CHAPTER 2: SPATIAL ASPECTS OF POVERTY AND INEQUALITY

Introduction

This chapter reports on estimates of household income poverty at district level for the first time in Tanzania. Previously, poverty estimates obtained from household budget surveys were available at the regional level. By combining information from the population census and the household budget survey, it has proved possible to arrive at poverty estimates for smaller administrative areas. The availability of district level poverty information has many advantages. The information can be used, for instance, for improved targeting of anti-poverty programs, or to make budget allocations to districts more pro-poor by including poverty levels into the formulae for district budget allocations.

The poverty estimates for 119 districts are presented in the form of so-called poverty maps. An advantage of such a spatial representation of poverty is that it can be combined with other geographic data for social amenities like schools, health centres, or biophysical, environmental and agro-climatic information. Poverty maps can give visually oriented, more comprehensive and integrated data bases that can be immensely valuable for evidence-based development planning and policy formulation.

A spatial representation of poverty gives rise to new questions for research. For instance it provides pointers towards the importance of district characteristics in explaining poverty. It also provides insight into the extent to which physical isolation and poor agro-ecological endowments may affect communities' rates of poverty. Poverty mapping techniques also lend themselves to estimating poverty for small vulnerable groups such as orphans or people with disabilities, and to considering geographic inequality in greater detail. Inequality is further pursued in this chapter.

This chapter is organised as follows. The next two sections explore evidence of geographic disparities in poverty - in household income poverty as evidenced by data on household consumption - and in aspects of non-income poverty. Section two presents poverty maps and briefly discusses how they have been derived. Section three provides information taken from the National Bureau of Statistics' 2002 population census, from the Ministry of Education and Culture's basic statistics in education (2002, 2004) and from statistics of the Ministry of Health. In the final section we discuss some of the policy implications from this analysis.

Income poverty at regional and district level

Poverty estimates in Tanzania have, to date, been obtained from periodic surveys. Household Budget Surveys (HBS) have been conducted with detailed questions about income and expenditures from which poverty estimates were derived. The most recent household budget survey, conducted in 2000/01, provides regional estimates of income poverty. These estimates, presented in Table 1, show large differences among regions.

The estimates are unable to show variation in poverty within regions because the samples which generated these estimates were not large enough.

For planning purposes, poverty estimates for smaller administrative levels are most useful. To meet this demand Elbers, Lanjouw and Lanjouw [69] developed a small area poverty estimation method also known as poverty mapping. The method generates poverty estimates for relatively small geographical areas by enriching household budget survey data with census data which are available at much smaller levels of geographic disaggregations. The poverty mapping technique not only provides estimates of poverty at the district level but also generates regional poverty estimates with greater precision. Both are presented below.

To derive the poverty map for Tanzania, data from the 2000/01 Household Budget Survey were combined with the population data from the 2002 Tanzanian Housing and Population Census, both conducted by the National Bureau of Statistics (NBS). This method combines the strength of both data sources, i.e. the high level of detail on household income present in the HBS and the large number of observations of the population census.

The Tanzania poverty maps were derived in a four step procedure. The first step involved comparing the variables that are available in the HBS and the Census and selecting those variables that are defined and measured in an identical way. Once these variables were identified, the second step involved exploring the relationship between these variables and per capita consumption. As there is no information on income or consumption in the census, this was done through an analysis of HBS survey data. Regressions were estimated, explaining per capita consumption with variables such as household size, education and housing characteristics.

In the third step, the regression relation that was estimated for the HBS was used to infer for each household in the census its per capita consumption. This is possible because in step 1, common variables between the census and HBS were identified, and in step 2 a relation was estimated using variables that were present in both the HBS and the 2002 Population Census.

Finally, once consumption was derived for every household in the census, estimates such as the proportion of households that are poor, or indexes of inequality, were inferred and then mapped.

A more detailed explanation of the poverty mapping methodology and derived estimates will be published shortly. [70]

Poverty incidence is defined as the percentage of people below the basic needs poverty line. In Tanzania, the basic needs poverty line in 2000/01 was set to be TShs 262 per adult equivalent per day. [71]

[69] Elbers, Lanjouw J.C. and Lanjouw, P (2003). Micro-level estimation of Poverty and inequality. Econometrica, Econometric Society, vol 71(1), pages 355-364

[70] Blandina Kilama, Wietze Lindeboom et al., Where are the Poor in Tanzania, forthcoming

[71] National Bureau of Statistics (2001) Tanzania Household Budget Survey 2000/01

Income poverty estimates at regional level

As Table 14 illustrates, the regional poverty estimates derived from the household budget survey have high standard errors.[72] By combining the HBS data with census information, new regional poverty estimates have been derived with much smaller standard errors. They are also shown in Table 14.

Table 14. Percentage of households below the basic needs poverty line, by region, 2000/01

REGION	Households below poverty line original (HBS)		Households below poverty line simulated (poverty map)	
	estimate %	std error	estimate %	std error
Dodoma	34	5.5	32	3.1
Arusha/Manyara	39	7.0	31	1.4
Arusha	-	-	21	1.5
Manyara	-	-	43	2.4
Kilimanjaro	31	6.3	28	1.3
Tanga	37	5.8	26	1.3
Morogoro	29	3.0	28	1.9
Pwani	46	8.3	38	2.1
Dar es Salaam	18	2.7	19	1.2
Lindi	53	14.1	39	2.3
Mtwara	38	4.3	38	2.0
Ruvuma	41	8.3	37	2.1
Iringa	29	5.3	28	1.6
Mbeya	21	5.1	23	1.1
Singida	55	4.8	49	3.4
Tabora	26	3.7	40	2.1
Rukwa	31	3.9	36	2.0
Kigoma	38	3.7	38	2.3
Shinyanga	42	6.5	43	2.4
Kagera	29	8.9	29	2.0
Mwanza	48	6.3	43	1.7
Mara	46	8.4	50	2.6

Source: HBS 2001 and Blandina Kilama, Wietze Lindeboom et al., Where are the Poor in Tanzania, forthcoming

For Dodoma, the new estimate is 32 per cent with a standard error of 3.1, and a 95 per cent confidence range of between 26 per cent and 38 per cent. Poverty mapping, therefore, has generated estimates of regional poverty rates with greater precision than the previously

[72] Standard errors are the usual measures of the precision with which a number has been estimated. If a poverty estimate is 30 per cent with a standard error of 2, we can be 95 per cent confident that the real poverty rate will lie between 30 plus or minus twice the standard error of 2, ie between 26 per cent and 34 per cent. High standard errors imply that estimates are imprecise and therefore less useful. An example is taken from Table 14. According to the HBS, the rate of poverty in Dodoma is 34 per cent with a standard error of 5.5. This implies that with 95 per cent confidence we can claim that the percentage of households in Dodoma who are poor is between 23 per cent and 45 per cent, a range so wide that it is almost uninformative.

available estimates.[73] The new estimates are not significantly different from the HBS's estimates, except for Tabora.

Income poverty estimates at district level

Using the poverty mapping technique, which allows for lower level estimation of poverty, we are able to estimate poverty at district level. Because districts are smaller, with correspondingly smaller sample sizes than regions, standard errors are higher. But in more than 90 per cent of the cases, standard errors of the resulting district estimates were below the standard errors of the HBS's regional estimates. Appendix Table A.10 provides the district level point estimates and their standard errors.

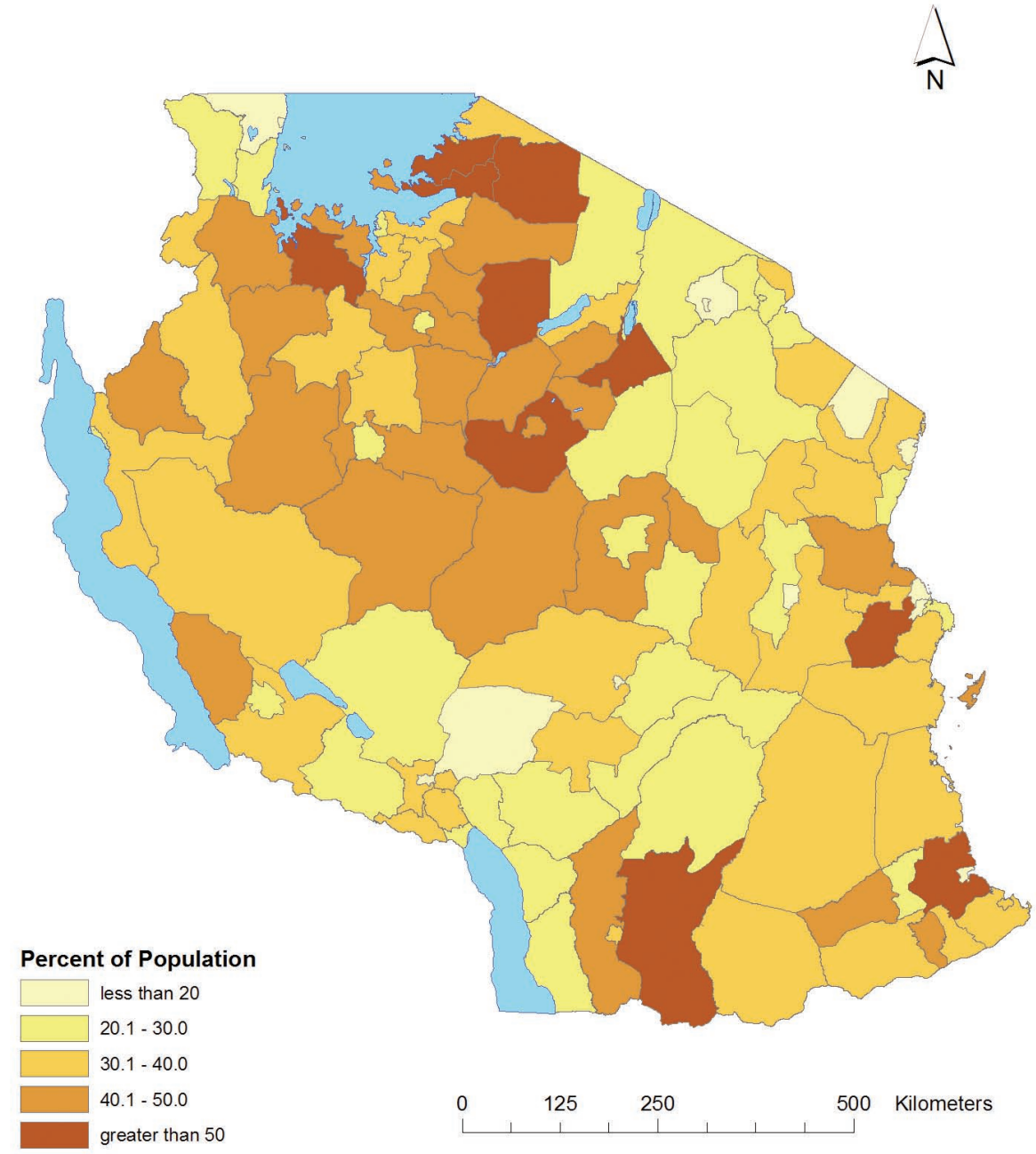
The highest rates of income poverty are estimated in Bunda (68 per cent), Musoma Rural (64 per cent), Geita (62 per cent), Serengeti (61 per cent) and Singida rural (56 per cent), all with more than half the population living below the basic needs poverty line. The lowest rates of income poverty are estimated in Bukoba Urban (11 per cent), Arusha Urban (12 per cent), Mbeya Urban (12 per cent), Mbarali (13 per cent), Morogoro Urban (14 per cent) and Kinondoni (14 per cent), all with less than 15 per cent of the population living below the basic needs poverty line. The map shows a tendency for the poorer areas to be clustered, whereas better-off areas are more scattered and mainly located in and around urban centres.

The map 2.1 and the data in the appendix table A 10 show differences in income poverty among districts. A measure of the extent of inequality is provided by the Gini coefficient, and this has been calculated for income poverty as well as for indicators of non-income poverty. The results are shown in Table 15 below.[74] It is clear from the table that access to improved water is the most inequitably distributed, and that income poverty rates are more unequal among districts than are under-five mortality rates, adult literacy rates and net primary enrolment. The value of the coefficient for net primary enrolment shows that there is little inequality in enrolment rates among the districts.

[73] As the HBS was drawn from the 1988 National Master Sample, the population census and the HBS used a different rural-urban classification for some of the enumeration areas. In addition, the distribution of household size in the HBS differed substantially from the distribution in the census. Differences in de jure and de facto definitions may explain part of this difference. HBS under-reports smaller households, which was not expected and is difficult to explain. Weights were applied to adjust for these differences. It matters which classification and which weights were used for regional poverty estimates. The second column in Table 14 presents poverty estimates that followed the HBS classification and weights. The fourth column presents poverty estimates that used the census classification and weights.

[74] The higher the value of the coefficient, the greater the inequality among districts. If the coefficient had a value of 1, there would be perfect inequality. A coefficient value of 0 means perfect equality – all districts would have the same poverty rates and values of non-income poverty.

Map 2.1 Percent of Population Below the Basic Needs Poverty Line by District, 2001



SOURCE: Calculations from Population Census 2002 and Household Budget Survey , 2000/01

Table 15. Measures of inequality and variation: Gini coefficient, Theil index and its decomposition

	Gini coefficient	Overall Theil index	Within region variation	Between region variation
Income poverty	0.20	0.071	47.3%	52.7%
Adult literacy rates	0.11	0.018	46.3%	53.7%
Net primary enrolment	0.08	0.008	40.8%	59.2%
Access to improved water	0.29	0.160	37.4%	62.6%
Under-five mortality	0.16	0.047	26.4%	73.6%

Source: Authors' calculations, Kilama and Lindeboom et al., Where are the Poor in Tanzania, forthcoming

Table 15 also shows values for the Theil index and its disaggregation, measuring the extent to which variations across districts are due to differences across regions or to differences within regions.[75] The Theil index for income poverty is 0.071, of which 47 per cent is attributable to inequalities within regions and 53 per cent to inequalities between regions. This disaggregation helps determine at what level more effective programming might take place. In the case of income poverty, interventions at district level need to be complemented equally with more regional approaches.

This is not always the case, as can be seen in Table 15. Applying the Theil index to under-five mortality, for instance, results in 74 per cent of the overall variation attributable to between-region differences and only 26 per cent to within-region differences. This implies that there are more generally common factors which determine rates of under-five mortality than there are district-specific factors, and that a more general approach to reducing under-five mortality is needed than in the case of income poverty. There are intermediate conclusions for strategies to deal with water supplies, where the differences between regions account for 63 per cent of the overall difference, and variation within regions accounts for 37 per cent.

The low value of the Theil index for net primary enrolment indicates that there was little overall variation in the estimates, and therefore that the disaggregation into within-regional and between-regional differences is not so important.

[75] See Shorrocks (1984). The decompositions are implemented using S. P. Jenkins's Stata program, ineqdeco

OTHER INDICATORS AT DISTRICT LEVEL

Education

Adult literacy

Adult literacy rates by district are shown in the following map 2.2 based on data reported in the population census.

Districts with above average literacy rates are in Dar es Salaam, the South (Southern Highlands), the North - in Arusha and Kilimanjaro and around Lake Victoria. Low literacy rates are noted in the coastal districts of Mkuranga, Lindi and Mtwara. The lowest literacy rates are in Ngorongoro, Monduli and Kiteto, largely attributed to the pastoralist way of life.

In contrast to the usual association between higher literacy and lower poverty, in southern Morogoro Region and western Ruvuma Region there are higher poverty rates together with higher literacy rates, while in Ngorongoro there is a relatively low rate of poverty, but also low literacy rates.

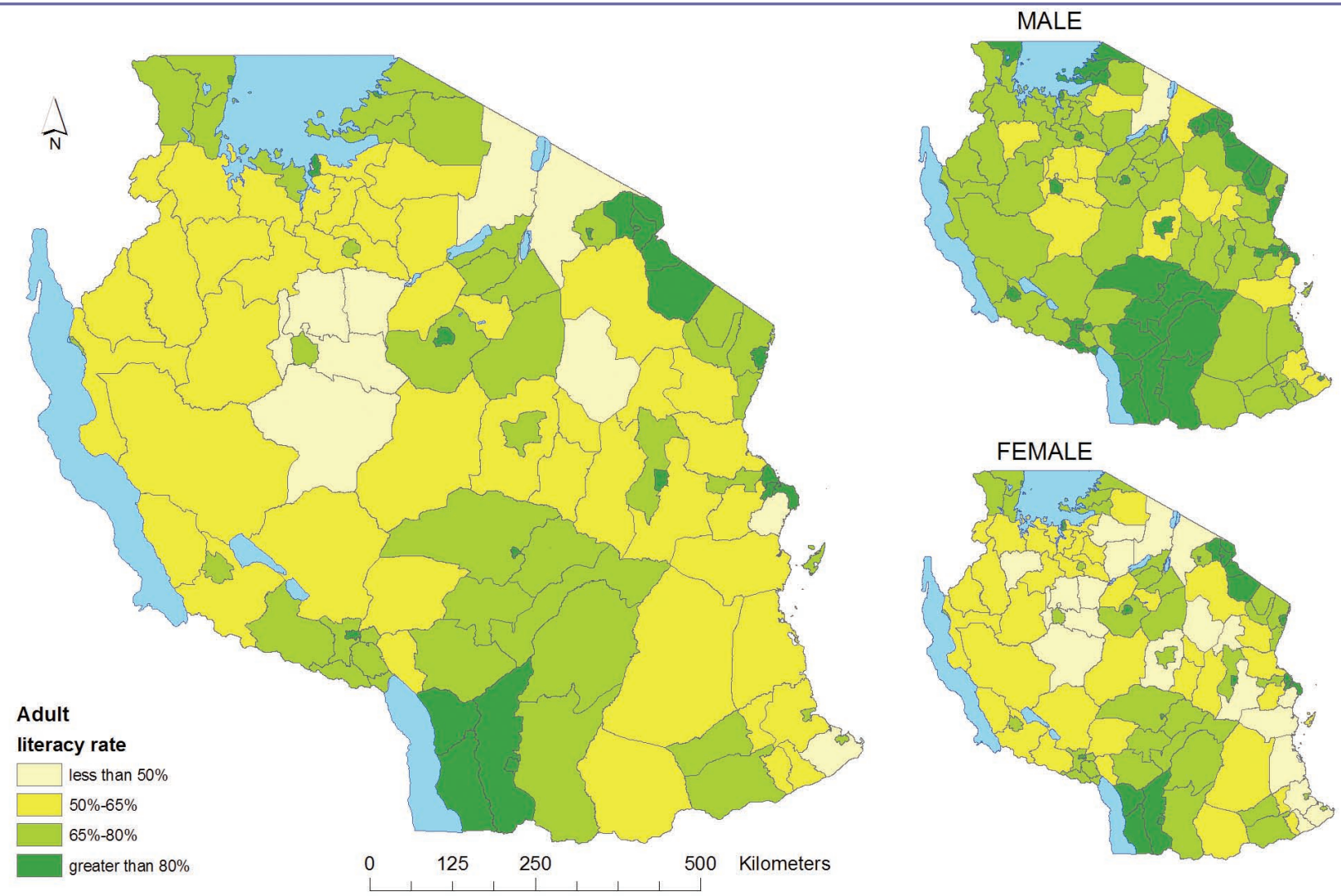
There is no district where women are more literate than men. Districts where women have the largest disadvantage (between 20 and 26 per cent) in literacy rates compared to men, are found along the Southern Coast and in the West.

Primary school enrolment

In 2002, higher primary school enrolment rates were associated with lower rates of poverty. This negative relationship of net enrolment and poverty seems to have disappeared in 2004, indicating that the Primary Education Development Programme has had a levelling effect on enrolment in primary education.

Table 16 shows the results of an analysis of poverty and some education indicators in 2002 and in 2004. The analysis uses Pearson correlation coefficients which have much lower values in 2004 than in 2002, indicating that the correlation between rates of poverty and primary school enrolment, pupil/classroom ratios and pupil/teacher ratios became much weaker in 2004 than had been the case in 2002. As the table also shows, the coefficients associated with pupil/classroom ratios were much lower than those associated with pupil/teacher ratios, indicating that classroom construction has been more successful in the poorer districts than has the deployment of teachers. Nonetheless, teacher pupil ratios also show substantial improvement.

Map 2.2 Adult Literacy by District, 2002



SOURCE: Calculations from the Population Census 2002

Table 16. Poverty correlates: Pearson correlation coefficients of education variables with district poverty rates

Variable	2002	2004
Net primary school enrolment	-0.27**	-0.10
Pupil/classroom ratio	0.22*	0.14
Pupil/teacher ratio	0.43**	0.26**

*Note: * significant at 5% level; ** significant at 1% level*

Source: Authors' calculations using 2002 Population and Housing Census, NBS 2003 and Basic Statistics on Education, Ministry of Education and Culture, 2002 and 2004, Kilama and Lindeboom et al., Where are the Poor in Tanzania, forthcoming

By 2004, slightly more than half the districts have recorded net enrolment rates to match or exceed the MKUKUTA target of 90.5 per cent for 2004, and about a quarter were within 10 per cent of reaching the target. Seven districts were more than 20 per cent below target: Uyui (58.1 per cent), Kibondo (63.4 per cent), Nzega (65.1 per cent), Dodoma Rural (66 per cent), Igunga (67.2 per cent), Ulanga (68.3 per cent) and Urambo (69.2 per cent).

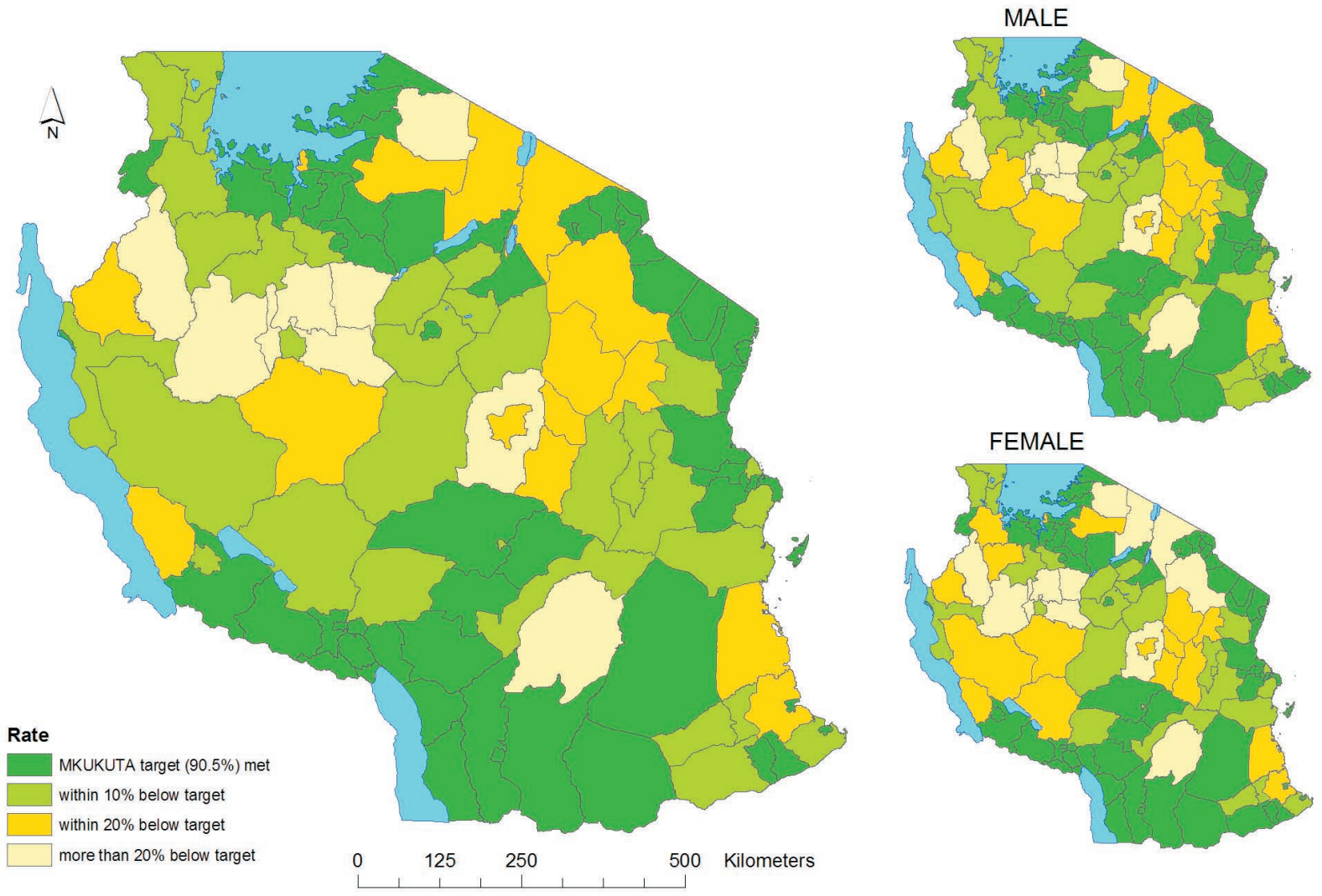
There are gender gaps in net primary enrolment. The north-eastern districts of Ngorongoro, Bariadi, Simanjiro, Monduli and Nzega have substantially fewer girls enrolled than boys, while in Mbinga, Karagwe, Kondoa and Moshi Rural, more girls than boys are enrolled (see map 2.3).

Pupil-teacher ratios

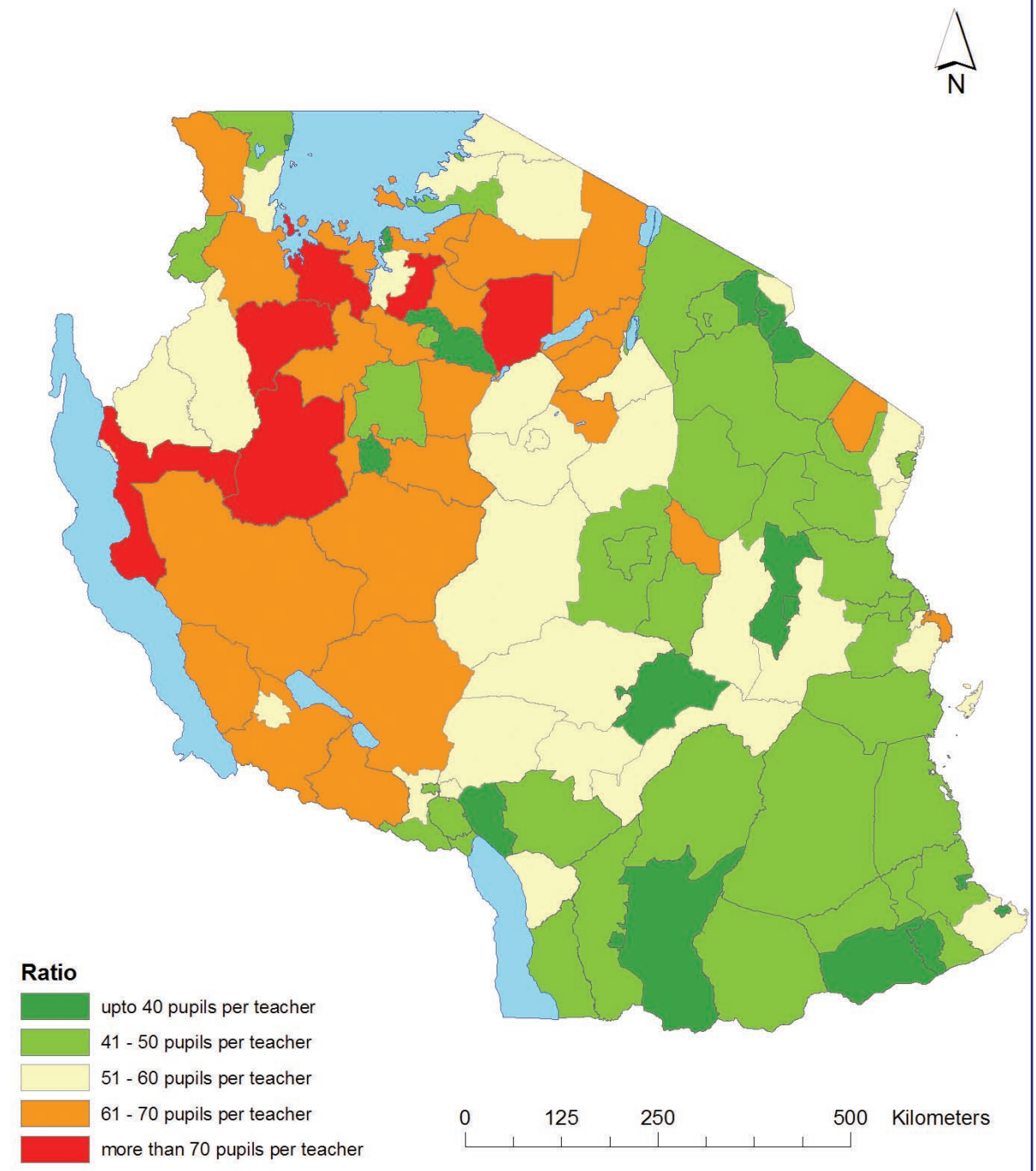
Map 2.4 shows the pattern of pupil-teacher ratios. Districts with higher ratios in 2002 had lower net enrolment rates in 2004 among girls. A reason for this may be that large class sizes may have discouraged parents from enrolling their children in school.

Those districts which had higher pupil-teacher ratios also tended to have larger proportions of children aged between 7-13 who were working and they tended to have lower school enrolment rates. Districts with higher proportions of school-age children working and not in school also tend to have higher rates of poverty (Map 2.5)

Map 2.3 Boys and Girls Aged 7 - 13 Enrolled in Primary School by District, 2004

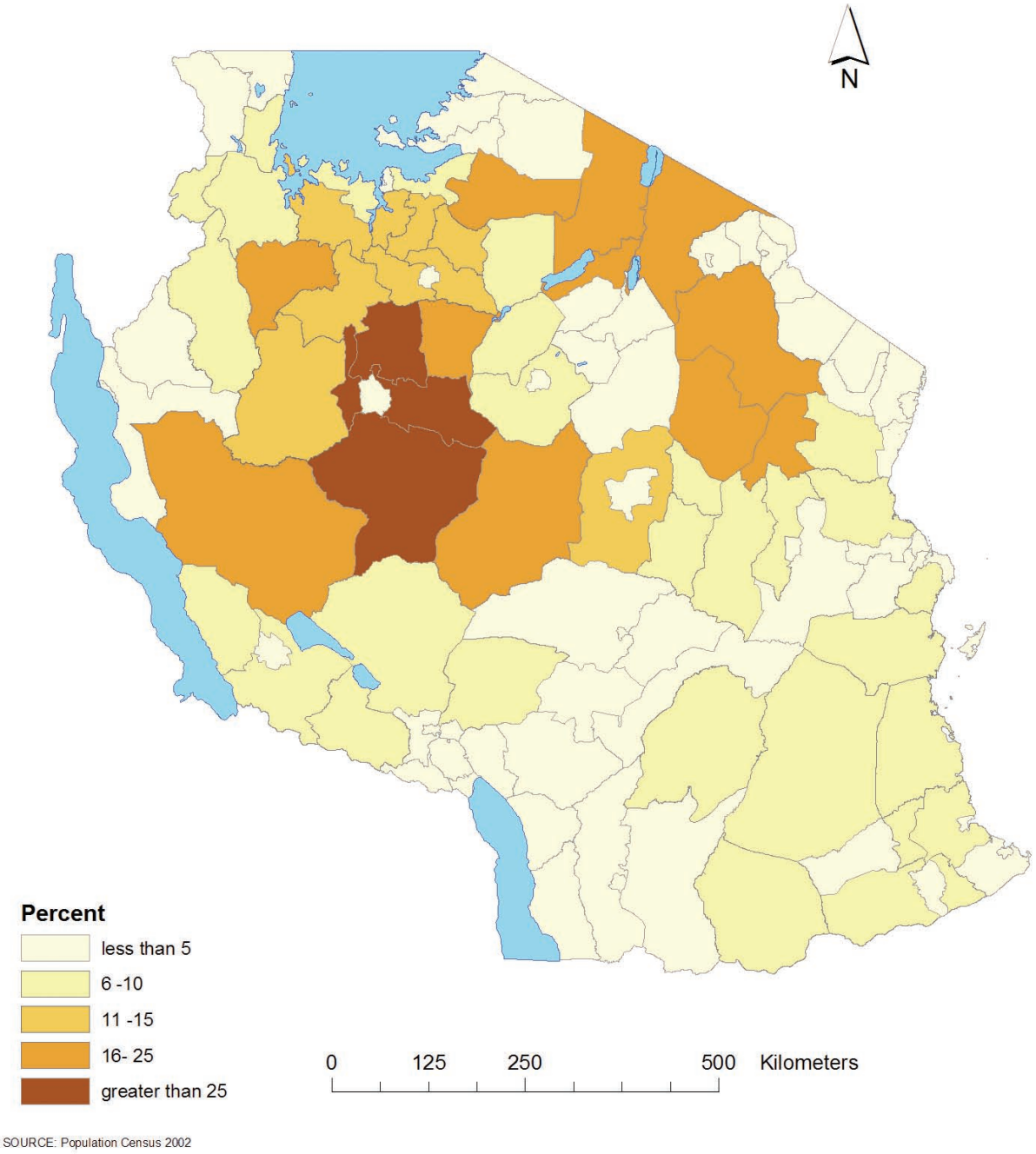


Map 2.4 Pupil-Teacher Ratio by District, 2002



SOURCE: Ministry of Education 2002

Map 2.5 Children 7-13 Years Working and Not in School, by District, 2002



SOURCE: Population Census 2002

Vulnerability of children

Children working and not in school

In more than two thirds of the districts in Tanzania, fewer than a quarter of children aged between 7 - 13 are working and do not go to school. On the other hand, Tabora, Shinyanga and parts of Arusha region have a high prevalence of working children not in school. In the high prevalence districts of Ngorongoro, Monduli, Simanjiro, Kiteto and to the centre of the country towards the West in Manyoni, Sikonge, Mpanda, Uyui, Nzega, Kishapu, Maswa and Bariadi, the proportion of children between 7 - 13 who are working and not going to school ranges from 25 to 39 per cent.

This would suggest that in those districts more resources, and teachers in particular, may be needed to strengthen the education system. School systems may need to be adapted where pastoralism and long distances to school discourage enrolment. Satellite schools for the first few standards of primary school might be established with good effect.

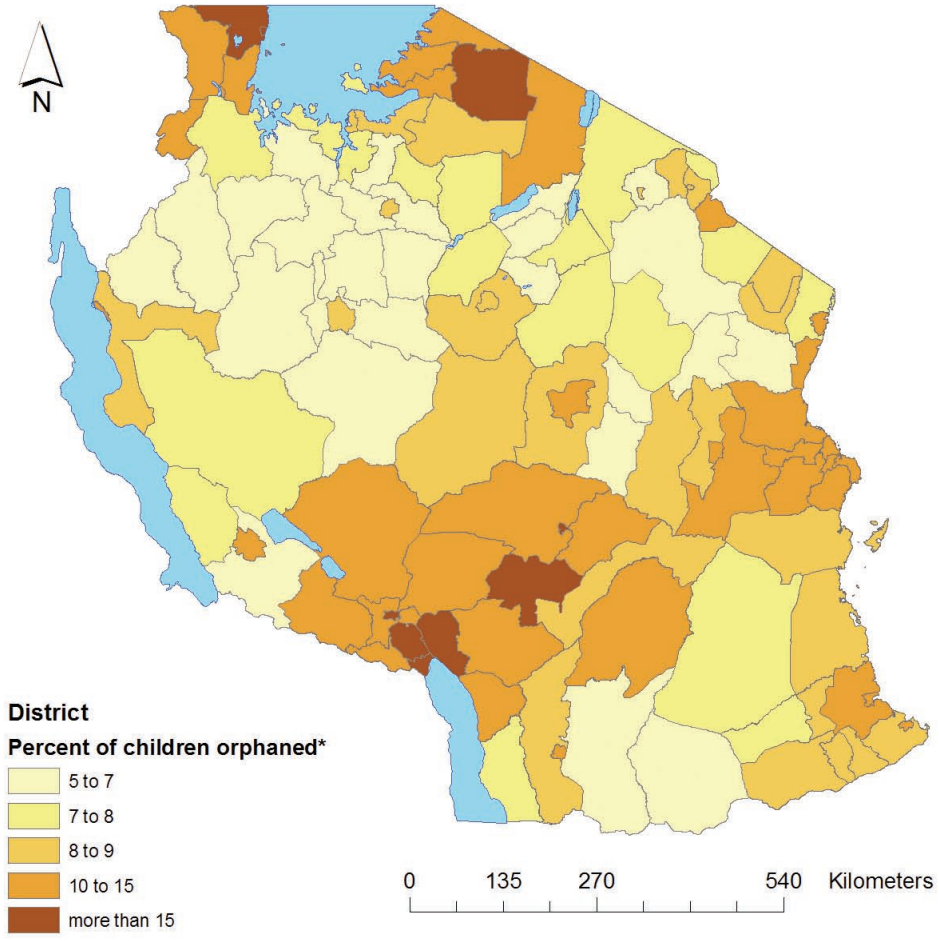
Orphanhood

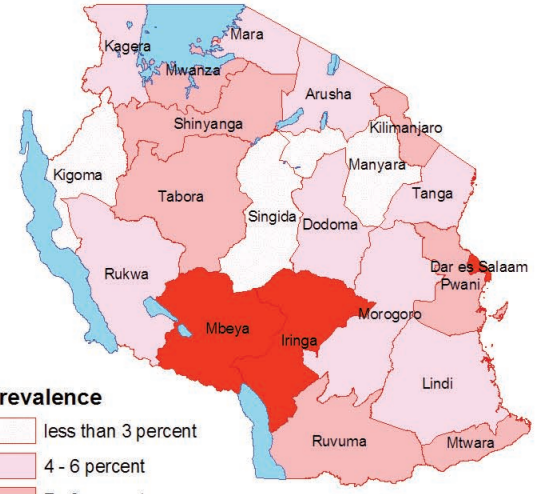
Another indicator of possible vulnerability of children is orphanhood, which has been discussed in chapter 2 above. Map 2.6 shows the geographic pattern of orphanhood, by district, based on the population census reports of children under the age of 18 who have lost their mother, or father, or both.

The map shows the relatively high prevalence of orphaned children in districts in the Southern Highlands. In Makete, 24 per cent of children have been orphaned. In 10 more districts, more than 15 per cent of the children are orphaned, most of them in the Southern Highlands: Kyela (19 per cent), Iringa Urban (19 per cent), Rungwe (17 per cent), Mbeya Urban (16 per cent), Mufindi (16 per cent), Iringa Rural (15 per cent); but also in Kagera: Bukoba Rural (18 per cent) and Bukoba Urban (16 per cent); and in Mara: Serengeti (16 per cent) and Tarime (15 per cent).

The map is accompanied by a regional map of HIV prevalence in adults, and it is clear that the higher rates of orphanhood are associated with higher rates of HIV prevalence. The analysis reported in the status chapter above suggests that orphaned children in 2002 were only slightly more likely to live in poor households, and that overall, district-level analysis did not show significant differences in the conditions of orphaned children compared with those who are not orphaned. Nonetheless, households, communities and districts with much higher percentages of orphaned children are straining to provide the necessary support. Co-ordinated public intervention is sorely needed in these areas.

Map 2.6 Percentage of Children Under 18 Years Who Have Been Orphaned, 2002

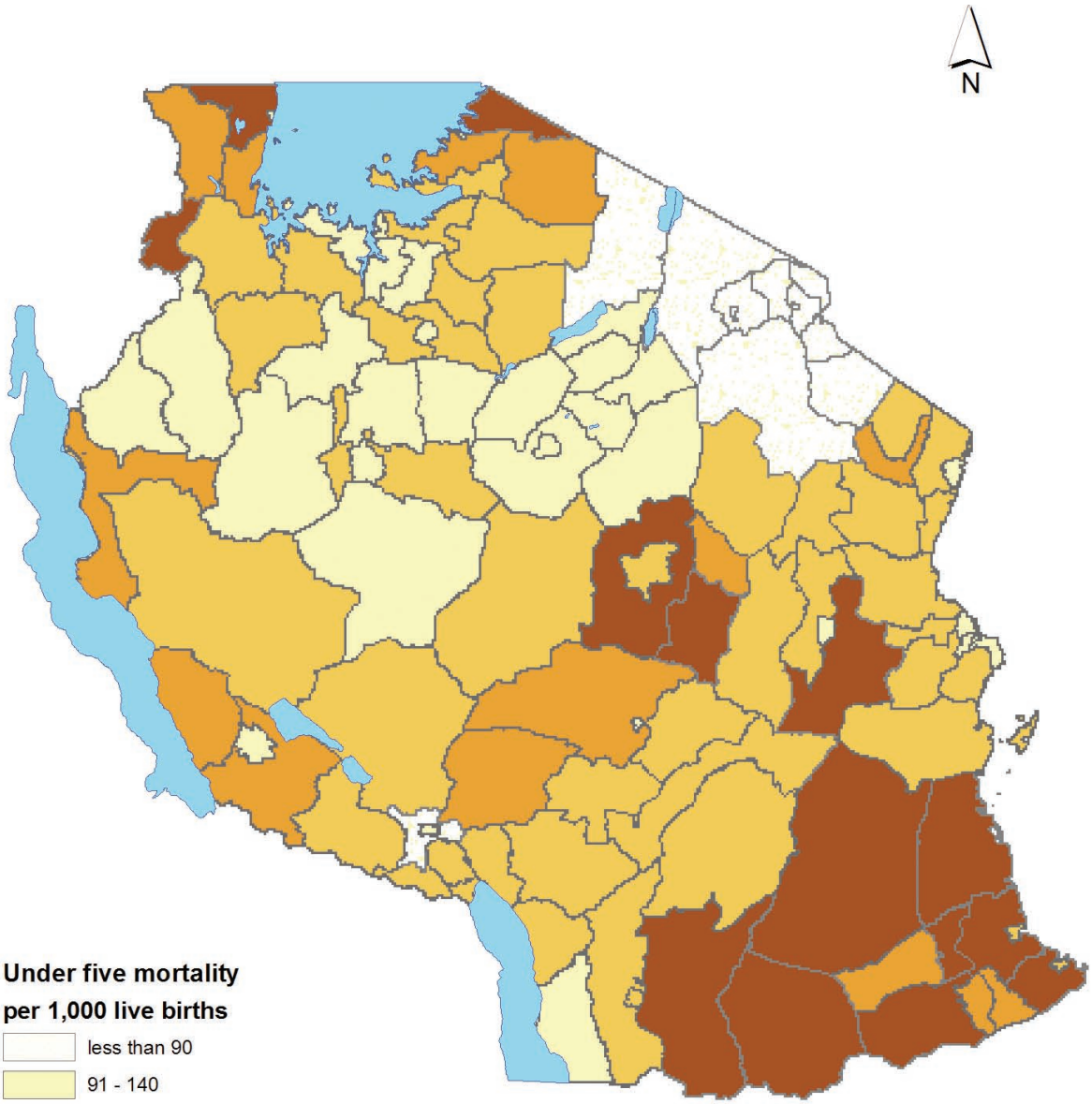




* Lost either mother or father or both parents

SOURCE: Population Census 2002 and Tanzania Demographic and Health Survey 2004-2005 Preliminary report

Map 2.7 Death of Children Under Five Years (per 1,00 Live Births), by District 2002



SOURCE: Population Census 2002

Mortality, health, water and sanitation

Under-five mortality

Map 2.7 shows the geographic pattern of under-five mortality. South-Eastern districts have higher under-five mortality than most other districts in the country.

There does not seem to be a one-to-one relationship between district poverty rates and under-five mortality rates.[76] Districts in the North-West (mainly in Tabora, Shinyanga and Mwanza) have low under-five mortality rates but relatively high poverty rates, while in the South (Lindi, Mtwara and the eastern part of Ruvuma) there are high under-five mortality rates and high poverty rates.

In most districts, under-five mortality has declined. Map 2.8 shows district estimates of under-five mortality based on the 1988 and 2002 population censuses. There has been little or no improvement in Lindi, Mtwara and parts of Ruvuma.

Map 2.9 shows that facilities providing health services are mainly concentrated in urban areas and in districts with major roads. A higher concentration of health facilities per square kilometre is associated with lower under-five mortality.

Water and sanitation

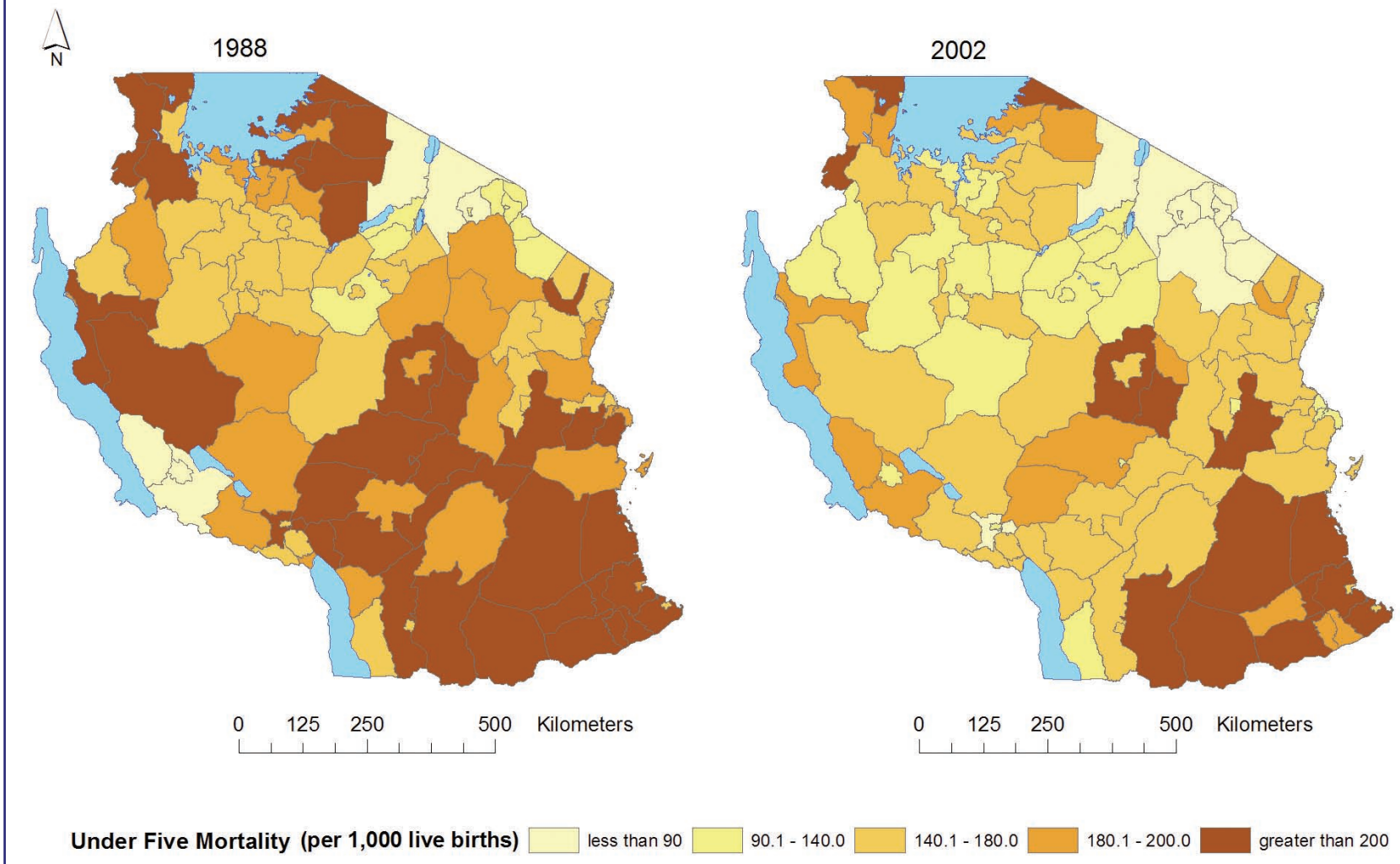
Improved water supplies and sanitation also have an impact on under-five mortality rates. Diarrhoeal and other water-borne diseases are common causes of young child deaths. A cleaner environment and safer storage of waste provides a safer environment with a reduced risk of disease. Overall, access to and use of improved toilets, defined as flush toilets or improved ventilated pit latrines, is very low. Even though a high proportion of households has a latrine, in most cases this latrine is not improved and may well be unsanitary and unsafe. On average, fewer than 5 per cent of households have access to an improved toilet. The highest access is in urban areas, and highest in Moshi urban district (36 per cent). In over a third of the districts, less than 1 per cent of households has an improved toilet.

Map 2.10 shows the inequitable water supply infrastructure across the country.

Only 42 per cent of rural households have access to improved water sources compared to 88 per cent in Dar es Salaam and 84 per cent in other urban areas. While the overall difference in access to improved water supply between urban and rural areas is high, available information from some of the districts provides further evidence about the depth of disparities. There are seven districts in which fewer than 10 per cent of rural households have access to improved water supply: Sikonge (4 per cent), Igunga (5 per cent), Kishapu (10 per cent), Liwale (8 per cent), Mkuranga (6 per cent), Rufiji (9 per cent) and Mafia (3 per cent). There are some difficulties in extending water supplies in these districts: Liwale and Sikonge have very low population densities, salinity is an issue in Mkuranga, and fluoride is a problem in Kishapu. In another 67 mainland districts fewer than 50 per cent of rural households have access to improved water sources. In addition, where district census data are complemented with water point mapping data, even in districts where over 50 per cent of households have access to improved water supplies, there can be considerable differences between and within wards. [77]

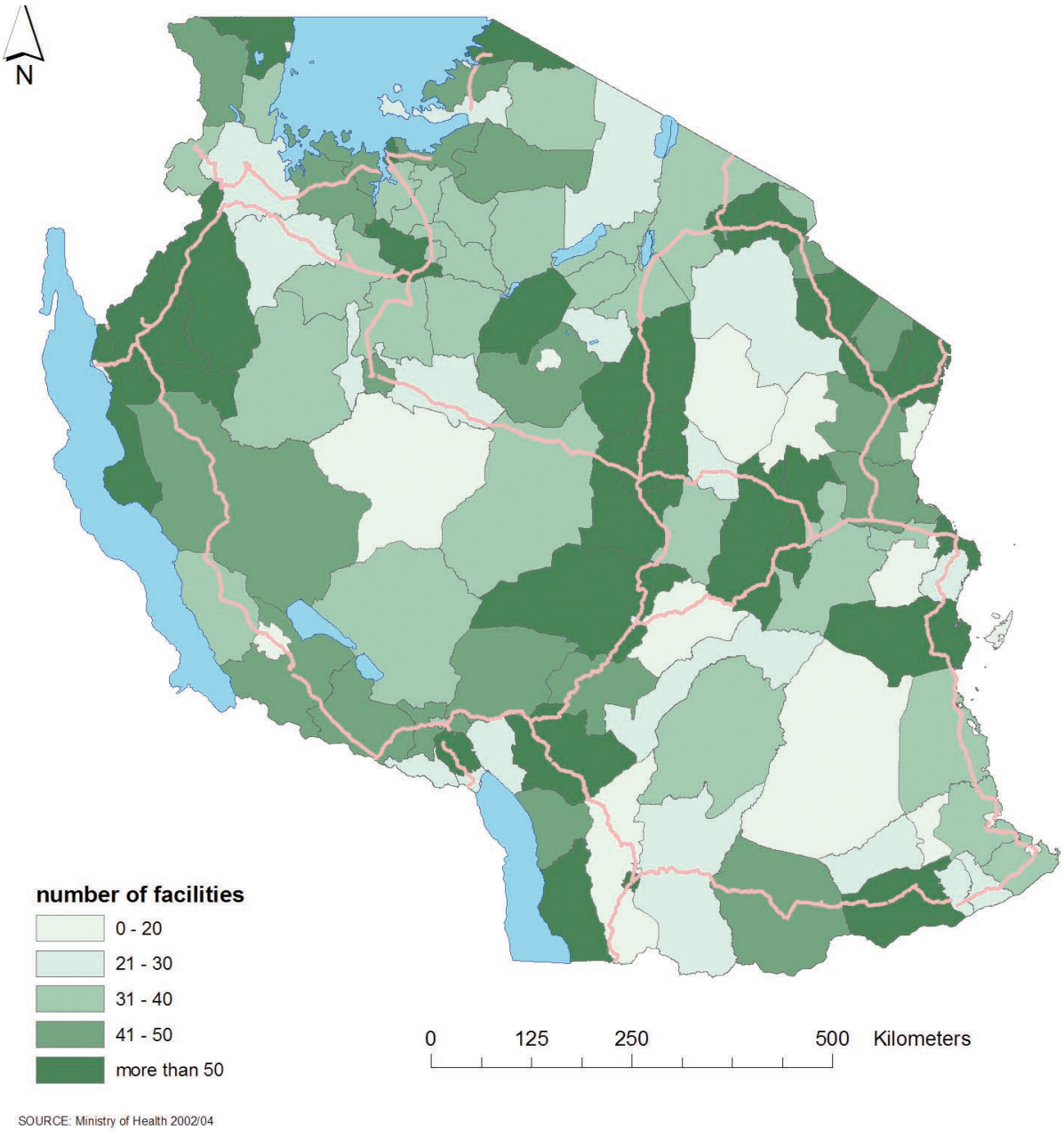
[76] Correlation is not very strong (0.18) but statistically significant at five per cent level.
[77] WaterAid (2005). Water and Sanitation in Tanzania: An Update based on the 2002 Population and Housing Census.

Map 2.8 Under Five Mortality Rates, by District, 1988 and 2002



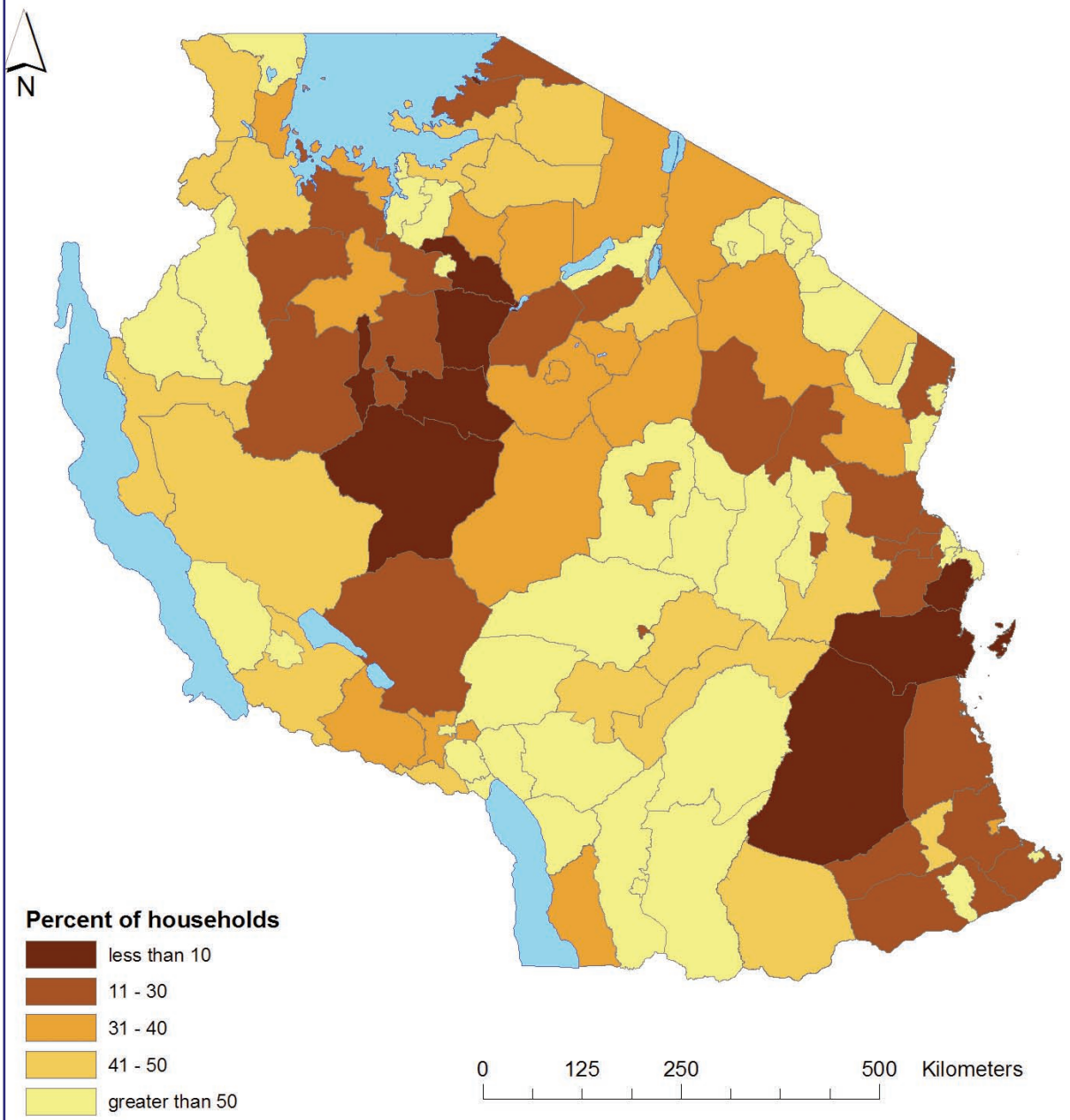
SOURCE: Population Census 2002

Map 2.9 Health Facilities, by District and the Road Network



SOURCE: Ministry of Health 2002/04

Map 2.10 Access to Improved Water Supplies, by District, 2002



SOURCE: Population Census 2002

Infrastructure

Access to the road network

Access to the road network helps with access to markets and services. Map 2.11 shows population density at ward level, together with the road network. It is clear that pockets of the country are densely populated, but that much of the land area of Tanzania remains sparsely inhabited. Population density follows the main roads - areas near main roads are densely populated - just as are urban centres. Road networks similarly tend to follow population concentrations.

Population density and the road network have also been shown to be strongly associated with other indicators of development, and the more widespread use of geographic information systems will permit analysis for even smaller geographic areas. The TEHIP work in Rufiji, for example, has also shown a strong relationship between indicators of survival and health within the district and proximity to population centres and road networks.[78] Likewise, Alderman et al. (2005)[79] report for Kagera the existence of a strong relationship between malnutrition and the proximity to and passability of roads.

Access to electricity

Most households do not have access to electricity. The highest percentages of households with electricity are in Kinondoni, Ilala and in Iringa Urban. At the other end of the spectrum are districts like Mtwara Rural and Kilindi (Tanga) where only 0.06 and 0.07 per cent respectively have access to electricity. In about a quarter of the districts less than 1 per cent of households has access to electricity.

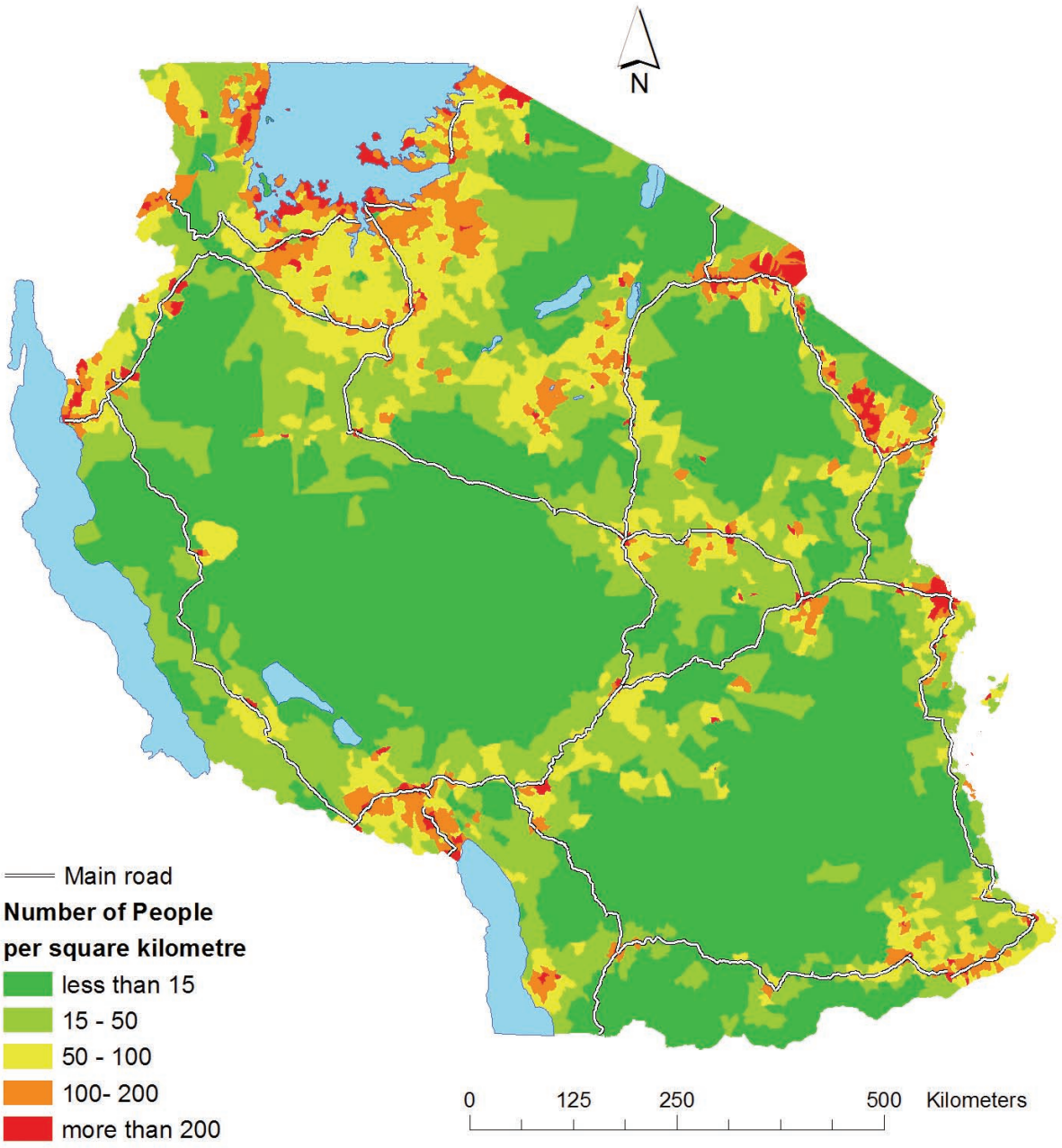
Access to electricity is usually associated with the prosperity of the specific area. Electricity is generally available in the urban centres for example, but not necessarily in some of the more densely populated rural areas. Thus areas with a high population concentration in Shinyanga and Mwanza regions go without electricity. The largest proportion of non-urban households with access to electricity can be found in the North-Eastern part of country; this is because of the presence of the Pangani Grid that runs from Arusha to Pangani.

Other indicators of poverty, which have not been shown here in map form, show that poor quality housing, as reflected in poor flooring and roofing, is associated with higher rates of poverty.

[78] De Savigny D, Kasale H, Mbuya C & Reid G (2004). Fixing Health Systems. Ottawa: International Development Research Centre (IDRC) (in collaboration with Ministry of Health, Tanzania).

[79] Alderman, H., H. Hoogeveen and M. Rossi. Reducing Child Malnutrition in Tanzania. Combined Effects of Income Growth and Program Interventions. Journal of Economics and Human Biology. Forthcoming

Map 2.11 Population Density, by Ward and Main Roads, 2002



SOURCE: Population Census 2002

Radio ownership

A radio is a quite common household asset. Based on district means, on average almost 50 per cent of households own a radio, ranging from 83 per cent in Moshi Urban to almost 16 per cent in Arumeru district. In 12 districts, less than a third of households own a radio. Districts with higher percentages of households with radios tend to have lower rates of poverty.

Table 17 below presents the coefficients of correlation between the district data on poverty rates and on various measures: access to improved water supplies, improved latrines or flush toilets, electricity, radio, telephone, bicycle, material for flooring, wall construction and roofing. In all cases, except for wall materials, there are strong correlations. In the case of improved water supplies, improved toilet facilities, electricity, radio, radio and telephone, increased ownership or access is associated with reduced rates of poverty. On the other hand, those districts where higher proportions of households own a bicycle or have a home of earth flooring and poor quality roofing material, are districts with higher rates of poverty.

Table 17. Poverty correlates: Pearson correlation coefficients of household characteristics with district poverty rate

Variable	Pearson correlation coefficient
Piped or protected drinking water source	- 0.50**
Flush toilet or ventilated improved pit latrine	- 0.50**
Electricity	- 0.53**
Ownership of radio	- 0.35**
Ownership of phone	- 0.51**
Ownership of bicycle	0.42**
Flooring: earth	0.55**
Poor quality material used for wall construction	0.10
Poor quality material used for roof construction	0.56**

Note: ** significant at 1% level

Source: Authors' calculation using 2002 Population and Housing Census, NBS 2003, Kilama and Lindeboom et al., Where are the Poor in Tanzania, forthcoming

Implications for policy

The data and the maps presented in the previous sections suggest considerable differences in outcomes among regions and districts and there is some evidence in these data that the unequal outcomes are related to unequal opportunities. Some patterns of relationships are evident from these maps, but the general picture is one of variation across the different indicators which have been presented.

A summary of critical indicators - income poverty rate, net primary enrolment, under-five mortality, adult literacy and access to improved water - ranked by district, is presented in Table 18. This table lists, for each of these indicators, the 20 districts which have the best values and the 20 districts with the worst values. Appendix Table A.9 has the data for all districts.

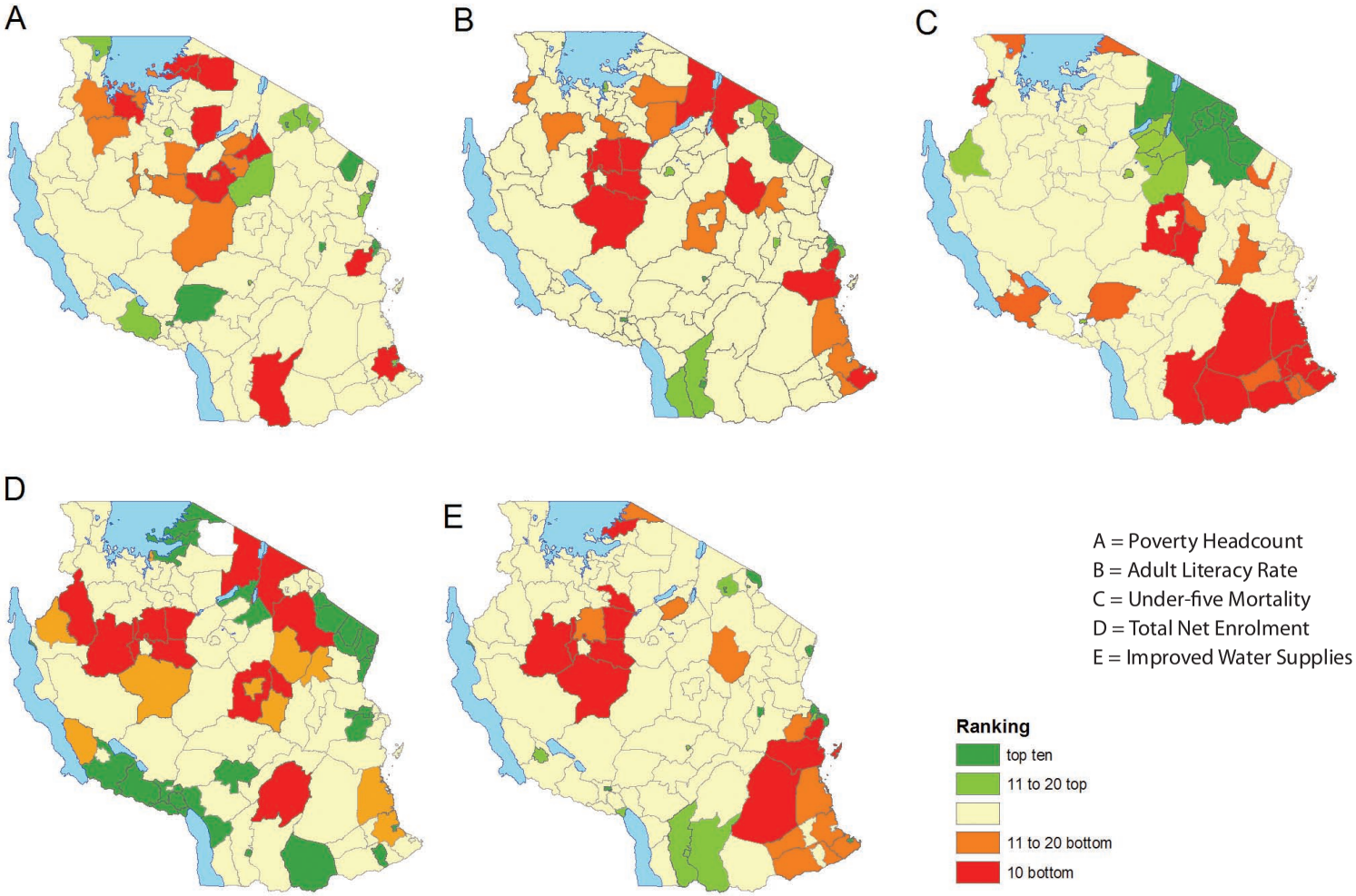
The rankings in Table 18 show that different indicators produce different rankings, that specific districts have relatively higher or lower rankings for different indicators. This suggests that specific focus may be needed in districts ranking poorly to address the specific issues for which improvements are needed.

Table 18. Districts ranked by income poverty rate, net primary enrolment, under-five mortality, adult literacy and access to improved water

	Per cent of households below basic needs poverty line		Net primary enrolment rate		Under-five mortality rate (per 1,000 live births)		Adult literacy rate		Per cent of house-holds with access to improved water (piped or protected source)	
Rank	District	Value	District	Value	District	Value	District	Value	District	Value
1	Bukoba (U)	11	Lushoto	100	Ngorongoro	40	Moshi (U)	96	Arusha (U)	99
2	Arusha (U)	12	Korogwe	100	Monduli	48	Arusha (U)	94	Nyamagana	97
3	Mbeya (U)	12	Muheza	100	Arusha (U)	55	Ilala MC	93	Mbeya (U)	96
4	Mbarali	13	Tanga (U)	100	Moshi (R)	57	Nyamagana	92	Mtwara (U)	96
5	Morogoro (U)	14	Kibaha	100	Simanjiro	57	Bukoba (U)	92	Rombo	93
6	Kinondoni	14	Kisarawe	100	Arumeru	58	Kinondoni	92	Moshi (U)	92
7	Nyamagana	15	Karatu	100	Moshi (U)	63	Iringa (U)	92	Kinondoni	92
8	Lushoto	16	Mwanga	100	Hai	65	Mwanga	91	Musoma (U)	92
9	Ilala MC	16	Same	100	Mwanga	68	Same	90	Kigoma (U)	89
10	Tanga (U)	17	Moshi (U)	100	Rombo	73	Songea (U)	90	Temeke	89
11	Bukoba (R)	17	Babati	100	Same	84	Mbeya (U)	90	Tanga (U)	89
12	Moshi (U)	18	Kigoma (U)	100	Babati	91	Moshi (R)	89	Morogoro (U)	88
13	Arumeru	18	Ukerewe	100	Karatu	93	Temeke	87	Arumeru	85
14	Iringa (U)	18	Magu	100	Nyamagana	100	Tanga (U)	87	Kyela	85
15	Lindi (U)	18	Nyamagana	100	Hanang	103	Musoma (U)	87	Songea (U)	85
16	Kondoa	21	Tarime	100	Mbeya (U)	106	Hai	86	Iringa (U)	85
17	Mbozi	21	Musoma (R)	100	Mbulu	107	Morogoro (U)	85	Ilala MC	81
18	Hai	22	Bunda	100	Singida (U)	108	Mbinga	84	Namtumbo	79
19	Shinyanga (U)	22	Musoma (U)	100	Kasulu	109	Ilemela	84	Songea (R)	77
20	Pangani	22	Mufindi	100	Kondoa	110	Songea (R)	83	Moshi (R)	75
100	Singida (U)	46	Mpwapwa	79	Korogwe	192	Ngara	57	Mtwara (R)	26
101	Sengerema	46	Kilindi	78	Kongwa	195	Shinyanga (R)	57	Kisarawe	25
102	Biharamulo	48	Kiteto	76	Sumbawanga (R)	195	Meatu	55	Nzega	25
103	Igunga	48	Kilwa	76	Newala	197	Tandahimba	54	Tandahimba	25
104	Bukombe	48	Ilemela	75	Nachingwea	198	Kilindi	53	Nachingwea	25
105	Uyui	48	Nkansi	75	Tandahimba	200	Lindi (R)	53	Mbulu	24
106	Ukerewe	48	Sikonge	75	Bukoba (R)	204	Bukombe	53	Kiteto	23
107	Manyoni	49	Dodoma (U)	75	Tarime	207	Kilwa	52	Lindi (R)	23
108	Hanang	49	Kisulu	74	Morogoro (R)	209	Dodoma (R)	52	Tarime	22
109	Mbulu	49	Simanjiro	72	Ngara	212	Bariadi	51	Kilwa	22
110	Babati	50	Kongwa	72	Tunduru	212	Rufiji	51	Rufiji	21
111	Kisarawe	51	Ngorongoro	71	Namtumbo	213	Igunga	49	Mafia	17
112	Lindi (R)	51	Monduli	71	Mpwapwa	217	Uyui	49	Musoma (R)	17
113	Meatu	53	Urambo	69	Kilwa	217	Nzega	49	Liwale	16
114	Namtumbo	55	Ulanga	68	Lindi (R)	220	Sikonge	49	Urambo	14
115	Singida (R)	56	Igunga	67	Liwale	221	Mkuranga	47	Kishapu	13
116	Serengeti	61	Dodoma (R)	66	Masasi	225	Mtwara (R)	46	Uyui	11
117	Geita	62	Nzega	65	Mtwara (R)	231	Monduli	43	Igunga	9
118	Musoma (R)	64	Kibondo	63	Dodoma (R)	239	Kiteto	42	Mkuranga	9
119	Bunda	68	Uyui	58	Rwangwa	250	Ngorongoro	28	Sikonge	7

Source: Authors' calculation using 2002 Population and Housing Census, NBS 2003, Ministry of Education Basic Statistics 2004, Kilama and Lindeboom et al., *Where are the Poor in Tanzania*, forthcoming

Map 2.12 Top and Bottom Districts for Selected Indicators



SOURCE: Household Budget Survey 2000/01, Population Census 2002 and Ministry of Education 2002

However, there are some geographic concentrations of districts which have a general pattern of relatively poor indicators. They are mapped in Map 2.12, which shows the 20 districts with the poorest indicators and the 20 districts with the best.

From Map 2.12, we see that districts with the worst indicators tend to cluster in the same areas, while districts with the best indicators are more scattered, and most of them are located in and around urban centres, except for under-five mortality where districts with relatively low mortality rates are also clustered in the North. Districts in the Southeast have the worst adult literacy rates, under-five mortality rates and access to improved water. Districts in Kilimanjaro and Arusha (Arumeru and Arusha districts) stand out with strong indicators.

There are important considerations for policy in addressing such disparities and inequities, especially in those districts which have the poorest indicators. Concern with equality of opportunity implies that public action should focus on the distribution of assets, economic opportunities and political voice, rather than directly on inequality in outcomes. In doing so, policies can contribute to greater investment in human resources of the poorest, to greater and more equal access to public services and information, to improved equality of property rights, and to greater fairness in markets.

In a resource constrained environment, there may well be difficult budget decisions to be made with respect to measures to increase equitable investments in human resources and access to services. Cost-effectiveness considerations may mean that coverage is determined by lower unit costs. To the degree that the unit cost of an intervention aimed at poor households increases in isolated areas, it is evident that with an equal per capita budget allocation, fewer people will be reached in isolated areas. Hence a trade-off may be needed between reaching a larger number of poor people with lower unit costs, versus one where more is spent per capita on higher unit-cost services to reach people in isolated areas. The map which follows illustrates the dilemma.

Poverty density: a policy dilemma

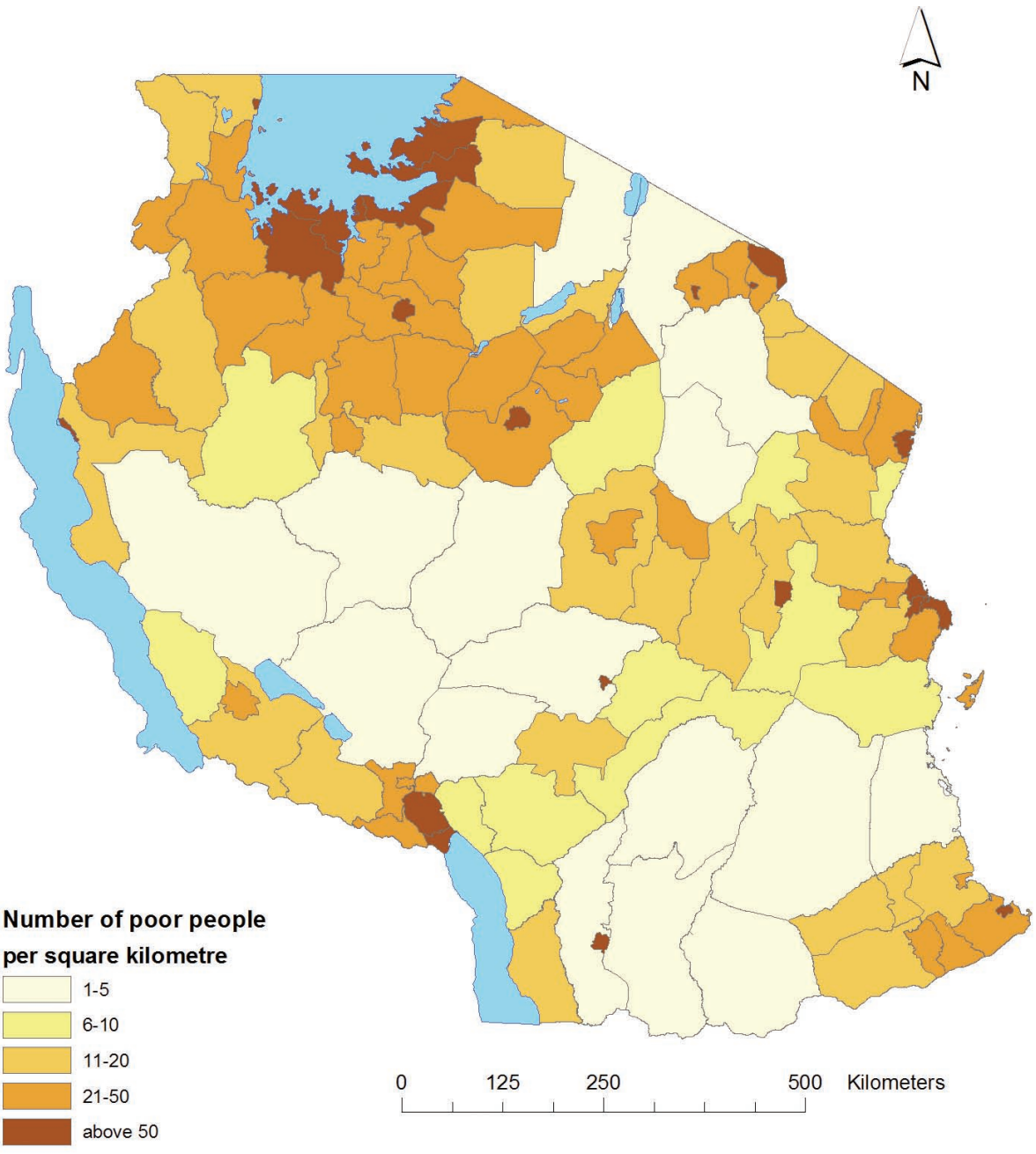
Poverty density measures the number of poor persons per square kilometre. This is shown in Map 2.13. Areas with many people - urban areas - have the highest poverty density, have larger numbers of poor people per square kilometre, even though these areas are not the areas with the highest proportion of their population who are poor.

Arusha, Kinondoni, Ilala, Temeke and Ilemela have the highest poverty density, while Liwale, Ngorongoro, Simanjiro have the lowest number of poor people per square kilometre. Large districts tend to be sparsely populated, and thus have low poverty density, even though a larger proportion of their inhabitants may be among the poorest – living below the poverty line.

Current Government budget allocations to districts for education and health are derived from the use of formulae which are heavily weighted by population size (or the school-age population in the case of allocations for primary education). There is also provision in the formulae for some consideration for long distances in large districts, and for relative poverty rates. The increasing use of formulae such as these, and the use of more specific formulae according to the service to be provided - education, health, water, or others - accords with the conclusions from this spatial analysis.

In order to enhance equitable access to high quality essential services, it will be important to ensure that trained staff are also distributed more fairly, and that other potentially distorting factors are taken into account. These include the additional resources made available through specific projects and programmes supported by development partners, as well as the resources local authorities can generate from their own sources of revenue.

Map 2.13 Number of People Below Basic Needs Poverty Line per Square Kilometre by District



SOURCE: Calculations from Population Census 2002 and Household Budget Survey , 2000/01