

A MAP OF THE SURFACE OF POPULATION POTENTIAL
OVER TANZANIA, 1967

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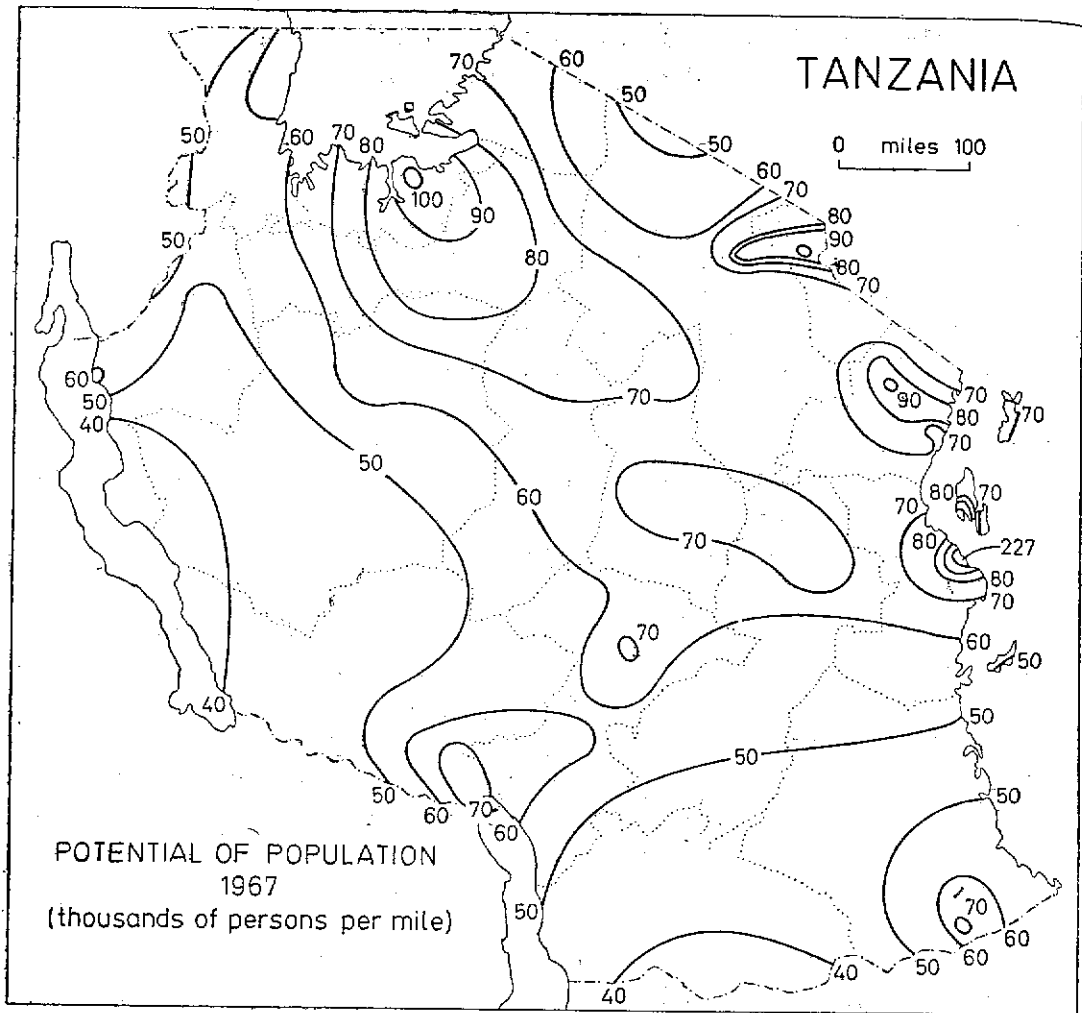
Potential of population is an index of the nearness, or accessibility, of people. It is equal to the number of people divided by their distance away and has the dimensions of persons per unit distance. Using data grouped by areal units, the potential which the population of a segment of an area creates at a distant segment is that population divided by the distance between the two segments — the population of each segment is assumed to be concentrated at some chosen control point within their boundary and the distance is measured between these two points. The total potential at each segment is itself potential plus the sum of all the separate potentials created there by the population of all the other segments. If this summed-up value is computed for each segment within the total area, it is possible to interpolate isopleths of potential on a map. (1)

For the population potential map of Tanzania, divisions were adopted as the basis of computation and urban centres were included with the division in which they occurred: this gave a total of 345 control points. The 1967 population total and the area in square miles of each division, plus the grid co-ordinates of their geographic centre were fed into the computer. The potential of each division upon each of the remaining 344 divisions was computed and self-potentials were approximated by assuming each division's area to be circular and dividing their population by half the 'radius'. For each division, its self-potential and the separate potentials created there by the population of all the other divisions were summed and these values of total potential were plotted on the base map, isopleths being interpolated at intervals of 10,000 persons per mile. In effect, the resulting population potential map is a density map smoothed according to the inverse-distance formulation, though without the local urban peaks shown.

In Tanzania, values of population potential range from less than 35,000 to more than 225,000 persons per mile but there is little coherence in the spatial pattern. Dominated by the peak at Dar es Salaam, Tanzania is characterized by separate peaks at Arusha-Moshi, Mwanza, Tanga, Rungwe, Morogoro, Dodoma, Iringa, Newala and Kigoma. With an extremely steep gradient of potential, the demographic isolation of Dar es Salaam and its immediate environs, from the remainder of Tanzania is particularly striking. These observations are of course not new, but because population potential has proved valuable as an indicator of the spatial structuring of a wide variety of economic and social phenomena, it is useful to examine them in the light of Tanzania's present levels of development and her future development plans.

In a study of the spatial impress of modernization over Tanzania from 1920 to 1960 (forthcoming in *World Politics*), Gould writes, "simply consider Tanzania

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in 1920, its people unevenly spread in clusters as the land, the rain and the tsetse fly allow more in some areas than others. Administrators are sent by the early colonial and mandate powers to the population clusters, not the empty areas, and the administrators themselves must move and communicate. Roads and railways link the administrative nodes and provide, in turn, channels through which modernizing innovations seep". A map of modernization for the early 1960's, based upon scores on a principal component which explained 58 per cent of the variance of an original set of 26 variables, clearly identifies the distinct and persistent centres of greatest development. Dar es Salaam which towers as a peak over its immediate area is followed by separate and lower peaks at Mwanza, Moshi, Arusha, Tanga, Bukoba, Dodoma, Morogoro, Iringa, Mbeya and Tabora. The correspondence of these centres with the peaks of potential is clear. Places which are accessible to a large number of people (i.e. having a high population potential) will attract modernizing innovations which will in turn reinforce the relative advantages of such places for future developments. Clearly, such a self-perpetuating process creates both

A POPULATION POTENTIAL MAP OF TANZANIA

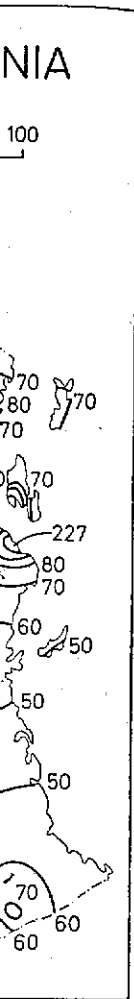
problems and prospects for further developments in a country the size of Tanzania. On the one hand, regional inequalities of modernization and economic development may become solidified and present problems of political stability and national integration. On the other hand, enlightened planning could build upon existing growth poles to generate development in the intervening areas.

The facts of Tanzania's population distribution have thus received recognition in the current five year plan (1969-74). A strategy for regional development has been outlined which is based essentially upon ten urban centres: Dar es Salaam, Tanga, Mwanza, Arusha, Moshi Morogoro, Dodoma, Tabora, Mtwara and Mbeya. Briefly, the intention is to establish these as self-sustaining growth centres which will stimulate development in their respective regions with the important corollary of controlling the increasing concentration of development in Dar itself. Although several factors have guided the choice of these ten centres (e.g. Tan-Zam links in the case of Mbeya), their relation to the islands of high potential is clear.

Finally, two other macroscopic measures of population distribution were derived. The *mean centre* of Tanzania's population was Farkwa division in the Kondoia district of Dodoma region. This is close to the geographic centre of the country and heightens the nodality which Dodoma region already possesses with respect to the road, rail and telecommunications network. Although hampered by inadequate water supplies, these are additional grounds for the selection of Dodoma as one of the urban growth centres. The *standard distance deviation* or dispersion of Tanzania's population about Farkwa was 266 miles. Both the mean centre and the standard distance deviation are little more than statistical indices but their value, albeit academic, will increase when a time series of such parameters becomes available with future population enumerations.

Acknowledgement: Mr. C. D. Mann, Department of Mathematics Makerere, wrote the computer program.

1. J. Q. Stewart: Empirical mathematical rules concerning the distribution and equilibrium of population, *Geographical Review*, Vol. 37, 1947, pp. 461-85.



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