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Global Health Promotion 2013 20: 10

DOI: 10.1177/1757975912462417

A spatial analysis of a community-based selection of indigents in Burkina Faso

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Abstract: Over recent decades, Burkina Faso has improved the geographic accessibility of its health centres. However, patients are still required to pay point-of-service user fees, which excludes the most vulnerable from access to care. In 2010, 259 village committees in the Ouargaye district selected 2649 indigents to be exempted from user fees. The 26 health centre management committees that fund this exemption retained 1097 of those selected indigents. Spatial analysis showed that the management committees retained the indigents who were geographically closer to the health centres, in contrast to the selections of the village committees which were more diversified. Using village committees to select indigents would seem preferable to using management committees. It is not yet known whether the management committees' selections were due to a desire to maximize the benefits of exemption by giving it to those most likely to use it, or to the fact that they did not personally know the indigents who were more geographically distant from them, or that some villages are not represented at the management committees. (Global Health Promotion, 2013; 20 Supp. 1: 10–19).

Keywords: exemption, indigence, targeting, geography, spatial analysis, equity, Burkina Faso

Introduction

Social protection is defined as 'public actions taken in response to levels of vulnerability, risk, and deprivation, which are deemed socially unacceptable with a given society' (1). User fee exemptions for the indigent, understood as those who are worst-off and unable to pay for services, constitute a preventive instrument for the social protection of the most vulnerable (2). In West Africa, where it is standard practice to ask patients to pay for care at the point of service, the capacity to pay is a major determinant of access to care. This is why user fee exemptions have been advocated for the indigent, so that they can obtain services. However, to benefit from this exemption, they also need to be able to get to a health centre. Thus, a geographic barrier is added to the financial barrier. The objective of this article is to understand how the geographic dimension was taken into account in a community-based selection of indigents to be exempted from user fees in Burkina Faso.

The indigent selection process is a major challenge for health care systems trying to ensure universal access to health care. While there is no perfect solution for selecting the worst-off, it appears that

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(This manuscript was submitted on 10 October 2011. Following blind peer review it was accepted for publication on 28 June 2012)

Global Health Promotion 1757-9759; Vol 20 Supp. 1: 10–19; 462417 DOI: 10.1177/1757975912462417 http://ghp.sagepub.com

leaving the selection to public administration agents is not very effective, particularly in the absence of specific criteria (3). Community-based processes would appear to be preferable but evidence on their effectiveness is still meagre. While these processes seem better suited to the social context, some pose certain risks such as stigmatization, conflicts of interests, or profiteering by local elites (4). Studies on community management committees have shown that they are often not very democratic and that the worst-off are rarely represented on them (5). In addition, anthropological studies have shown that social isolation sometimes limits the expression of community solidarity (6).

The intervention: a community-based selection process

In Burkina Faso, the national health policy calls for exempting indigents from user fees. To support decision-makers, an action research project was undertaken in 2007 in the rural district of Ouargaye (260,000 inhabitants). The aim of that intervention was to test a community-based indigent selection process that was carried out in two stages. The intervention analyzed in this article involved the whole district. It was organized in 2010 after the local decision-makers asked that the trial carried out in 2007 in half the villages be extended to all of the villages.

In the first stage, a village selection committee (VSC) was created in each of the district's villages (n=259). Each committee was made up of seven people from the same village, appointed by the members of the community management committee (COGES) of the health and social promotion centre (CSPS) of the district (n=26). The VSC prepared lists of the persons whom they considered to be indigent and in need of free care based on a common definition of indigence that had been previously formulated in a participative process and was valid for all VSCs. The VSCs were not given any selection criteria. They were free to make their selections based on their deep knowledge of their own village and on the common definition.

In the second stage, to ensure the sustainability of the process, these lists were validated by the COGES, because they are the ones who fund this free care by means of revenues from user fees for services and sales of drugs to patients who are able to pay. In each of the COGES, there are seven members who are elected representatives from the villages surrounding the CSPS. The COGES therefore met and developed a final list of indigents based on the lists submitted by the VSCs and using the same definition of indigence that had been given to the VSCs.

At the end of the process carried out in 2010, of the 2649 indigents who had been selected by the VSCs, 1097 were retained by the COGES. The indigents were informed of their selection and were given cards signed by the administration that gave them free access to the health centre and to the district hospital.

The evaluation of the intervention process tested in 2007 and reproduced identically in 2010 showed that it was appreciated, did not lead to any patronage, and did not produce any social stigmatization (7). The evaluation of its effectiveness showed that the VSCs and COGESs selected the worst-off, whose needs were greater than the rest of the population. The COGESs retained the persons whose capacity to pay was lowest and who had the fewest economic resources (8). Now that the financial barrier had been overcome for these indigents, the question remained as to whether their access to care was constrained by aspects of physical accessibility.

Objective

The objective of this study was to test the hypothesis that the entities representing the communities (VSCs and COGESs) tended to select indigents who were physically nearer to them, to the detriment of those living further away. In effect, the members of each VSC came from the same village and met in that village to select indigents. However, the COGES members were elected to represent all the villages in the service area of the CSPS, and they met at the CSPS. Here we are not comparing the two targeting methods, since they were similar and both were community-based; rather, we are comparing two groups of indigents selected by two different community organizations.

Method

The district has a population of 268,286 inhabitants. The study population consisted of the 2,649 indigents

selected by the VSCs in 2010. The analysis looked at a sample of 1313 indigents (50%), of whom 577 were retained by the COGESs and 660 were selected by the VSCs but ultimately not retained by the COGESs (Figure 1; rectangles are not proportional). Our sample is spatially and socially representative of the population of indigents.

Each indigent person's geographic location was recorded using a global positioning system (GPS) receptor. The analysis was conducted using a geographic information system (Arcinfo© ESRI software) in the form of maps. The data came from the Institut Géographique (Geographic Institute) of Burkina Faso. We used data from the hydrographic network, the roads and trails network, the administrative boundaries, and the locations of villages, to which was added data from the Department of Water Resources database.

Spatial analysis methods were used to study the geographic remoteness of indigents. These methods used the distance between individuals and their CSPS to analyze concentrations of indigents, their distance from the centres, and their geographic distribution. Since it was not possible to obtain such information for all the population in the district, the analysis was based on comparing the distances for the two groups of indigents selected (VSC vs COGES). This information allowed us to map and quantify out the data, and to cross-reference geographic information that could be used to identify the spatial determinants. The majority of the data were point data with attributes (number of inhabitants, number of households/indigents) that allowed us to quantify the populations. Visualization and trend estimation in space was improved thanks to a method of data point smoothing using moving averages: kernel density analysis (9). The resulting maps express, through the intensity of colours, the point densities weighted by the attributes. Map algebra was then used to produce synthesis maps that characterized the differences in spatial distribution of the estimated densities for the selections of the COGESs and VSCs (10).

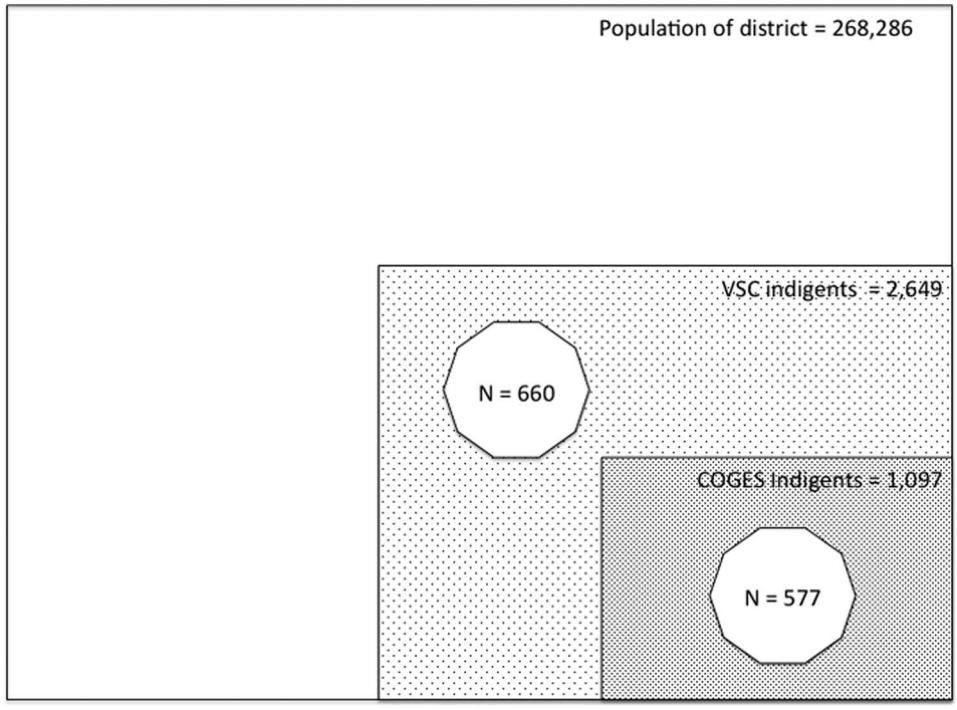

Figure 1. Selection of study population.
COGES: community management committee; VSC: village selection committee.

To evaluate the spatial concentrations of the two entities' indigent selections, a Gini index was produced for each distribution of the distances between the indigents' locations and the nearest CSPS. A test of the difference between the two Gini indices validated the difference between the two spatial concentrations.

The characterization of the spatial distributions was analyzed using spatial analysis tools (centrographic analysis). These allowed us to estimate the concentration, dispersion, and directional or geographic trend of the distribution of indigents. Thus, the distribution of the points in space can be synthesized with an ellipse. With a final processing, we were able to create a theoretical boundary around each CSPS based on its proximity to the other CSPSs nearest to it. Thiessen polygons were used to evaluate the accessibility of the CSPSs based on the nearest neighbour rule (11). They were constructed by tracing bisectors perpendicular to the lines linking two neighbouring CSPSs.

Results

Indigents selected by the VSCs

In Figure 2, the density of the indigents selected by the VSCs reveals diversified concentrations, that is, the largest selections were distributed without following any particular logic. Moreover, a high density of villages and of population did not necessarily coincide with a large number of indigents having been selected. Among the five greatest concentrations of indigents (Figure 2(A)–(E)), two (Figure 2(B) and (E)) were in immediate proximity to the road network which is often a place of polarization because of the facilities for exchange that it represents. However, the other three (Figure 2(A), (C) and (D)) were on the fringes of the road network, although not too far from it (less than 5 km). This analysis of the geographic distribution of the estimated density of the indigents selected by the VSCs thus shows that there were no particular geographic criteria applied in the selection done by the VSCs. Only the proximity to a good quality road network would appear to have been a determinant for the largest concentrations.

Indigents selected by the COGESs and proximity to health centres

In Figure 3 the analysis is refined by cross-referencing the density of indigents and the locations of the CSPSs. The highest densities are still associated with proximity to a CSPS (Figure 3, boxes F to J). The proximity of the road network and the density of the VSCs' selection have no real influence on the COGESs' selection. While it can be seen that the two concentrations in the north and south (I, H) are located on the road network, this is due above all to the fact that the health centres are also there. Thus, the proximity of CSPSs seems to have been determinant in the COGESs' selection of indigents.

Figure 4 presents the distribution of the number of indigents in the two groups based on their distance from the CSPSs. The graphic analysis of the distribution of the COGES indigents is more staggered to the left than is that of the indigents selected by the VSCs. The indigents selected by the COGESs are less distant from the CSPSs than are those selected by the VSCs (Table 1). The results of the two Gini indices (0.34 (0.33–0.35) for the VSCs and 0.23 (0.21–0.25) for the COGESs) and their comparison reveal a significantly different index. Moreover, the difference between the two Lorenz curves is significant (d=0.10, standard error of the mean (SE)=0.01). From this we can deduce that the COGESs, in their process of filtering the indigents selected by the VSCs, chose the people closest to CSPSs. There is thus a spatial concentration of the user fee exemption beneficiaries selected by the COGESs.

Synthesis map

The small size of the polygons in Figure 5 would suggest a geographic coverage of CSPSs driven by a concern for effectiveness. However, moving southward, the polygons grow larger. The distances to be covered are therefore greater for inhabitants of the southern regions and for those in the east and west margins when the CSPS is off-centre.

The selection of indigents appears to be spatially more diversified in the south. In other words, there was no particular selection in these areas (no area where a committee selected more than in another); all types of selections were done here, by both the

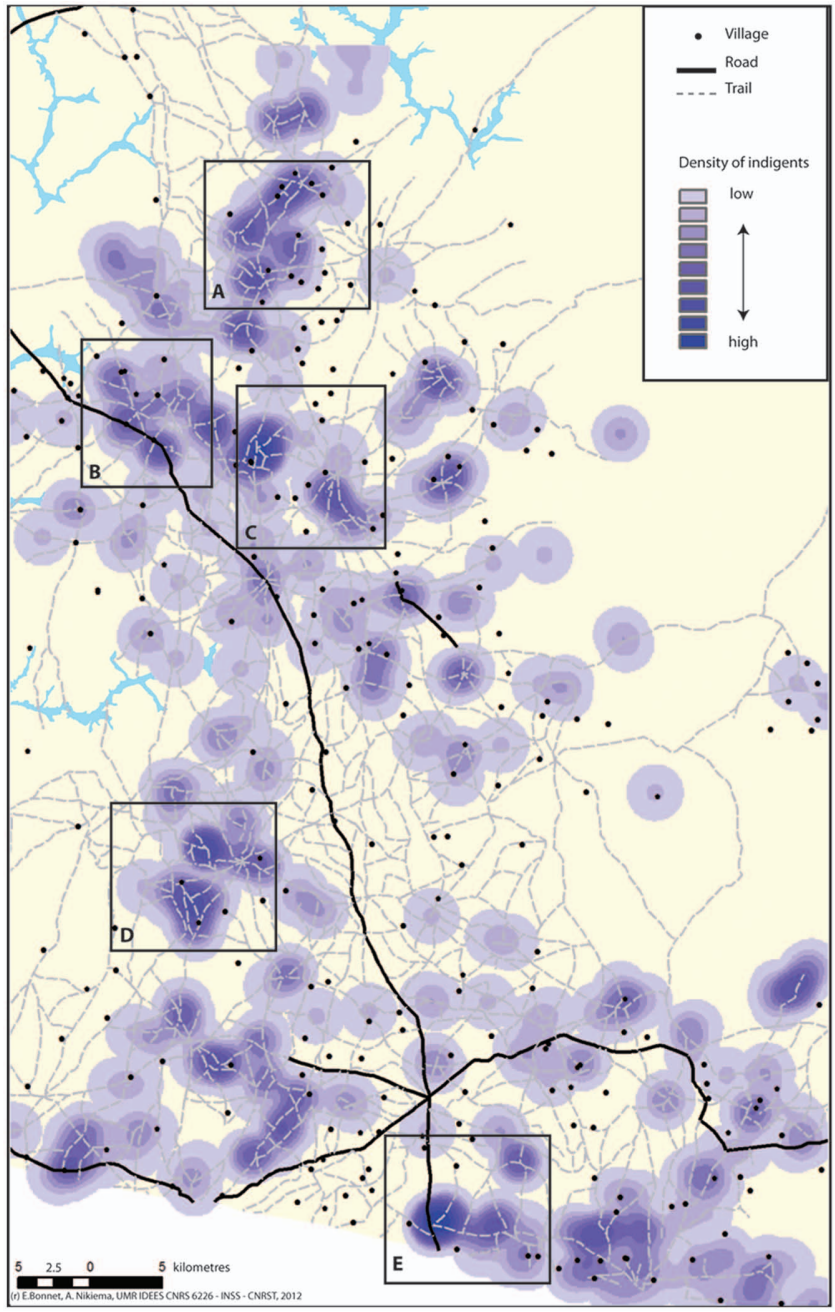

Figure 2. Density of indigents selected by the village selection committees (VSCs).

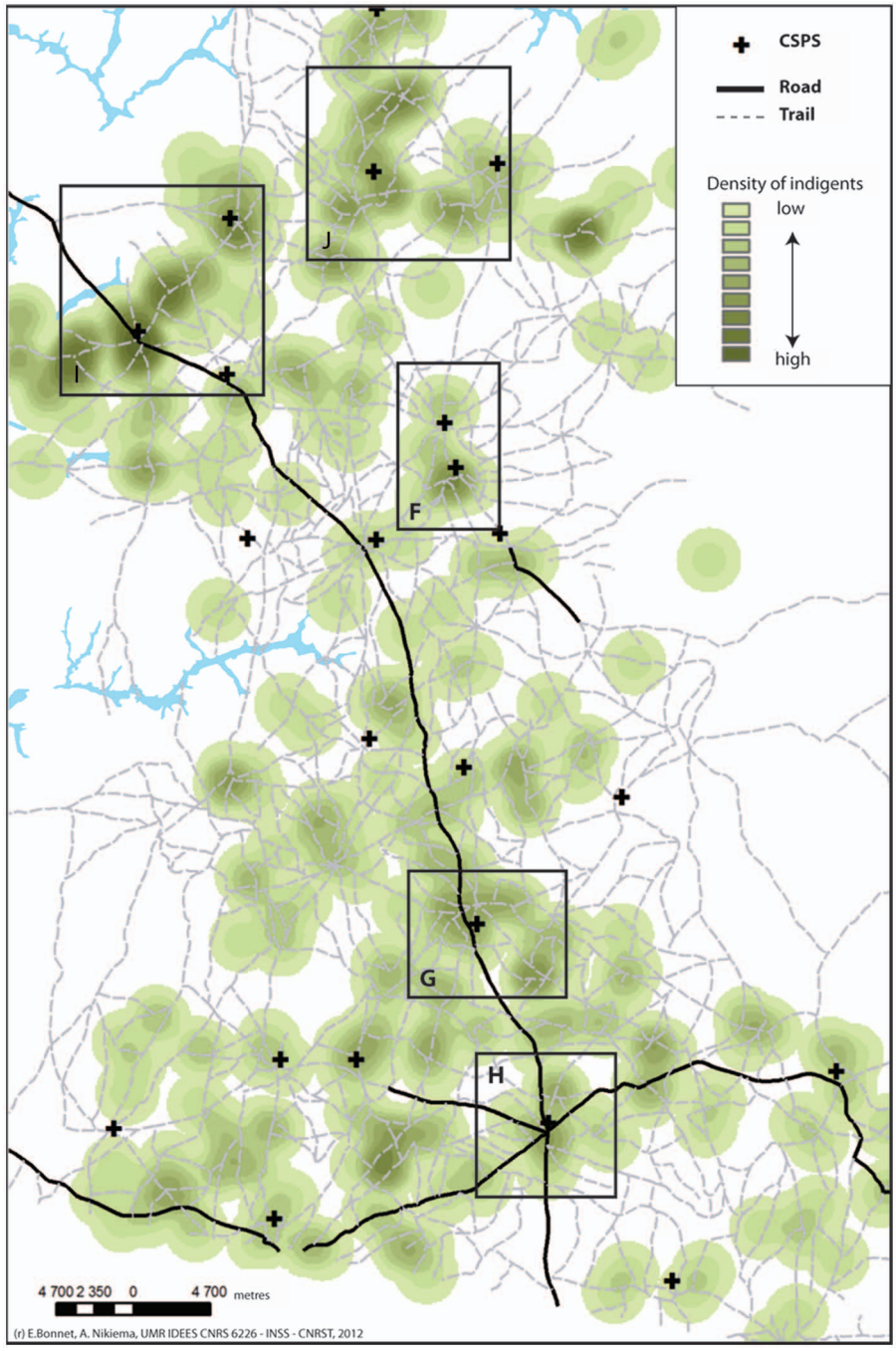

Figure 3. Density of indigents selected by the community management committees (COGESs). CSPS: health and social promotion centre.

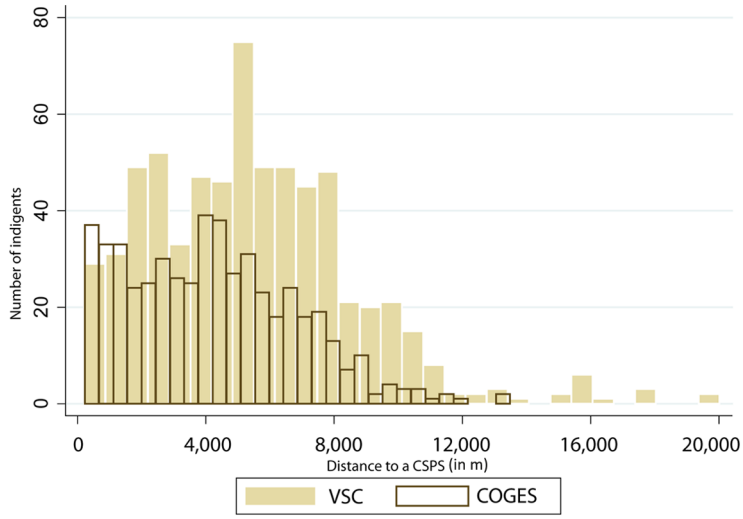

Figure 4. Number of indigents in the two groups based on their distance from the health and social promotion centres (CSPSs).
COGES: community management committee; VSC: village selection committee.

Table 1. Distance (in metres) between indigents' place of residence and the nearest health and social promotion centre (CSPS)

	VSC N=660	*COGES N=570*
Mean	5,444	4,198
Median	5,260	4,062

COGES: community management committee; VSC: village selection committee.

VSCs and the COGESs. In Figure 5, the differences in colour express the comparison of densities between the VSC and COGES indigents. When the densities are bluer, the number of indigents selected by COGESs is higher than the number selected by VSCs. The colour red indicates the inverse, with the number of COGES indigents selected being lower.

The Thiessen polygons represent the CSPSs' theoretical catchment areas. They highlight the fact that distance was a barrier to selection. Indeed, the peaks of density for indigents not retained by the COGESs, in red, display high values (more than the blue values) and a peripheral geographic positioning, often at the junction between two polygons as if wavering between two catchment areas. It can be seen that some polygons contain nearly all one colour (polygons T, L, P, etc. for the COGESs and U, R., etc. for the VSCs). There is therefore a specialization in the selection of indigents according to the catchment areas of the CSPSs.

The ellipse characterizes the general distribution of the indigents. It can be seen in Figure 5 that the two greatest concentrations are in the northwest and the southeast. This orientation, together with the elongated form, seems to correspond to the main road network. This confirms that the combination of accessibility to the road network and proximity to a CSPS was a major determinant in the selection of indigents for all of the communities but applied more systematically for the COGESs.

Discussion

Because this analysis is based on a sample of indigents, the results should be interpreted with caution. Further studies, taking into account other characteristics such as indigents' income and needs, would help to refine the analyses. This article does not call into question the effectiveness of targeting, as we have shown elsewhere that the persons selected in 2007 indeed had greater needs than the rest of the population (8). Here, we raise the issue of

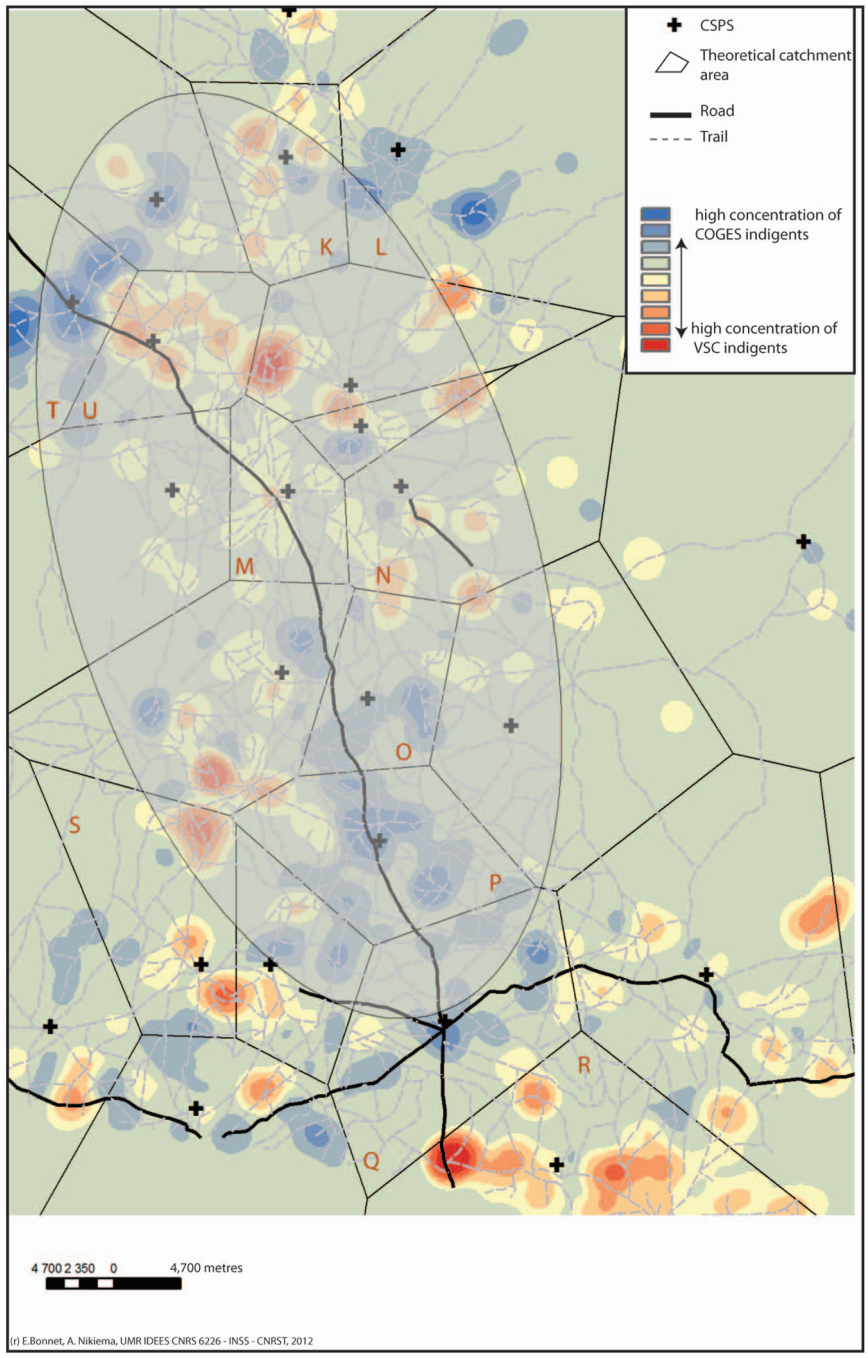

Figure 5. Spatial distribution of the community management committee (COGES) and village selection committee (VSC) indigents and the service offered.
CSPS: health and social promotion centre.

the spatial distribution of this community-based selection process.

The synthesis map confirmed the efforts undertaken in recent decades by Burkina Faso to overcome the geographical barrier to access to services (12,13). The State has built numerous health centres which appear to be well distributed in this district in relation to the population. However, there is still much to be done to improve financial accessibility.

At the level of the VSCs, the study confirmed the well-known fact of villagers' good knowledge of one another (14) and revealed an indigent selection process that did not take into account distance from the CSPS. On the other hand, the analysis confirmed our starting hypothesis and the biases that can be introduced by having the indigent selections validated by the COGESs. There was some social insistence on this validation in the preparatory phase of the intervention and it was essential for the financial viability of the exemption in order to respect national directives. However, this validation was called into question by the VSCs, who considered it too restrictive (7). The analysis confirmed that COGES members tended to select people who were geographically nearest to the CSPSs. Thus, when selecting people for whom the financial barrier would be eliminated, the COGES members took into account the ease of geographic access. It may be that the COGESs implicitly chose indigents who lived nearest to the CSPSs from a utilitarian standpoint. In seeking to maximize the benefit of this exemption for the worst-off, they may have decided to select indigents who would be most likely to use the exemption based on relative proximity to the CSPS. However, this selection might also have been due to the fact that the COGES members did not know all of the inhabitants of all of the villages, since certain villages are sometimes not represented by the seven COGES members. The COGES members may have tended to select those they knew, or those who lived in their own villages, and excluded the others, thereby demonstrating the sometimes not-very-democratic nature of the COGES (2). Finally, it may also be that in certain COGESs, some villages were simply not represented because the elections themselves are not always entirely democratic or representative (2) which would have led to the near de facto exclusion of any indigents selected by the VSC of those villages. These are all hypotheses to be examined in future studies.

Conclusion

This spatial analysis of the community-based selection of indigents is, to our knowledge, one of the first studies on the subject. The proposed method appears to be innovative and useful for evaluating the distribution of benefits of population health interventions.

Beyond the effectiveness and relevance of this community-based process which have already been described elsewhere (12,13), the analysis shows the selection biases that can be engendered by a community-based funding system in which the paying users fund the user fee exemptions for the worst-off. The analysis showed that selection by the village committees was more effective from a geographic standpoint than was that of the COGESs, in addition to being more socially appropriate and more likely to capture those in greatest need. If the State decides to become involved in managing the care of indigents, as appears to be intended in the national health insurance project for example, and to provide specific public funding beyond the necessarily limited community resources (15), then the COGES validation step could be eliminated and the selection essentially entrusted to the village committees.

Acknowledgements

This work is the product of a collaborative process involving many people and organizations to whom the authors extend their warmest thanks. Thanks to Moctar Ouédraogo of AfricSanté for data collection, to Slim Haddad and Isabelle Agier at the CRCHUM for the analysis of the distribution, and to all who participated in the planning workshop (April 2012) for this special issue and whose feedback helped to improve this article substantially. Thanks to Donna Riley for translation and editing support. Valéry Ridde holds a New Investigator Grant from the CIHR.

Funding

The study was funded by the International Development Research Centre (IDRC) of Canada and by the Global Health Research Initiative (GHRI), a research funding partnership that includes the Canadian Institutes of Health Research (CIHR), the Canadian International Development Agency (CIDA), Health Canada, the IDRC, and the Public Health Agency of Canada.

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