# How to obtain a representative sample of economic studies in the areas with strong mobility? Case of the Senegalese Sahel (Ferlo)

A. Wane[1], I. Touré[2], B. Toutain[3], V. Ancey[4], A. T. Diop[5], A. Ickowicz[6]

[1] Economist - URP Pastoralism – Cirad-PPZS, Dakar, Senegal, awane@cirad.fr
[2] Geographer - URP Pastoralism – Cirad-PPZS, Dakar, Senegal, ibra.toure@cirad.fr
[3] Pastoralist - URP Pastoralism – Cirad-PPZS, Montpellier, France, Bernard.toutain@cirad.fr
[4] Socio-economist - URP Pastoralism – Cirad-PPZS, Dakar, Senegal, ppzsdkr@orange.sn
[5] Veterinary-Pastoralist - URP Pastoralism – ISRA-PPZS, Dakar, Senegal, amtadiop@orange.sn
[6] Veterinary-Pastoralist - URP Pastoralism – Cirad-PPZS - Montpellier, France, aickowicz@cirad.fr

## Introduction

The weakness of the Senegalese mechanisms to collect economical data and the dominance of informal exchanges explain the present gaps in the statistics concerning the primary economic sector, and subsequently the livestock sector. The pastoral extensive livestock production system, localized in the Sahelian region, the Ferlo, is concerned. This complex system constitutes apparently more or less organized networks and market chains justifying statistical economical analyses to understand their dynamic (Hatfield and Davies, 2006). These analyses, however, are constrained by methodological difficulties caused by the mobility of the population and the extent of area (Ferlo covers 67610 km², the third of the Senegalese territory). *In this context, how to obtain a representative sample for economic analysis of the most important livestock production area in Senegal?* The aim of this contribution is the formalization of a data collection methodology adapted to the study of pastoral mobile populations. The results of the application in Ferlo provide primary data about pastoral activities, a basis for economic analysis and their relevance are discussed.

## Methodology

We propose an approach at two sampling levels for countries lacking in reliable statistical data.

**Frame 1: sampling process in Ferlo**
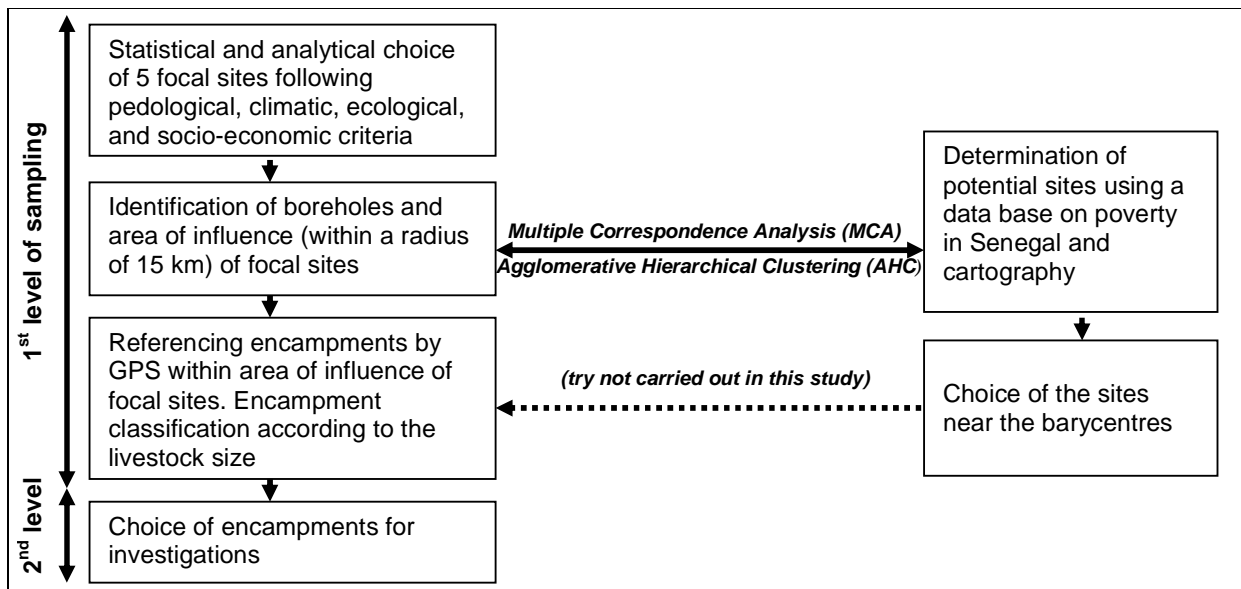


We call focal sites delimited areas where ecological factors, populations and activities present a certain unity. At this stage is applied a data analysis using Multiple Correspondence Analysis (MCA) and Agglomerative Hierarchical Clustering (AHC). These focal sites were our first places of investigation according to the time, the human resources and the money available. The other sites not selected are kept to test the relevance of the site selection and could be used for a scaling up of the study. The tools used for statistical analysis was Xlstat Pro 7.5 and for the geographical approach and cartography the software Map Info 7.0. The investigation units are the encampments. The pastoral family is formed by a whole of households. They are units of management and production, agglomerated in the basis of extensive family relationships in houses

which represent units of residence and accumulation. In a broadly scale, the socio-economics' units which are houses are gathered together in large whole called encampments.

## Results

The main result deals with the uniform spatial distribution the seasonal encampments within the areas around a pastoral borehole with a 15 km radius, and a similar area around the site named Mbame, which has only pastoral wells (figure 1).

The sampling size was set beforehand according to standard statistical rules in the absence of complete characterization of the sites. At the confidence interval of 95%, the 3% (5%) error margin, the proportion of 50% on an initial population of 740 encampments, the size of the theoretical sampling must be 438 (253) encampments. This (these) sampling(s) was (were) proportionately distributed between the focal sites according to the densities of referenced encampments.

Figure 1: spatial distribution of the investigated encampments



A reprocessing, reclassifying and cross-checking work has been done to keep only questionnaires with completes informations. Finally, we obtain a sample of 276 encampments. This remains within standard statistical norms with an error margin of 4.68% and a confidence interval of 95%. Many results have been obtained. Some of them are briefly presented here.

**Distribution of trading income** (figure 2)
- Gini index (Ferlo): 52.8%
- Gini index (rural): 31.7% in 1995; 29.9% in 2002 (Direction of Statistics Forecast and the World Bank)
- Average income is below the standard deviation: this shows the inequalities for income between pastoralists
- 37% of the poorest encampments earn only 10% of the pastoral trading income;
- Within-sites inequalities represent 21% of total inequality
- Between-sites gross inequalities constitute 79% of total inequality.
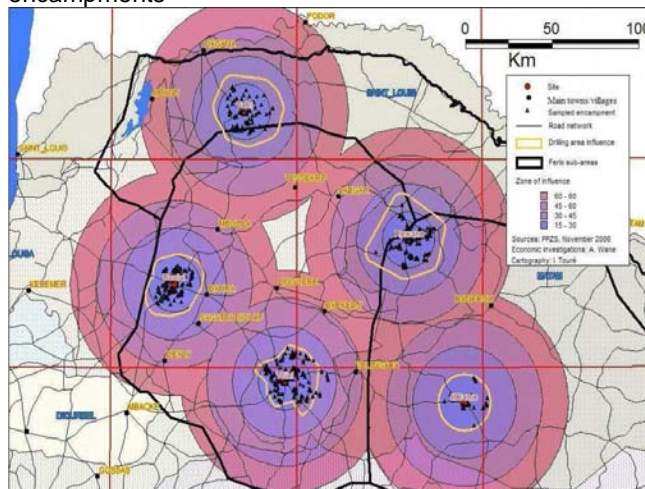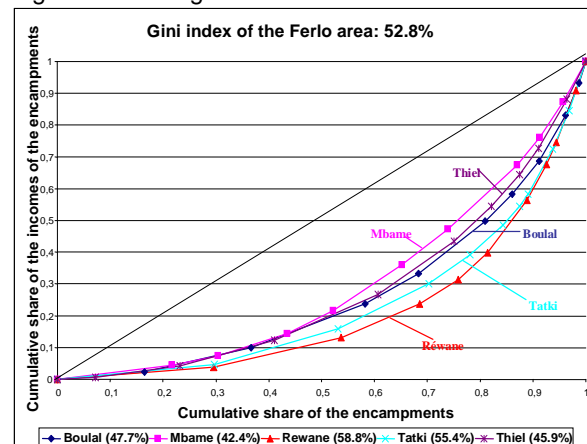  (Wane, Ancey and Touré, 2007)

Figure 2: Investigated areas – Concentration curves



## Conclusion

We showed that it is possible to use statistical and analytical tools to better understand the pastoralism which is an adaptation to marginal environments, characterized by mobility, climatic uncertainty and scarce resources. This orientation will contribute to demonstrate the usefulness of economic evaluation as a decision making tool and an economic argument to obtain appropriate policies for pastoral systems which concerns the Sahelian area, and more globally the arid lands.

## References

Hatfield R., Davies J., Global Review of the Economics of Pastoralism, 2006, Report prepared for the WISP project (World Initiative for Sustainable Pastoralism) with contributions from A. Wane, C. Kerven, C. Dutilly-Diane, J. P. Biber, J. L. Merega, M. O. Odhiambo, R. Behnke and S. Gura, IUCN: Nairobi, 47 p.
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