

Planning Techniques: Physical Indicators in Tanzania

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Introduction

Planning indicators are not themselves solutions to problems, but they can assist in identifying objectives for planning efforts, and in measuring rates of progress towards these objectives. This paper presents some indices developed in research and advisory planning work in Tanzania with reference to the provision and location of health facilities in Iringa Region.

One line of research was not initially concerned with planning at all but with the explanation of observed differences between districts in Tanzania in the level of infant mortality.¹ Measures of infant mortality, derived from the results of

the 1967 population census, suggested that there were great differences between one part of the country and another, and between rural and urban areas (Table 1). Data were compiled by district on a number of characteristics which might relate to the level of infant deaths—average household size, the proportion of women with schooling, *per capita* gross domestic product, etc. Included among the variables were a number constructed from the information available for each district on the provision of medical facilities—number of health establishments (hospitals, rural health centres, and dispensaries), and the number of medical personnel (physicians, medical aids, nurses, etc.). No general statistical relation could be observed between the provision of health facilities measured by these indices and the level of mortality (Table 2). One outcome of this finding was

¹ See I. D. Thomas, 'Infant Mortality in Tanzania', *East African Geographical Review*, no. 10, April, 1972.

Table 1
Variations in infant mortality and expectation of life at birth in Tanzania, mid-1960s.
(IMR = infant deaths per thousand livebirths, e = expectation of life at birth in years.)

Area	National Aggregates		Area	Regional Variations	
	IMR	e		IMR	Rank
Mainland Tanzania	140	43.0	Northeast	102	lowest zone
Mainland Rural	143	42.4	Far West	200	highest zone
Mainland Urban	87	54.4	Tabora District	110	lower quartile
			Tunduru District	240	highest district

Source: Thomas, 1972, pp. 8-10.

Table 2
Variations in the provision of health facilities and in infant mortality, by rural district of mainland Tanzania.

Indicator	Levels			Association with Infant Mortality, Index of Variation (%)
	Lower Quartile	Median	Upper Quartile	
1. Infant Mortality	115	142	173	—
2. <i>Per Capita</i> GDP (Shs)	242	297	427	14.1
3. Average population/physician	23,600	36,000	60,300	0.1
4. Average population per health establishment	5,400	7,100	8,900	0.5
5. Proportion of the district population not within 10km of a health facility (%)	10.2	23.1	34.7	5.2

Source: Thomas, 1972; Thomas and Mascarenhas, 1973.

a joint exercise with the Ministry of Health to collect information on the location of every health facility so that new indicators of provision could be constructed.² An index of geographical proximity to health facilities proved to be more highly associated with the level of mortality (item 5, Table 2), and also drew attention to some of the regional inequalities in the provision of health services.

Functions of Indicators

An indicator may serve a variety of purposes: it is a measure of attainment and as such is usually the outcome of a process of inventory. It may also be a measure of progress, particularly if it is possible to calculate it on a comparable basis over a period of years, and it may be set as a target for future attainment. In practice these functions usually overlap.

The following are facts about the health services and their use. In 1967, the average population per dispensary in Iringa Region was 7,418. A total 2,162 women attended ante-natal clinics, of which 352 were first attendances. The average population per dispensary for the whole of Tanzania in 1967 was 9,047, so that judged by the national average. Iringa Region was well served. The planning target applied in each region at that time was one dispensary per 10,000 inhabitants, and clearly Iringa had already surpassed the target. The ultimate target with respect to the provision of dispensaries is not so easy to specify but it is probably necessary to express the goal in some other form, for instance that each village has a dispensary, or that no person should have to travel more than 3 km to reach one. The number of attendances at ante-natal clinics might be evaluated by reference to the total number of livebirths in the region in 1967. This was estimated at 38,000, or an average of 1,120 per clinic, and if allowance is made for stillbirths and miscarriages, the disparity between attendances and those at whom the services are directed becomes even greater. An intermediate goal would be to have all pregnant women attend a clinic at least once, and an ultimate goal would be to have most women attending a number of times in the course of a pregnancy. The calculation of indicators such as the average population per dispensary or attendances at ante-natal clinics is a part of the process of inventory.

The information from which the indicator is

constructed may be provided on a continuing basis, or periodically and frequently, as part of normal data gathering and reporting procedures. The number of first attendances at a clinic is the type of information which can easily be obtained from the daily records kept by the medical staff. That is not to say that the data are always complete, or that proper provision has been made for the aggregation of daily records by month and year, by district, region and nationally, but it is a piece of information customarily recorded. By contrast, the number of livebirths, the total population in a given year, or indeed the number of dispensaries in a given district, are not recorded frequently or regularly.

Similarly, there are difficulties when estimating the total population for a district. A national population census has been held in Tanzania every ten years or so since 1948, but in 1974, seven years after the last census, any estimate of population size is obviously very approximate in the absence of vital registration and migration data. The estimate of the number of livebirths in 1967 given in the previous section was obtained by multiplying the total population by an indirect estimate of the crude birth rate derived from census data on age, the number of children ever born to mothers, and an indirect estimate of infant mortality.

Quite clearly, even the two relatively simple indicators used as illustrations here raise a series of data problems if it is considered necessary to record them annually or even quinquennially. Some useful indicators, such as annual average protein-intake of children under five, by district, have such complex data requirements that they are unlikely to be measurable in a country such as Tanzania for many years to come. Others, such as person-miles to the nearest dispensary, may be relatively easy to provide and may help to focus attention on important deficiencies in service provision.

National Indicators

In Tanzania's first five-year plan there were three major long-term objectives:

- (i) to raise the *per capita* income from Shs. 386/- per annum to Shs. 900/-;
- (ii) to be fully self-sufficient in trained manpower requirements;
- (iii) to raise the expectation of life to 50 years.

The target date for these objectives was 1980. An indicator such as life expectation at birth obviously subsumes a wide variety of conditions which affect the chances of survival in infancy, childhood, and throughout adult life. The whole

² See O. Gish, *Planning the Health Sector: the Tanzanian Case*, Coon Helm, London, 1975 and I. D. Thomas and A. C. Mascarenhas, *Health Facilities and Population in Tanzania Part One, Bralup Research Paper no. 21, University of Dar-es-Salaam, 1973.*

spectrum of social and economic influences on the quality of life is involved, but clearly the nature of medical services will be particularly important. During the first plan period some progress was made in the development of physical medical facilities, though many of these were located in the towns. There were also improvements in provisions for medical education.

The second five-year plan aimed to encourage the development of preventive and rural health services. Increased emphasis was placed on Rural Health Centres, with the intention of providing ultimately one per 50,000 persons. Other than this ratio, and that already quoted for dispensaries (1:10,000), the Second Plan did not set up quantitative targets in the health sector. It did, however, incorporate the plan's four basic qualitative goals; namely, that all Tanzanians should:

- (i) enjoy a healthy diet;
- (ii) be adequately clothed;
- (iii) enjoy acceptable housing conditions;
- (iv) have access to basic education and health facilities.

One indicator that created a major impact at the time these aims were being formulated was the proportion of children at school. The results of the 1967 population census modified the basis for this estimate—there was a larger population than had been supposed—but despite expansion in the provision of school places during the first five-year plan it came as a shock to find that the percentage of school-age children who found a place in Standard I increased only one percentage point from 46 per cent in 1964 to 47 per cent in 1969. Within the health sector, the priorities of the public health programmes for 1969-74 were to be:

- (i) better nutrition, especially for children;
- (ii) better environmental sanitation, especially water supply;
- (iii) better maternal and child health;
- (iv) better control of communicable disease.

If progress could be achieved in these spheres there would be an increase in the expectation of life, although the second five-year plan made no explicit reference to the indicator of 50 years for 1980. Towards the close of the plan period commentators were still lamenting the emphasis on curative facilities rather than preventive measures in the health field, and demonstrating that the small urban population was receiving preferential treatment by comparison with the large and rapidly increasing rural population.³ Estimates

of the expectation of life at birth in 1967 demonstrated the difference between rural and urban areas (see Table 1) but no data with which to generate this indicator existed in 1974, and the evidence being used was the placement of medical staff, the location of new buildings, budgetary allocations, and the distribution of drugs.

The device suggested for use in the preparation of the third five-year plan to link general and specific planning proposals was the key indicator. A general development objective, such as the expectation of life at birth of 50 years by 1980, was adopted as a primary key indicator which thus describes the target for a specified date in measurable terms. Then secondary key indicators were chosen for related areas of development activity, such that if these secondary targets were achieved the primary target would have been attained. The general expectation of life indicator can be broken down into male and female levels and related to child and infant mortality rates. These in turn may be linked to particular causes of death, and therefore levels of attainment were to be determined to indicate the degree of control over the prevalence of these diseases. Particular medical indicators were to be established for cases of measles, malaria, pneumonia, acute malnutrition, etc. per 1,000 of the population, and for the percentage of children under the age of five years who had been vaccinated against infectious diseases such as tuberculosis, tetanus, poliomyelitis, typhoid, diphtheria, and smallpox.

Whereas data are not commonly available on a regular and frequent basis for the calculation of expectation of life at birth—the primary indicator—data are available for a number of the secondary indicators. Further, much of this information is generated at a subnational level. The more usual target indicators of population per hospital bed, or per dispensary and rural health centre, are specified for the country as a whole, but the level of achievement was to be carefully measured in each administrative area, and this level continually compared with a set of interim targets established by the plan for that particular administrative unit. Other indicators proposed for the health sector were the percentage of the population using clean water, and the proportion of the population within specified distances of various health facilities. These last indicators are of particular interest because it will be apparent that they are applicable at a very local level, and so can be used not merely to establish national targets and regional targets, but also to measure inequalities between regions and districts, and the progress towards development in these and even more local administrative areas.

³ See M. Segall, 'The Politics of Health in Tanzania', in J. F. Rweyemamu *et al* (eds.) *Towards Socialist Planning*, Tanzania Publishing House, Dar-es-Salaam, 1972.

The details of the key indicator scheme were circulated to regional development offices by mid-1974. But the timing of its appearance (just prior to the accelerated drive for villagization), and the number of indicators listed (almost 200), was virtually guaranteed to evoke feelings of incredulity if not ridicule. By mid-1975 the exercise had been shelved.

An earlier attempt to promote a means of assessing the performance of *ujamaa* villages⁴ was also received unsympathetically and yet in Tanzania today there is an urgent need—being met by *ad hoc* schemes rather than systematic methodological enquiry—to determine means of monitoring conditions in the newly created development villages.

Local Indicators

Although the achieved population to dispensary ratio for Iringa Region in 1974 was well within the national target (7,640 against 10,000), more than 30 per cent of the population of the area lived over 10 km from any health facility (Table 3 and Map 1). The persons to facility ratio is

Table 3
Health facilities and population in Iringa Region by district (1967/72)*

District	Population within 10km of a health facility	Population not within 10km of a health facility	Per cent of the total population not within 10km
Iringa	174,827	77,800	30·8
Mufindi	60,267	58,200	49·1
Njombe	234,411	84,400	26·5
Regional Total	469,505	220,400	31·9

* Population census data 1967; health facilities inventory 1972.

Source: Thomas and Mascarenhas, 1973:32

an aspatial indicator, and a measure which examines the relative location of the population and the facilities—that is, a spatial indicator—usefully supplements the former. The preparation of this spatial indicator involves:

- (a) drawing a map showing the distribution of population;
- (b) collecting information on the location of health facilities, and mapping these locations;
- (c) combining the population and facilities maps and adding distance limits;

⁴ See P. Raikes, *Village Planning for Ujamaa*, Economic Research Bureau, University of Dar-es-Salaam, 1972.

- (d) calculating the number of people within and not within given distances of the health facilities.

The process of preparing the indicator brings into focus the deficiencies of the health service network, and the mapping involved provides an indication of where new facilities are required. In this case, if there is a gap between the achieved and the target aspatial ratio, the process of preparing the spatial indicator also suggests where new facilities should be built.

Operation Sogeza, or the movement of people into nucleated 'development' villages, completely altered the distribution of population in Iringa Region in the second half of 1974. Some 470 villages were designated, their size ranging from less than 100 to more than 1,000 families, and these contained almost all the inhabitants of the Region (Map 2). Earlier estimates of persons within and not within given distances of a health facility were no longer relevant.

This movement of the rural population at the very time when regional plans were being formulated created great difficulties, but certainly encouraged selective data collection and in Iringa Region led to the formulation of indices of relative deprivation (or need) as guidelines for the location of development inputs. Before the movement, some 30 per cent of the population of Iringa District lived over 10 km from a health facility. After the move only 33 out of the 159 development villages in the district had a dispensary, rural health centre, or hospital, and there were still 45 villages, containing 26 per cent of the estimated 1974 population, at distances of 10 km or more from a facility. But 114 villages with 74 per cent of the rural population were within

Table 4
Person-miles to the nearest health facility, Iringa District 1974

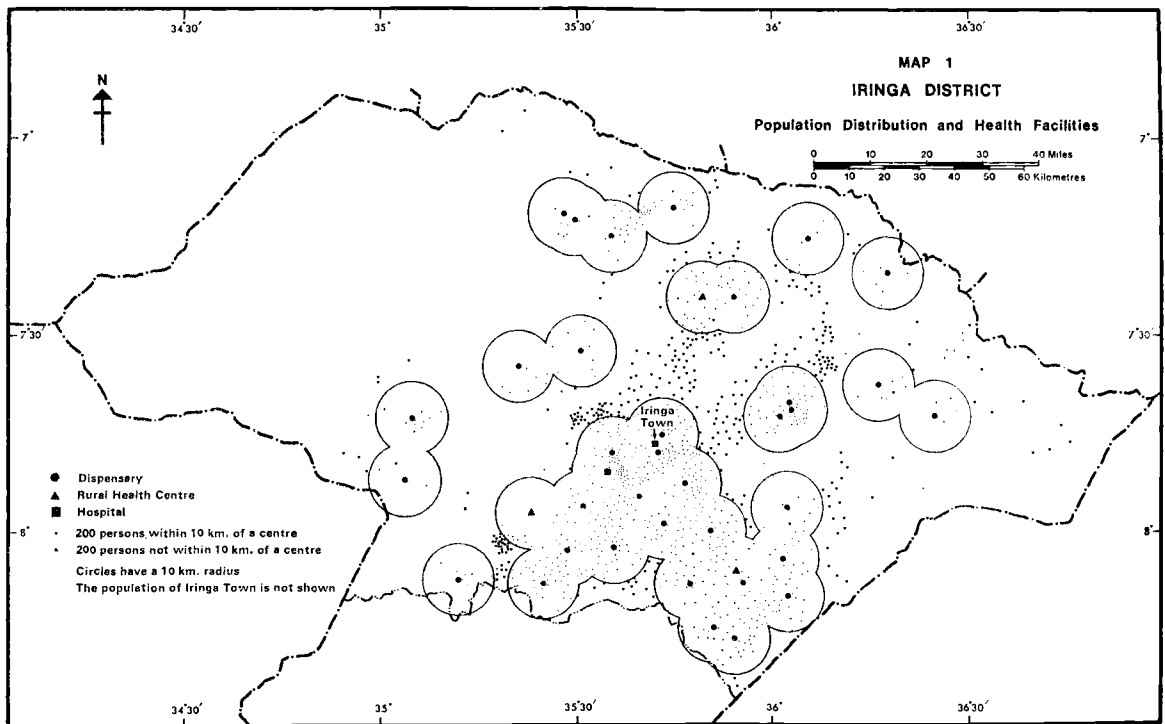
Division	Total Person-miles ('000)	Average Person-miles per village ('000)
Ismani	190	7·6
Kiponzelo	167	9·3
Kalenga	123	8·2
Mlolo	216	14·4
Kilolo	500	14·3
Mahenge	115	12·8
Mazombe	574	23·9
Pawaga	111	12·3
Idodi	22	2·4
District Total	2,018	12·7

10 km, and 67 of these—containing 47 per cent of the district population—were within 5 km of a health facility. The index of relative need was created by calculating the person miles to be travelled by the inhabitants of any given village to reach their nearest health centre.

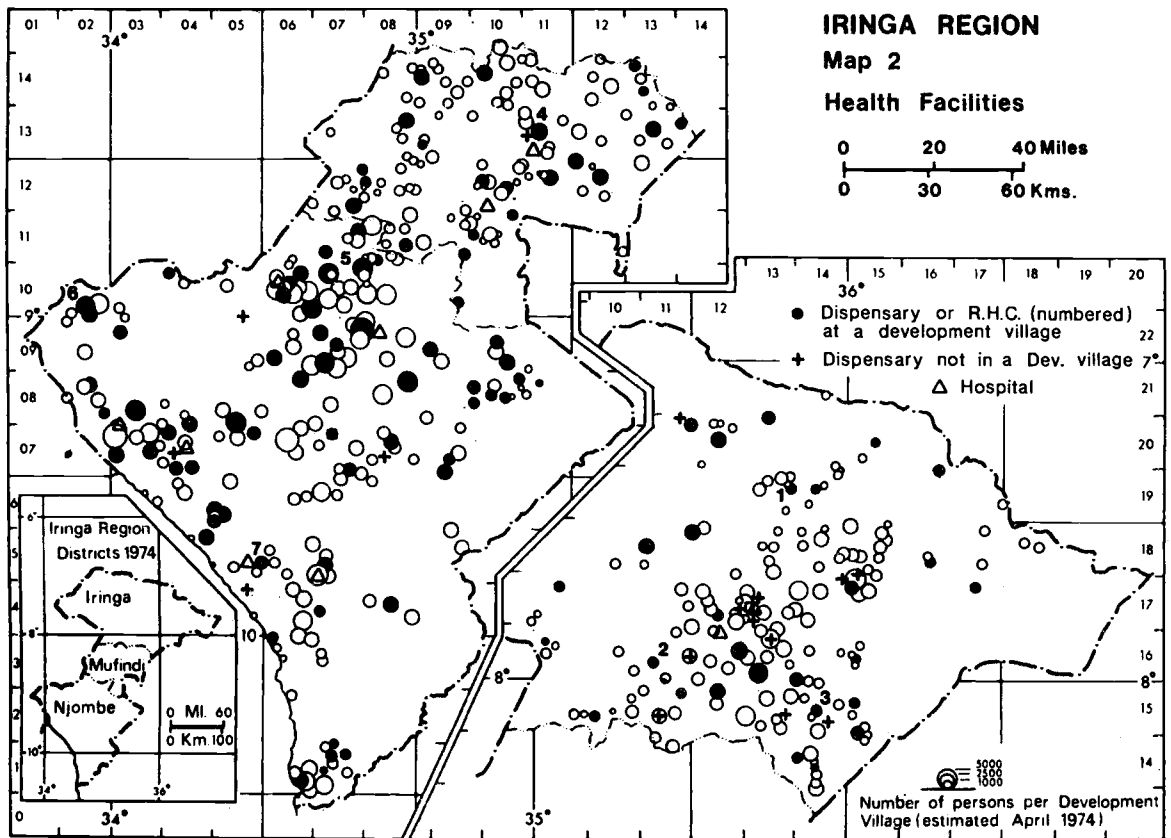
The results by administrative divisions of Iringa District are given in Table 4. The district average of person-miles per village is high. The average number of persons per village is approximately 1,470, and thus the mean distance to a health facility for a person in Iringa District may be taken as 8.6 miles (13.9 km). This is after villagization. A more desirable target would be 5 km,

and the ultimate target would be for every village to have a dispensary or equivalent health centre. The 1974 shortfall for this is 126 dispensaries.

There is resistance to modifying building and equipment standards in the health service or to accepting staff with lower qualifications, but programmes for training auxiliary staff are being mounted and interim provisions such as the supply of village medical boxes are being made. Also, additional mobile health units are being acquired to serve the more remote and isolated villages. But it is clear that it is not feasible to set an early date for achieving this ultimate target, and the problem of establishing priorities looms large.



MAP 1—IRINGA DISTRICT
Population Distribution and Health Facilities



References

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