLabour	-.2279	-.2041	-.2836	-.1205	-	-	.688
Household Size, Husb/wife pres.	-.0624	-	-.1948				
Household Size, Age	-	-	.0051	-	-.0007	-	.010
Household Size, Education		.0104	-	-	.0061	-	.021
Household Size, Location	-	-.1108	-.1108	-	-	-	-.130
PropLabour, Education	-	-	-.2479	-.9114	-.1143	-	.175
PropLabour, Sex of Head	-.2596	-.1815	-	-	-	-.329	-
PropLabour, Age	-	-	-	.0265	-.0110		
PropLabour, Location	-	-	-	1.1121			
OTHER CORRELATES							
Age (of head of household)	-.0129	.0175	-	-.0317			
Age, education of head	.0013+	-	-	-	-	-.792	-.003
Location	1.9214	3.7938	2.7545	2,5906	3,3290	1.439	-
Education	-.3253	-.2043	-	-	-.1544		

Sex, education	-	-	-	-.0601	-
Sex, Husband/Wife Present	.4911	-	-	-	.1573
Location, Husband/wife present	-	-	.7151	.2636	
Sex, Location	-	-.2549	-	.1416+	
Age, Location	-	-.0184	-.0106		
Education, Location	.0578	-.0547	-.0401	-.0456	

MZQ=MOZAMBIQUE, ZMW=ZIMBABWE, MGC=MADAGASCAR

(b) Western Africa

	TCHAD CAR	MALI NIGER BURKINA	CAMEROON COTE D'IVORE SENEGAL	BENIN	GHANA TOGO
HOUSEHOLD SIZE, PROP. LABOUR					
Household size		.3774	.1238+		.2435
Household size, PropLabour	-.2003				-.2194
Household Size, Sex of head	-.0574	-.2137			

Household Size, Age		-.0043	-.0002		-.0019
Household Size, Husb./Wife Pres.	-.0965	-.1530			
Household Size, Location				-.1427	.0923
Household Size, Education	-.0035+				-.0137
PropLabour		-.9394+	-2.5586		
PropLabour, Age		-.0231	.0152		
PropLabour, Sex					-.6327
PropLabour, Education		.0669			-.0884
PropLabour, Location		.7433	.6967		.4675
OTHER CORRELATES					
Age, Husband/wife present	.0114	.0131			
Age (of head of household)		.0387			
Age, Education of Head		-.0023			-.0023
Age, Location					-.0094
Sex, Education of Head	-.0990	-.1107	-.0468		-.1091
Sex of Head	.8651	1.3132			-.5587
Sex of Head, Age					.0100
Sex of Head, Husband/wife present	-.3476+				-.8647
Sex of head, Location					-.2103
Education, of Head					.0958
Education, Husband/wife present	.0922				-.0244
Husband/wife present			.2177		
Location	2.6473	1.6527	2.2252	2.6904	1.9625
Location, Education of Head			-.0430		-.0674
Location, Husband/wife present					

A first important observation is that higher household size per se is in most countries not selected into the equation; where it is, as in Mali-Niger-Burkina, Ghana-Togo and Benin, it is related with higher poverty, as would be expected. A second important observation does not dismiss the argument of focus, of less poverty with higher household size. Household size appears very much into the equations, but importantly when interacting with other variables. As can be seen with variables of household size or proportion in the labour force, almost all coefficients have a negative sign. It shows therefore that higher household size, rarely per se, but mostly by interaction with another variable is associated with less poverty. The more relevant and indeed important one is higher household size interacting with higher proportion of household members being in the labour force ages of 15 years and above and found to be less poor.

Evidence from the Egyptian and Turkish DHSs show similar results.

2.1 Poverty by household structure

Table 4 shows odds ratios of poverty compared to a household with the highest proportion, i.e. .67 and higher, of its members in the labour force (ages of 15 years and above), controlling for intervening factors of poverty including household size, for the two African regions. Median age of the head of the household at each level is also shown in the right panel.

Table 4: Odds of being poor, and age of head of household by household's proportion of members in the labour force ages of 15 and above in Eastern-Southern, and Western Africa

(a) Eastern-Southern Africa

Proportion in labour force	Odds of being poor*			Median age of head		
	Total	Rural	Urban	Total	Rural	Urban
0 - .335	1.63	1.53	1.69	37.0	38.0	36.0
.335 - .509	1.27	1.20	1.31	39.0	40.0	37.0
.509 - .673	.99	.90	1.06	43.0	45.0	38.0
.671 – 1.000	1.00	1.00	1.00	48.0	52.0	39.0
(b) Western Africa						
0 - .335	1.7	1.4	2.1	40.0	40.0	39.0
.335 - .509	1.4	1.2	1.5	42.0	43.0	40.0
.509 - .671	1.2	1.2	1.3	45.0	46.0	43.0
.671 – 1.000	1.0	1.0	1.0	44.0	50.0	39.0

*All odds significant at $p < .001$

Less poverty with higher proportions in the labour force can clearly be seen, as expected from earlier results of logistic regression. Though not shown, this is true at disaggregated level, whether by rural-urban location or grouping by pattern of poverty by household size. Over the life cycle, a household would be expected to have more of its members older, therefore in the labour force. It can be seen that the head's age rises in proportion to members in the household, and given the earlier observation of less poverty related to higher size, it shows that a life cycle buildup of both wealth and size is shown to exist, importantly with a fair indication of causality (for wealth buildup) from labour availability for both household production and in-coming income transfers.

The issue is examined further by looking at whether the correlates of poverty vary by poverty/development level groupings above.

2.2 Correlates of poverty by development level

African countries were seen above to be in three groupings: the pervasive or dominant one of less poverty with higher household size, a second, where this pattern is not significant, and a third where smaller household were significantly less poor. Whether these are related to level of development is unclear. It is because this is notable only in Eastern-Southern Africa. As shown in Table 2 (bottom), countries with the dominant pattern are less developed, with GNP per caput of US $ 210-350, while where there is no significant pattern, i.e. in Namibia, Zimbabwe and the Comoros it is US $ 400-1,940 (Population Reference Bureau, 2000: 2-3). However in Western Africa, some countries of the first, dominant group of less poverty with higher household size, namely Cameroon, Cote d'Ivoire and Senegal, show the highest income ($520-700) compared to Ghana and Togo, which though depicting a converse pattern of smaller households being less poor, are at incomes of only $330-390.

There seems to be an Eastern-South versus Western Africa contrast: development level in the former, and other factors, unknown in the latter. Some preliminary indicators could be associated with modern or western life styles, probably higher education, (e.g. Namibia and Ghana) rather than income that may be distinguishing them from the dominant first group.

Tanzania is a relatively huge country, and is known to have wide variations in development levels or modernisation. It is therefore disaggregated to see whether any patterns emerge on the poverty/household size relationship.

2.3 Tanzania: poverty/household size pattern versus development

Regions of Tanzania fall into four main groups by pattern of poverty by household size. At one end is a dominant, first group, of less poverty with higher household size in rural areas of most regions; at the other end is the converse, fourth group, with

lower poverty, smaller household in rural areas of some regions. In between the two ends are two groups, both in urban areas, one a complement of the first group but where the poverty/household size pattern is not significant and the second group contrasting with its rural, (fourth group) complement, where poverty is less with size. There is also another group not shown –the 'outlier' regions, namely Dodoma and Singida, that do not show any relationship with any of the factors being considered. Tables, 5.1 to 5.4 show logistic regression results of poverty level with household size controlling for intervening variables for the four groups.

The first group shown in Table 5.1, is (a), the pattern of less poverty with higher household size. As can be observed in the last column, the odds of a household of a given size being poor compared to the largest, decrease with increase in household size. These are rural parts of most, 15 out of Tanzania's 22 regions, accounting for over 81 per cent of the total sample households. These reflect the general countrywide pattern seen earlier and span basically the south, south-west, west and Lake (Victoria) areas of the country, and a few from the north-east. Most of these are the main agricultural regions. This pattern is a highly significant one-to-one relationship. This is confirmed by stepwise logistic regression, panel (b) that brings in, at high significance ($p < .0001$), the interaction of higher household size with proportion of members in the labour force.

Although attention is on the poverty pattern of household size, intervening variables, except one, have the right, expected (negative) signs, and are significantly associated with less poverty. However in rural areas of some regions the presence of both husband and wife, i.e. a normal household is observed. The negative sign for sex of head in panel (a) indicating unexpectedly less poverty for a household with a female head is easily explained away by stepwise regression in panel (b), that it is less poor if the female head has higher education.

The second group, is the urban complement of the first group that includes most regions, and Dar es Salaam City. It depicts a transition from the first, rural stage. Shown in Table 5.2 are results of stepwise regression to see which factors are 'called' into the equation as significant in the level of poverty (the poverty pattern by household size however is only a tendency but not significant, therefore omitted).

The results show pretty much what is expected in urban areas: it is the intervening variables of education per se, and its interaction with higher proportion of household members being in labour force ages that are significantly related to less poverty ($p < .0001$). Additional significance is the head being female. Because Tanzania does not have a strong female economy as in Western Africa, being categorised as heads is new. However, an emergent factor is that women work hard.

Table 5.1: Logistic regression of poverty with household size controlling for intervening variables: pattern of less poverty with higher household size in most of rural Tanzania

(a) Contrast by household size

Variable	(n)	B	S.E.	Df	Sign.	R	Exp (B) (odds ratio)
Household size				7	.0096	.0468	-
1	(265)	1.1866	.4079	1	.0036	.0556	3.2758
2	(453)	1.2003	.3194	1	.0002	.0761	3.3211
3	(541)	.8231	.2567	1	.0013	.0629	2.2775
4	(604)	.6437	.2282	1	.0048	.0534	1.9034
5	(611)	.3798	.2105	1	.0712	.0245	1.4620
6	(539)	.4404	.2260	1	.0514	.0293	1.5533
7	(428)	.2341	2286	1	.3058	.0000	1.2637
8+ (Ref.)	(680)	-	-	-	-	-	1.000
Sex of head		-.8752	.2421	1	.0003	-.0727	.4168
Age of head		-.0112	.0051	1	.268	-.0373	.9889
Education of head		-.2310	.0224	1	.0000	-.2229	.7937
PropLabourForce		-1.3090	.3827	1	.0006	-.0681	.2701
HusbWife Present		-.2647	.2428	1	.2756	.0000	.7675
Stepwise regression							
H/hold size, Prop. Labour Force		-.2703	.0531	1	.0000	-.1068	.7631
Sex, Education of Head		-.1071	.0224	1	.0000	-.0997	.8985
Age, Education of Head		-.0018	.0007	1	.0049	-.0531	.9982

(REG = 1,2 RUR, n=4121 (81.14 %))

Coding: Poverty level: Poor=1, less poor=0

Sex of head: male=1, female=2

The third group, even though in urban location, presents a contrasting, indeed seemingly strange pattern relative to the first and shows that there is less poverty with higher family size (Table 5.3). These are urban areas of Kilimanjaro, Zanzibar (excluding Pemba) and Morogoro regions. This difference is identified in the stepwise regression results.

This sub-group eliminates both the seemingly strange less poverty/higher household pattern, and shows the interaction of higher education level with higher proportions of members being in the labour force. The size and labour force show socio-economic changes from the typical state of higher household size cum higher proportion of

members in the labour force, seen for the majority of the regions. The second is the position of females in bigger households and whether it is a female economy in urban households.

Table 5.2: Results of stepwise logistic regression of poverty with household size and intervening variables in most urban areas of Tanzania (including Dar es Salaam City)

N = 1428

Variable	B	S.E.	df	Sign	R	Exp (B)
Sex of head	-.3070	.1467	1	.0364	-.353	.7357
Education of Head	-.1448	.0318	1	.0000	-.0991	.8652
Education, PropLabourForce	-.1464	.0394	1	.0002	-.0787	.8638

The fourth group, in Table 5.4, shows extremes of smaller households being less poor, in the rural location, as observed in the second urban group observed earlier. However, the pattern is not significant for the smallest households of 1 or two members, most probably due to the nature of the regions themselves: Kilimanjaro, Zanzibar, and Morogoro not predicting the full rural characteristics.

Table 5.3: Logistic regression of poverty with household size controlling for intervening variables: pattern of less poverty with higher household size in some regions of urban Tanzania

(a) Contrast by household size

Variable	(n)	(B)	S.E.	df	Sign	R	Exp(B)
Household Size				3	.0127	.1174	-
1-2	(75)	1.4702	.6043	1	0150	.1059	4.3503
3-4	(66)	1.0675	.4464	1	0.168	.1031	2.9081
5-6	(64)	1.2708	.4285	1	.0030	.1394	3.5638
7+ (ref.)	(69)	-	-	-	-	-	1.0000
Sex of head		-.7277	.4377	1	.0964	-.0468	.4830
Age of head		-.0259	.0121	1	.0319	-.0863	.9744
Education		-.2342	.0491	1	.0000	-.2439	.7912
PropLabourForce		-2.4420	.9158	1	.0077	-.1209	.0870
HusbWifePresent		-.1520	.4140	1	.7136	.0000	.8590

(b) Stepwise regression

N=274

Age of Head	-.0336	.0114	1	.0034	-.1373	.9670
Household size, Sex of head	-.0111	.0047	1	.0181	-.1012	.9890
Education, PropLabourForce	-.3553	.0645	1	.0000	-.2848	.7010

Table 5.4: Logistic regression of poverty with household size controlling for intervening variables: pattern of less poverty with smaller household size in some regions of rural Tanzania

(a) Contrast by household size

Variable	**(n)**	**(B)**	**S.E.**	**df**	**Sign**	**R**	**Exp(B)**
Household Size				**3**	**.0469**	**.0438**	-
1-2	(237)	-.4150	.3708	1	.2630	.0000	.6603
3-4	(287)	-.7077	.2657	1	.0077	-.0706	.4928
5-6	(291)	-.5246	.2522	1	.0375	-.0477	.5918
7+ (Ref..)	(251)	-	-	-	-	-	1.0000
Sex of head		-.7799	.3216	1	.0153	-.0616	.4584
Age of head		-.0443	.0065	1	.0000	-.2092	.9566
Education of head		-.3135	.0334	1	.0000	-.2900	.7309
PropLabourForce		-.0588	.4800	1	.9025	.0000	.9429
HusbWifePresent		-.1772	.3070	1	.5637	.0000	.8376

(b) Stepwise regression

N=1041

Variable	**B**	**S.E.**	**df**	**Sign**	**R**	**Exp(B)**
Sex, Age of head	-.0120	.0028	1	.0000	-.1267	.9881
Education, Age of head	-.0059	.0006	1	.0000	-.3030	.9941

Coding: Poverty level: Poor=1, less poor=0.

Sex of head: male=1, female=2.

These results show households headed by older females, or any headed by an older person with higher education, to be less poor. It is both a life cycle build up of wealth and perhaps emergence of a female economy.

The general observation is that less poverty with higher household size is pervasive in most of west, central and south Tanzania, especially the agricultural regions known for less economic diversification. This is in contrast to urban centres and parts of the north-east where the pattern is not significant or is the converse. It is a clear change of pattern of development as earlier noted in the eastern-southern Africa region.

3.0 Discussion

The pattern of less poverty with household size is pervasive of the African region, with indications of changes with modernisation being clear in eastern-southern Africa but more complex in the west. The most pertinent issue of the study is how this can be interpreted; and the implications, particularly on population policy and development inter-relationships.

The pattern seems to reflect more of older household heads, over the life cycle, having accumulated both more children and wealth. Relevant to this study is that the basis is higher household size from which both a higher proportion and number of workers is drawn, which augers well with the labour shortages that micro level farm studies have shown as characteristic of the labour-intensive smallholder agriculture which is the basis of the African economy (Ruthenberg, ed., 1968; Cleave, 1974; Kamuzora, 1980). The observed high fertility behaviour in Africa completes the circuit.

What are the implications for the family planning movement? It suggests that people should be left to decide and be helped to have the number of children that they desire, which is a UN convention assuming, as *homines sapientes et economici*, that people know what is best for themselves. The latter has all along been put loud and clear by people themselves: they use family planning methods mainly for spacing (Bongaarts, 1991; Cohen, 2000), and attempt to limit fertility only at high parities, as reported from e.g. African country DHSs, like the Tanzania Demographic and Health Survey 1996 (Tanzania, 1997: 45-50). Thus efforts by the family planning movement for young households to stop at just a few children may be misguided. Concentration should be on reproductive health in general, and specifically child spacing for healthy children, and let couples decide themselves on the number.

The findings of this study satisfy both theory and reality and that in contrast to the alternative, less poverty in smaller households, that were argued above, and seem to be wanting in both methods and data.

The findings of this study also bring attention to the protracted debate on the relationship between population growth and development, as there is little evidence of negative effects. It is a phenomenon that has been observed right from Kuznets by

1965 through to his student Easterlin (1967). Of perhaps more significance, given the power-politics of the debate, are three high powered studies, two, 15 years apart, 1971 and 1986 sponsored by the (American) National Academy of Sciences and National Research Council and the third one - the World Bank's 1984 World Development Report where consultants saw no evidence of deleterious effects except agreeing that "on balance" lower population growth was preferred (see reviews in Population and Development Review 1985, 1986 respectively), but it did not amuse the 1986 study lead consultants (Simon, 1986). These studies in effect repudiate the Coale-Hoover thesis, fertility decline, the prime prescription of Coale and Hoover (1958).

The thesis might trigger population ageing with its negative consequences that current developed countries and Asia dread and actually fear in terms of the burden of care of an increasing proportion of the elderly by decreasing proportions of the working populations (see e.g. Ratnasabapathy (1994); JOICFP News, 1991, 1998). The highly unlikely reversal of the trend by a rise in fertility, leads to the disliked but inevitable option of immigration of dissimilar racial stock. Further, the thesis negates implications of findings of this study, less poverty with higher household size connected to labour supply in a labour demanding socio-economy of Africa.

The Boserup (1965) thesis of the positive power of population growth, which is argued by Simon (1981, 1996) and succinctly evaluated by Julian Simon (RIP, 1998) is explained by Ahlburg (1998).

> …. Economics does not *conclusively* show that a greater number of people implies slower economic development or a lower standard of living. … Julian Simon made a valuable contribution to the population growth debate. He forced us to think harder about the issues and to consider the long-run positive consequences of population growth as well as the short-run negative impacts. … (*ibid*.: 324).
>
> (emphasis in original)

4.0 Areas for further research

Although a pattern of less poverty has with no doubt been established, yet at each level of household size there are high proportions in the poverty category conflicting with the pattern; e.g. poor at high household size and the converse. There is need therefore to investigate factors behind this phenomenon. For example aspects on poor household management where data is not available could be the crucial factor.

References

African Academy of Sciences, 1994: "Statement by the African Academy of Sciences at the Population Summit" Population and Development Review 20 (1): 238-9.

Ahlburgh, Dennis A., 1998: 'Julian Simon and the population growth debate.' Population and Development Review 24 (2):317-328.

Bagachwa, M.S.D. (ed.), 1994: Poverty Alleviation in Tanzania: Recent Research Issues. (Dar es Salaam: Dar es Salaam University Press, 1994).

Bongaarts, John, 1991: 'The KAP-gap and the unmet need for contraception.' Population and Development Review 17 (2): 293-313.

Boserup, Ester, 1965: The Conditions of Agricultural Growth (London: Allen and Unwin).

Boserup, Ester, 1981: Population and Technological Change: A study of long-term trends. (Chicago University Press).

Cleave, J.H., 1874: African Farmers: Labour Use in the Development of Smallholder Agriculture (New York: Praeger Publishers).

Cohen, Barney, 2000: 'Family planning programs, socio-economic characteristics, and contraceptive use in Malawi.' World Development 28 (5): 843-60.

Easterlin, Richard A., 1967: 'The effects of population growth on the economic development of developing countries.' The Annals of the American Academy of Political and Social Sciences 369: 98-108.

Easterlin, Richard A., 1985: 'Review Symposium' Population and Development Review: 11 (1): 113-38

Kamuzora, C.L., 1980: "Constraints to labour time availability in African smallholder agriculture: the case of Bukoba District, Tanzania". Development and Change 11 (1), 1980.

Kamuzora, C.L., (in press): A Youth-full Population: the ultimate resource for Africa, Tanzania (Dar es Salaam University Press) (earlier presented as Professorial Inaugural Lecture, 25 October, 1999, University of Dar es Salaam)

Kamuzora, C.L. and S. Gwalema, 1998: Aggravation of Poverty in Rural Bukoba

District, Tanzania: Labour Constraints, Population Dynamics and the AIDS Epidemic. Research Report No. 98.4. (Dar es Salaam: REPOA).

Kamuzora, C.L. and William Mkanta, 2001: Poverty and family size in Tanzania: multiple responses to population pressure? Research Report N0. 2001.4(Dar es Salaam: REPOA).

Lee, Ronald, 1985: 'Review Symposium' Population and Development Review 11 (1): 113-38.

McNicoll, G., 1995: "On population growth and revisionism: further questions." Population and Development Review 21 (2): 307-40.

Mosk, Carl, 1992: Review of Robert Hodge and Naohiro Ogawa, 1991. Population and Development Review 18 (2): 365-67.

Mtatifikolo, F., 1990: Resources for Human Development: Tanzania. Report to UNFPA. (Dar es Salaam: UNFPA).

Mwisomba, S.T. and B.H.R. Kiilu, 2001: "Demographic factors, household composition, employment and household welfare." Paper No. EM5 of REPOA 6th research Workshop, Dar es Salaam, April 18-19, 2001 (Dar es Salaam: REPOA).

Population Reference Bureau, 2000: 2000 World Population Data Sheet (Washington DC: PRB)

Ruthenberg, H., 1968: "Some characteristics of smallholder farming in Tanzania", in H. Ruthenberg (ed.).

Ruthenberg, H., 1968: Smallholder Farming and Smallholder Development in Tanzania (London: C. Hurst and Co.).

Semboja, J., 1994: "Poverty assessment in Tanzania: theoretical, conceptual and methodological issues.: in Bagachwa (ed.): 31-56.

Sender, J. and S. Smith, 1990: Poverty, Class and Gender in Rural Africa: A Tanzanian Case Study. (London: Routledge).

Simon, Julian L., 1981: The Ultimate Resource (Princeton University Press)

Simon, Julian L., 1996: The Ultimate Resource II (Princeton University Press).

Tanzania, 1997: Demographic and Health Survey, 1996 (Dar es Salaam and Calverton MD USA: Bureau of Statistics and Macro International).

Appendix 1 Construction of a possessions index

The construction of a possessions index goes in the following manner. A type of an item is given a weight or score: the value of the weight/score given is determined by an item's relative standing on level of value. For example a sewing machine is certainly more valuable and shows one having more wealth than a table or chair; so would be a motor vehicle compared to the sewing machine. Simply an arithmetic sum of the weights would give the possessions index: a higher weight value indicates more wealth. There are however important refinements that need consideration for a more proper index.

The value of the weight could be a score, e.g. 1,2,3,…., with any interval. This leaves room for arbitrariness and important attention paid to the differences in the values between items. A hierarchical 'binary system' is preferred as shown in the example. On the survey questionnaire, a household has (=1) or does not (=0) possess an item. With an item's relative standing as an indicator of level of wealth an item is given a position as shown in the following example. Take the above items, namely chairs, tables, sewing machines and a car, valued higher in this order by taking positions one, two to four respectively. With two persons, one possessing chairs, tables and a car; the other person possessing chairs and a sewing machine. Their possessions indexes would be as follows:

	Chairs	Tables	Sewing Machine	Car	POSSESSIONS INDEX
Person No 1	1	1	0	1	1011
Person No 2	1	0	1	0	101

Note: The last position on the index is the position of lowest value.

Person No. 1 is certainly wealthier than No. 2. Their possessions indexes are respectively 1011 and 101. (The arithmetic of combining a person's items can easily be discerned.) The advantage here is that, knowing an items position, one can tell what particular items a person possesses.

Grouping can be done into manageable 'Possessions classes': in this study the classes (they are actually a step to arriving at a poverty category) are poorest, poor and less poor. It can be noted that the word rich is avoided because as will be seen in the results one is dealing with largely poverty conditions in the survey area.

The items going into the possessions index (with their value position in that order as explained above) are: motor car/lorry, motor cycle, sewing machine, bicycle, radio, lantern, tables, chairs, cattle, and sheep/goats; an additional item going into the index is housing quality (materials making the roof, walls and floor, and number of rooms, where the latter is converted into a crowding variable of number of persons per room.

The three 'Possessions classes' (Posclass) are then as follows:

1. POOREST: owning a bicycle OR radio and any of the lower value items (including none);
2. POOR: owning a radio and a bicycle and any of the lower items;
3. LESS POOR: owning a sewing machine OR any of higher, and lower value items.

Housing quality (materials it is made of) was also determined with higher value put to the roof, then walls, and lastly the floor. A qualification was made by adding a crowding (persons per room) dimension. In the TDHS data, further poverty variables, namely type of water source and toilet exist, were used. Three classes of quality were arrived at: poor housing (basically a thatched roof), improved housing (corrugated iron roof but basically with mud walls and floor), and modern (corrugated iron /tile roof and brick/stone/cement walls and floor).

By combining housing quality and possessions class a two 'Poverty Categories' (PAUPE4) was produced to facilitate logistic regression analysis.

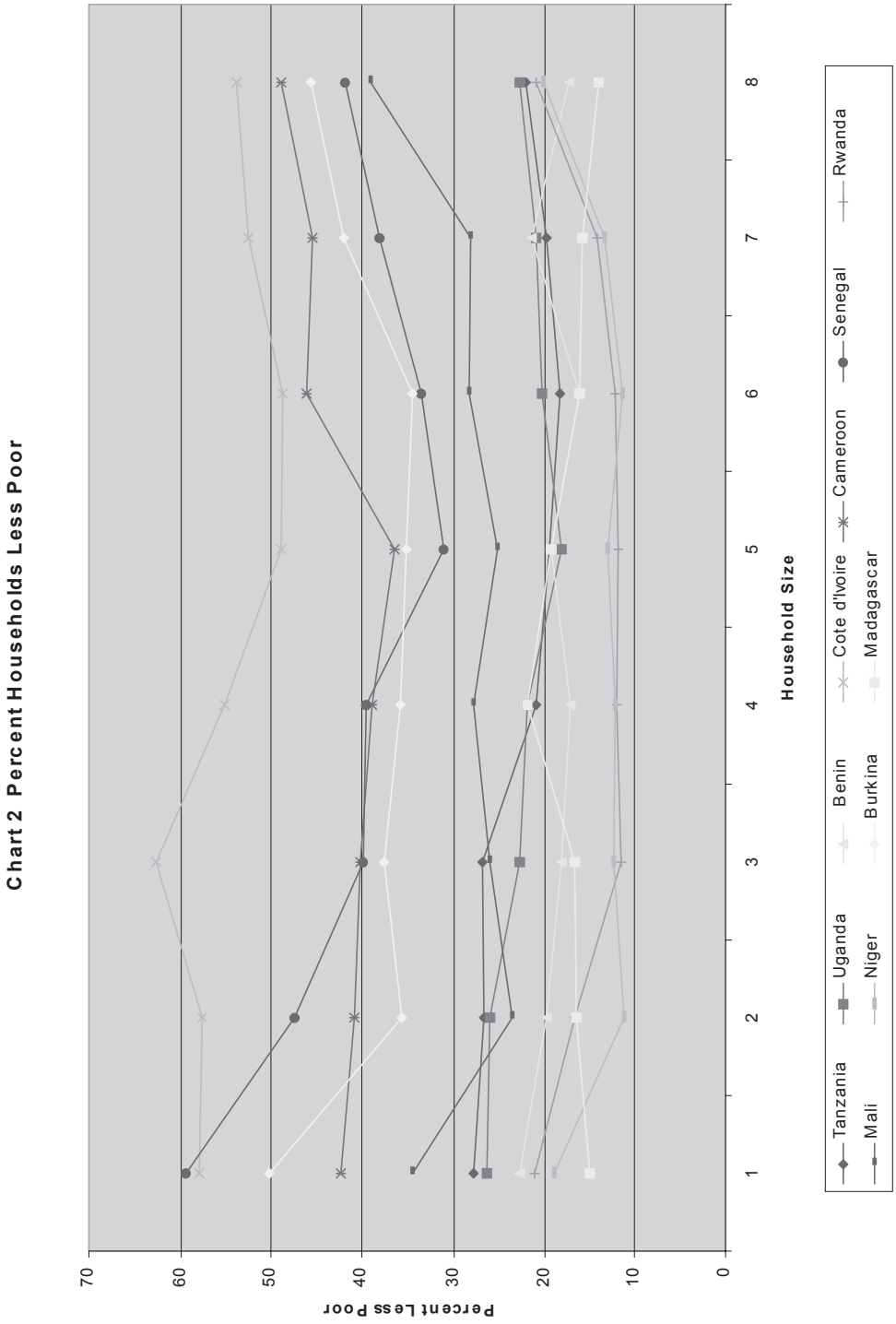
Chart 2 Percent Households Less Poor
Percent Less Poor
0
10
20
30
40
50
60
70
1
2
3
4
5
6
7
8
Household Size
Tanzania
Uganda
Benin
Cote d'Ivoire
Cameroon
Senegal
Rwanda
Mali
Niger
Burkina
Madagascar

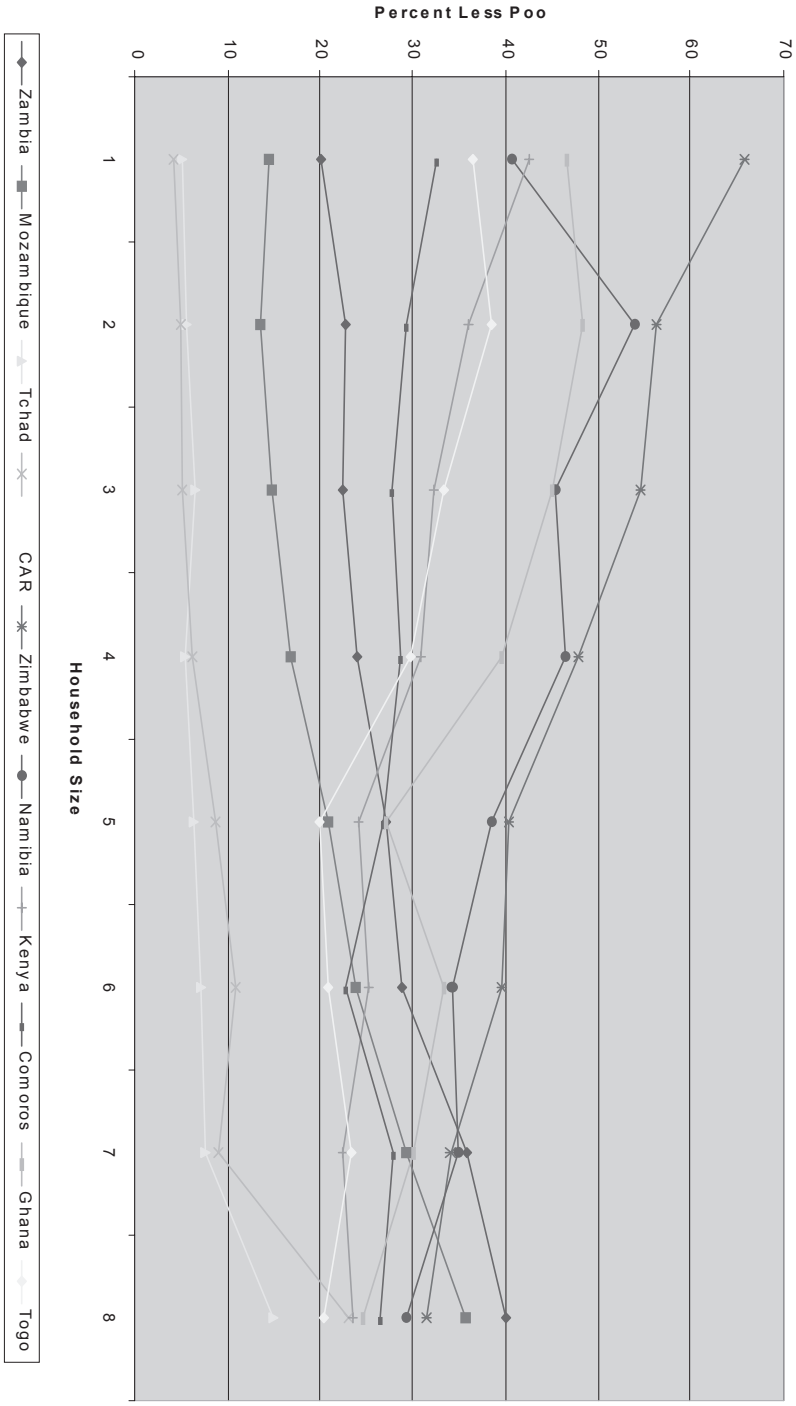

Chart 1 Percent Households Less poor by Size

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