Perspectives On African Urbanism: "New Methodologies"

Beyond a baseline survey: development of a sampling technique for an urbanization study in Africa

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Urbanization encompasses both physical and social dimensions. The former includes the attributes of size, layout, land use pattern, and the pattern and rate of growth or expansion. The social dimension on the other hand, embodies a panoply of subjects that include, but are not limited to, the composition and distribution of the population, housing, the availability and accessibility to services, and the livelihood strategies of the urban dwellers. While data on most of these variables may be collected using scientific sampling techniques such as those used for the National Science Foundation sponsored project, Creation of a GIS for six Cities in Arid Environments: in Morocco, Senegal, Mali, Niger, Tanzania and Botswana, which aim for representative sampling, research on some of these and other urban issues may also require complementary techniques. This paper seeks to examine the adequacy of the remote sensing imagery-based random sampling technique in collecting information on the social dimensions of urbanization such as the urban migrant and to demonstrate the need for complementary techniques such as migrants' network analysis at both ends of the rural and urban continuum. This paper is part of an on-going dissertation research on land tenure reforms and social transformation in Botswana: implications for urbanization and development.

The project attempts "to document and assess the linkages between land cover change, urban structure change and the work/livelihood history of the urban poor in six African cities located in arid environments." To accomplish this objective, the project processed and analyzed remote sensing imagery to ascertain land use/land cover changes as well as the framework for selecting a random sample of households for interview. The first part entails the analysis of the remote sensing imagery to identify the various categories of urban land use at each time and over the study period. This methodology also allows for the quantification of the observed land use changes through the computation of pixels in the imagery. The second component of the project entails the conduct of household interview to reconstruct the livelihood history of the urban residents especially, the poor. The processed imagery with a grid overlay is also used for the spatial stratification of the cities (based on the perceived land use classes) from which a random sample of households are selected for interview. This process starts with a random selection of cells by a computer software, with a bias for poor residential sections as well as adjustments for stages of growth in the different sections of the cities. A list of households closest to the center of each cell are then drawn up from which ten are randomly selected for interview. The claim that is made for this sampling method is that it allows for a stratification of the random sample based on the land use patterns perceived from the remote sensing imagery. In short, the sampling approach aims for a scientific research that could be replicated.

While this sampling method may be appropriate in tackling a broad array of urban issues that the NSF project is concerned with, it may not be adequate in investigating quite a number that relate to the urban migrant and rural-urban migration in which the project is also interested. This paper will use urbanization in Botswana, one of the six countries covered by the NSF project, as a case study.

The Case of Botswana

Botswana provides a classic example of urbanization in Africa, both in terms of the expansion within the existing cities and the emergence of new urban centers. On the eve of independence in 1964, the urbanization rate was only 4%. This rose to 18.3% and 45.7% in 1981 and 1991 respectively (Republic of Botswana, 1998: 7). Botswana urbanization rate becomes alarming when the projected annual growth rate of 52.9% for 2001(actually 39.4% from the

preliminary results of the 2001 national census) and 55.6% for 2011 for existing urban centers as Gaborone is considered (Republic of Botswana: 1997: 18). The inclusion of Gaborone, the capital city and the main center of urban growth of Botswana in the National Science Foundation's sponsored urban study in Africa is, therefore, not a coincidence.

Equally important to the understanding of urbanization in Botswana and elsewhere in Africa is the distribution of the population between rural and urban settlements. In 1971, the percentage distribution of the population between rural and urban is 90.4% and 9.6% respectively. By 1991, the percentage distribution has changed to 54.3% and 45.7% respectively. To bring this to a better focus, in 1981, the annual growth rate for rural and urban settlements was 3.7% and 11.6% respectively. By 1991, this growth rate was -0.7% and 13.4% for rural and urban settlements respectively. These figures are against the backdrop of an overall population growth rate of 4.1% for 1981 and 3.5% for 1991 (Republic of Botswana 2000:8). The significance of the second set of statistics is that it illuminates the first set and helps in understanding the nature of urbanization in Botswana.

As the figures above show, the urbanization process in Botswana is primarily fueled by the influx of migrants from the rural areas rather than a natural increase in the existing urban population. The extensive literature on urbanization in Africa have highlighted the fact that these migrants were either attracted by the glamor and opportunities which the urban centers offer or pushed out by the hardships in the rural areas or both. Whatever might have been the motive for migration, these migrants, especially the recent ones, nonetheless, form a significant proportion of the urban population. Conversely, the rural areas constitute a wellspring of new immigrants for the urban centers. A deep understanding of the 'world' of this segment of the urban population is therefore crucial not only for comprehending the urbanization process in Botswana but also a variety of urban issues like housing, health care, transportation, and employment. The objective of this paper is the evaluation of this technique vis-a-viz the collection of socio-economic data as well as to propose an additional sampling technique that would provide a better chance of capturing a population that is representative of the migrants.

The project's objective of representativeness in its sampling technique for household interview in Gaborone can be said to have achieved a measure of success. First, the sampled households have such a spatial spread that all the residential neighborhoods are adequately covered. Second, the random sample of households interviewed when grouped according to their residency history echoes the country's internal migration pattern. The highest percentage of 56.3 claim to have resided in different parts of Gaborone prior to moving to their current residence. 27.8% claimed to have moved into Gaborone from the other parts of Botswana excluding the other urban centers. About 11.8% of the households sampled immigrated from beyond the borders of Botswana. These statistics parallel, to a limited extent, the national average rate of 34.4% for intra-urban migration, and more closely, the rural-urban flow rate of 25.5% for 1991.

While the project's sampling technique might have achieved the spatial spread and representativeness it envisaged, the methodology may not have produced the appropriate composition of respondents required for research into key urban issues and challenges. One of the greatest challenges of the government of Botswana is the rapid urban growth that is apparent in the statistics above. This challenge comes in the provision of services for the ever-growing urban population, a concern that is only matched by the magnitude of labor loss from the rural areas especially, the traditional agricultural sector. For instance, the percentage of those engaged in agriculture in the rural areas declined from 33% in 1984 to about 15% in 1991 (Hope 1997: 23). The key to understanding and finding a solution to these twin problems lies with the in-depth study of the recent migrants into the urban centers and the potential migrants still in the rural areas. In the sampled population for the household interview above, recent rural migrants may appear to be proportionally represented with about 27.8%. While this may be so, the total number of forty-two recent migrants surveyed is such that their number is insufficient to investigate the phenomenon of rural-urban migration, one of the critical issues of urbanization in Botswana. Since the project's sampling approach aimed for representativeness among the categories of urban classifications, the sampling rate adopted in the initial survey is one that will produce fragments of populations that singularly, may not be large enough to tackle any issue specific to it, or collectively, may be too divergent to form the basis of any meaningful analysis. Just as the number of recent immigrants in the sampled population for Gaborone cannot provide adequate data on the issue of rural-urban migration, the large percentage of 56.3 for long established residents surveyed may not provide useful and required data on the current tide of rural-urban migration. This may

not be surprising as the density of pixels upon which the stratification of the city was made for sampling purposes is that of buildings and not any social class of people. For this reason, the investigation of social issues may require additional or modified sampling techniques that can balance the research objective of sample representativeness with that of the appropriateness and relevance of the sampled population to the questions been investigated.

For questions relating to rural-urban migration and the urban migrant, sampling objectives can be better achieved by the addition of a network sampling to the existing stratified random sample technique that has been used for this project. This proposal is based on my on-going dissertation research in Botswana on land reforms and social transformation. My research project seeks to evaluate the social transformations in the rural areas of Botswana that have followed land reforms and which often have resulted in rural-urban migration. For my research, I selected Kweneng District for reasons of proximity to Gaborone, population density, and the suitability of the land for agriculture. A stratified random sample of 300 households with access to only communal land was selected from the enumeration localities demarcated for 2001 national census The social transformations is operationalized by collecting data on livelihood strategies, kinship ties and terminologies, social balance of power, and patterns of population movement in the district over the past ten years. For the urban component of my research, I selected Gaborone for the obvious reasons, on one hand, of it being the capital city and the most populous and fastest growing urban center in Botswana. On the other hand, the city was selected so that I could compare the result of my research using a network analysis of the original randomly sampled migrant to the result of the Gaborone component of the NSF-sponsored project.

For a selection of my household sample in Gaborone, I am using two approaches. First, the survey data from the NSF sponsored project is being used to help choose areas of focus for my research. From each selected point of the remote sensing imagery, the earlier respondents as well as between two and four others in their network will be contacted. The number that will be selected from each cell will depend on the population density of the neighborhood as revealed by the national census exercise of 2001. The second approach will entail a sample of all the contacts (as well as new migrants in their network) in Gaborone provided by my respondents in the Kweneng District. Through this snowball approach, it is expected that a representative and sufficient sample of recent migrants will be interviewed on a range of issues on rural-urban migration, the recent urban migrant, and urbanization in Botswana. To complete the cycle, the survey will move back to the rural bases of the urban respondents for cross-referencing and confirmation of the data that would have been collected at the two levels.

Although this project is still on-going and as such, no definitive conclusion could be made, the benefits of supplementing the methodology of stratified random sampling with a network analysis of the original migrants sampled are obvious. First, the purposive and targeted sampling technique of network analysis and snowballing will be useful in quickly building a sufficient sample for a subject-specific research. Where funding is finite, this may be the way to go. When combined with a stratified random sampling technique as used in the NSF survey, the method can achieve scientific objectivity that is encapsulated in representative sampling. In the household survey in Gaborone, the divergent composition of the population sampled comprising intra-urban, inter-urban, rural-urban, and international migrants is such that it reduces the usefulness of the sample for the analysis of any single category. Second, since only a pool of the population relevant to the research questions is sampled, an in-depth investigation of the pertinent issues is more easily achieved with a focus on the relevant variables that have direct bearing on the target population. Because of the wide range of issues covered in the project's household survey, the few lines of questioning for each one can only provide a superficial understanding at best.

Although my research as of the date of the conference has not gone beyond household interviews in the single rural area of Kweneng, the emerging pattern in the distribution of contacts provided in Gaborone is such that it calls into question the "representativeness" of the random sampling based on remotely sensed data in so far as recent rural-urban migration is concerned. That is, if this is tested against the population category of recent migrants. A method of selecting rural-urban migrants, as a further subset of the sample, from among households surveyed in particular urban neighborhoods that were found using a mixture of remote sensing and to a lesser extent, local sociological categorization, may not provide a representative sample of recent urban migrants. This is not in itself a critique of the methodology for the purposes for which it was created but rather a caution against its misuse for other purposes. In spite of the fact that the collection of data in Kweneng district for my research is only 70% complete, the concentration of

about 20% of recent migrants from this district in the peri-urban villages of Mogoditshane and Gabane shows the significance of these two satellite towns in the urbanization trajectory of Gaborone. The reference to these two "villages" as dormatories for the low income workers of Gaborone as well as the increasing cases of 'squatting' in the areas underscore this point. As important as these two communities are, only 7.8% of their population are represented in the project's sample. While Kweneng may be unrepresentative of Botswana as a whole this may indicate problems with the representativeness of the sample both in terms of capturing the immigrant population and in terms of capturing urban growth in Gaborone.

Conclusion

The original NSF sampling technique being used can be useful in tackling a broad array of urban issues. Its overall significance is its suitability for collecting baseline information that could start off a more detailed study. However, this methodology, especially if a very small sample is drawn, may not provide a sample that is representative and large enough for the investigation of some issues that may be of social science interest The method of selecting rural-urban migrants from a particular part of urban neighborhoods using a sampling technique that bases the representativeness of the sample on a mixture of remote sensing and local sociological categorization, needs to be supplemented by the addition of other approaches including appropriate weighting of neighborhoods to fit specific research goals as well as network analysis starting with both rural and urban ends of the continuum. Network analysis starting from the sampling points selected by remote sensing and the rural end of the continuum provides a sample that may differ significantly from the original urban sample that did not focus specifically on recent rural-urban migration. Such differences in emphasis, if taken into consideration, may provide important keys to improving the sampling framework. Earlier trends in the spatial distribution of the new immigrants in Gaborone also show a tendency for concentrating in more specific neighborhoods of the city. In the 1980s and the 1990s when migration to Gaborone from the rural areas accelerated, Old Naledi (a squatter community that is less than two kilometers from the Government Enclave and the city's Central Business District) was the favorite destination (Krüger 1998: 120).

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Abstract

This article raises questions about sample size and representativity of the remote sensing based urban sampling methodology. It argues that for many purposes a larger sample, than that of the initial study, would be better and complementary sampling procedures such as network analysis and snowball sampling may be indispensable to capture the variation needed to study some specific research topics. It uses the case of recent immigration to Gaborone, Botswana, to illustrate these points.
Key words: Gaborone, Botswana, rural-urban migration, sampling techniques, urbanization, remote sensing.

Resumé

Cet article soulève des questions concernant la grandeur de l'échantillon et la représentativité de la méthodologie de l'échantillonnage urbaine basée sur la télédétection. Il propose que pour certains buts un échantillon plus grand que celui utilisé dans l'étude initiale serait mieux et on pourrait aussi ajouter des procédures comme l'analyse des réseaux et l'échantillonnage "snowball" à fin de capturer la variation nécessaire pour l'étude de certains sujets. L'article utilise le cas d'immigration récente à Gaborone, Botswana pour illustrer ces points.
Mots clefs: Gaborone, Botswana, migration urbaine, techniques d'échantillonnages, urbanisation, télédétection.

Resumen

Este artículo plantea preguntas sobre tamaño de muestra y el representatividad de la metodología de muestreo urbana basada de la detección remota. Discute que para muchos propósitos una muestra más grande, que la del estudio inicial, fuera mejor y los procedimientos de muestreo complementarios tales como análisis de red y muestreo del snowball pueden ser imprescindibles para capturar la variación necesitada para estudiar algunos asuntos específicos de la investigación. Utiliza el caso de la inmigración reciente a Gaborone, Botswana, para ilustrar estos puntos.
Palabras claves: Gaborone, Botswana, migración rural-urbana, técnicas de muestreo, urbanización, detección remota.