

**Spatial mobility survey in Yopal, Aguazul and Tauramena (Casanare, Columbia)**

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INTERNATIONAL SEMINAR  
THE CONTRIBUTION OF BIOGRAPHIES TO THE KNOWLEDGE ON SPATIAL  
MOBILITY

June 12-13, 1997, INED, Paris

**SURVEY :**  
**SPATIAL MOBILITY IN YOPAL, AGUAZUL AND TAURAMENA - CASANARE**

**Aspects Related To the Development And Evaluation Of The Survey**

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## I. INTRODUCTION

### I.1. Specific name of the survey:

Spatial Mobility in Yopal, Aguazul and Tauramena

### I.2. The research problem and its objectives

The survey is developed within a research program which main objective is to analyze the demographic dynamic of three cities in Casanare, Yopal, Aguazul and Tauramena, located near the main oil exploitation centers, Cusiana and Cupiagua. Secondary information suggests that Casanare and specifically these cities have experienced important demographic changes during the last decade as a consequence, among others, of recent oil exploration and exploitation activities. High population growth rates, rapid increase in the proportion of urban population, significant changes in the age distribution (increase in the proportion of young adults) and an increase in the sex ratio indicate selective migration flows of young adult men. The new dynamic of these populations has produced a significant expansion of the urban space and an increase in the population density: the urban centers are being consolidated with a high density central zone and a continuum low density periphery. The migration flows have implied important structural changes associated with the organization and life conditions of the population: non-family and extended households are now important forms of social organization, room-house and renting are new strategies for the increased housing demand. The migrants to the three studied cities have common characteristics: most of them are men with higher education than natives and they come from near regions (other municipios from the same state or neighbor states). There is evidence, however, of a change in the intensity and geographic composition of the migration flows: there is a relative increase in long distance migration. There are differences, according to the distance, in the modality and intensity of migration flows: intense short distance migration is not-recent and stable migration whereas weak and long distance migration is recent and temporary migration.

The demographic dynamics of the three cities, done with secondary information, indicates the necessity to approximate migration analysis considering the family unit and to extend the traditional migration concept to be able to include other types of spatial mobility that are also important in the Casanare cities. The secondary data sources available show that data refers to one of the types of spatial population mobility: intermunicipios or interstate permanent migration. These data is not adequate to measure and to analyze the new temporary spatial mobility in Casanare associated with the recent oil exploitation. Two are the most important limitations of the available data. First, the time definition: it excludes the population not living in the city according to the traditional definition; that is, it excludes those people with patterns of pendulum or circular migration. Second, the spatial definition: it does not consider intramunicipio or intraurban migration which is important to analyze the demographic dynamics at the micro-local level.

The survey system on spatial mobility in the cities of Yopal, Aguazul and Tauramena has as main objective to gather the necessary information to analyze:

- the different types of spatial population mobility in each city in relation to the labor market.
- the relationships of the labor and residential practices with the demographic and economic dynamic of each city as well as with the internal structure of the urban space.

Two questions are the base of the conceptualization of the survey system:

- Which are the population residential practices, their strategies to occupy the geographic and economic space of each city ? Which are the family and professional determinants of these practices ?
- Which are the relationships of these residential, economic and urban practices with the global and internal dynamic of each city ?

In order to be able to answer those questions, the survey system has three characteristics : 1) it considers the different types of spatial mobility independent of the distance (intraurban movements and migration from and to the city), and of the duration of the movement (permanent residential migration or temporary migration or pendulum migration); 2) it introduces a longitudinal approach to understand how people combine the different types of spatial mobility along their life cycle with their patterns of nuptiality, fertility and occupation in the labor market; 3) it analyses mobility patterns considering not only the individual but the family unit.

Combining statistical, anthropological and urban approaches, the survey system has three elements:

- a demo-statistical survey applied to 2 000 households (households living in particular housing and in hotels) to gather information on residence, education, family and occupation life histories of a family member. It also gathers information on the housing, the household, and the characteristics of all the members of the household including information on the daily movements between the housing and school and place of work, on residential systems of temporary mobility, on systems of temporary or permanent occupations, and a summary of their residential life history.

- an in-depth observation with a qualitative anthropological approach to be able to understand the individual and family strategies of mobility, to go deeper in the future plans of people life and how they change with migration, to understand causes of temporary or permanent migration, to identify perceptions on migrants place of origin. The in-depth observation is being applied in Yopal, Tauramena and in some origin places as Sogamoso.

- an observation on environmental conditions in the three cities done at the barrio level in order to identify the quality of life conditions. Given the objectives of this study, we include only those elements of the setting which could be measure and could be handle to minimize their negative action.

The remaining sections of this document will refer to the **demo-statistical survey** applied in Yopal, Aguazul and Tauramena.

### I.3 The preparatory phase of the survey

#### • The timetable of the preparatory phase :

The preparatory phase took about eight months and included several activities as specified in the following timetable. The first activity was the identification and analysis of secondary available statistical, cartographic and urban development information of the three cities. Its objective was to determine the state of knowledge on the demographic dynamic and population spatial mobility of the studied cities in order to be able to define more precisely the survey system, its methodology and its content.

**Table 1: Timetable of activities - preparatory phase**

ACTIVITY	Janua	Febru.	March	April	May	June	July	August
1. Identification and analysis of secondary information	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxx	
2. Identification and evaluation of cartographic information		xx		xxxx	xxxx			
3. Sample design and selection - Stratification of the universe - Sample design and selection					xx xx			xx
4. Preliminary questionnaire design				xxxx	xxxx			
5. Questionnaire testing						xx		
6. Yopal seminar to present analysis of secondary information and to discuss the preliminary questionnaire							x	
7. Final questionnaire design and impression							xxxx	
8. Actualization of cartography: - Maps and air photos analysis at the office - Field actualization					xxxx	xx		
9. Manuals - Interviewer - Supervisor - Critique and coding					xx		xx xxxx xxxx	
10. Supervisor and interviewer training						xx		xx

## • Questionnaire testing

The questionnaire applied in the study «Spatial mobility in Bogotá» was the base to define the questionnaire to be applied in the Casanare cities. Some adjustments were made on the bases of the Bogota field work evaluation. Other required adjustments were made to be able to apply the questionnaire on the Casanare regional context. The questionnaire was designed during the first semester of 1996 and was tested two times before the field work. The first testing was done during the first week of June by three experienced supervisors who applied the preliminary questionnaire to a random sample of 30 households in Yopal, Aguazul and Tauramena. The second questionnaire testing was done, by the same group of supervisors, in the third week of June to a sample of 6 households in Bogotá from the low socioeconomic stratum.

### I.4 Timetable of the field work

The field work was done from August 8th to September 22nd and from October 6th to October 28th. It had 58 working days which included the exhaustive household listing in the selected blocks and the application of the questionnaire.

### I.5 Responsible researchers and institutions

The survey is done within the research program «Spatial mobility in expansion zones: the cases of Yopal, Aguazul and Tauramena (Casanare)» which in turn is developed within a research agreement between Universidad de los Andes and ORSTOM (August 1996 - January 1998). The responsible researchers for the program are: C. FLOREZ and F. DUREAU, who work with a research group from the two institutions.

- CEDE. Centro de Estudios sobre Desarrollo Economico (Economic Development Research Center). Economics School, Los Andes University, Bogotá, Colombia.

- ORSTOM. SUD Department (Societies, Urbanization and Development), Research Unit 55. Main Program «Urban mobility and social recompositon».

### I.6 Financial support and participant institutions

The research program has two main external sources of financial support :

- COLCIENCIAS. Programa Nacional de Ciencias Sociales y Humanas (National Program of Social and Human Sciences)

- MINISTERIO DEL MEDIO AMBIENTE, Dirección General de Población y Asentamientos Humanos (General Direction of Population and Human Settlement)

Besides, the research agreement Universidad de Los Andes - ORSTOM establishes that each institution participant in the agreement must contribute with the necessary financial, human and material support to develop the research. Given this condition, CEDE and ORSTOM have financial participation in the research costs.

Additionally, the government local offices of each of the three cities (Alcaldías) participate through the interchange of information in the different phases of the research program.

## **1.7 The universe of study**

### **• Geographic definition**

To geographically define the universe in this study, we considered two criteria additionally to the urban perimeter defined by the local government: physical continuity and functional integration to the city. Based on air photos from each city from 1995 and based on the field actualization of cartography, it was possible to apply the physical continuity criteria to define the constructed area in each city by the middle of 1996. On the other hand, joint work with local planning offices and other private institutions made possible to define areas outside the urban perimeter which should be included in the universe given their high functional integration to the city.

Thus, besides the areas inside the urban perimeter, the studied universe include the following annexed areas:

- In Yopal: the residential unit «Colina Campestre» located outside the urban perimeter but with a high functional integration to the city.
- In Tauramena: the rural area «Puente Cusiana» given their high interrelationship with the urban center and the oil activities.

### **• Population**

The universe of study includes not only the population living in particular housing but also the population living in hotels. In fact, in order to be able to capture temporal-labor migration and complex residential systems (multi-residential systems), it was necessary to include in the universe not only the habitual residents in particular housing but also the non-habitual residents in particular housing and those residents in hotels. Specifically, the criteria used to define the population universe were:

- habitual residents : people who lived most of the time of the previous year in the interviewed household although they were not present at the moment of the survey.

- non-habitual residents : people who lived most of the time of the previous year in other household but who have lived at least 28 days (continuous days or not) in the interviewed household, although they were not present at the moment of the survey.

- residents in hotels : people who have stayed at least 28 days (continuous days or not) in the studied city.

However, it is necessary to clarify that the chapter of the survey related to the life history (biography) was applied only to members of the household 18 years of age or older, who were present at the moment of the survey.

## **I.8 Sample design**

### **• The selection process of households living in particular housing**

The sample design used was mainly a random, stratified, with two stages design whose characteristics are presented in table 2. Block sides were selected at the first step based on the socioeconomic stratification of the city done by the local government of each city and the field cartographic actualization done in June. In the second stage, households were selected based on an exhaustive listing of households living in the selected block sides.

### **• The selection of households living in hotels**

For the selection of households living in hotels, the sample design used was a three stages, stratified and systematic design. This design, whose characteristics are presented in table 3, was applied in each city (in the case of Aguazul and Tauramena) or in each stratum (in the case of Yopal).

In each city, hotels were selected in the first stage. All the hotels existing in the city were selected based on a list done by Casanare's Camara de Comercio and the field actualization done in June. Occupied rooms were then selected in the second stage. The number of selected rooms in each hotel was proportional to a previous estimated number of occupied rooms in the hotel. The selection of occupied rooms was done in a systematic and random way based on a list of all the occupied rooms at the moment of the survey. Households were then selected in the third stage. The questionnaire was applied to those household with a minimum stay of 28 days in the city (continuous days or not) during the previous year.



**Table 2: General characteristics of the sample design for the selection of households living in particular housing**

PARTICULAR HOUSING	YOPAL	AGUAZUL	TAURAMENA
GENERAL STRUCTURE	Two-stages sampling in each domain of study		
UNIVERSE OF STUDY	Urban perimeter + Colina Campestre unit	Urban perimeter	Urban perimeter - Puente Cusiana
DEFINITION OF THE DOMAINS OF STUDY	5 domains : Socioeconomic stratum 1, 2, 3, 4 in the urban perimeter (except La Arboleda unit) One domain (5) corresponding to residential units La Arboleda and La Colina Campestre.	5 domains : Socioeconomic stratum 1, 2, 3, 4 in the urban perimeter (except barrio El Porvenir) One domain (5) corresponding to barrio El Porvenir	4 domains : Socioeconomic stratum 1, 2, 3 in the urban perimeter One domain (4) corresponding to Puente Cusiana rural area
SELECTION OF BLOCKS SIDES: FIRST STAGE	Random systematic selection of block sides based on the list of block sides in the domain  In the urban perimeter, proportional distribution based on an estimation of the number of block sides with housing in each domain		
SELECTION OF HOUSEHOLDS: SECOND STAGE	Systematic selection of 3 households in each block side based on a list of households in the block side		
Observations	In the domain 5 : Selection of 6 households in La Arboleda and 9 in La Colina Campestre, based on the listing of households in each residential unit  In the domain 1 : Selection of 2 households per block side instead of 3	In domain 5 : Selection of 2 households per block side instead of 3	In domain 4 : Single stage sampling (selection of households based on the listing of households in the rural area)

**Table 3- Characteristics of the sample design for the selection of households in hotels**

HOTELS	YOPAL	AGUAZUL	TAURAMENA
SAMPLE DESIGN	Multi-stage stratified and systematic sampling	Multi-stage and systematic sampling	
SAMPLE FRAME	Hotels		
STRATIFICATION	2 strata : 1: professionals 2: others	Without stratification	
FIRST STAGE	Selection of all the hotels in the stratum  Proportional distribution according to an estimation of the number of occupied rooms (beds) in each hotel of the same stratum	Selection of all the hotels in the city  Proportional distribution according to an estimation of the number of occupied rooms (beds) in each hotel of the city	
SECOND STAGE	Systematic selection of the occupied rooms based on the list of occupied rooms in the hotel at the moment of the survey		
THIRD STAGE	Selection of all the households in each selected room with at least 8 days of stay based on a list of households in the selected rooms		

### 1.9 Selection of individuals for the life history interview

The chapter of the survey related to the life history was applied to members of the households present at the moment of the survey, of 18 years of age or older, selected according to a quota system defined with the following criteria :

- Sex : male and female
- Age : 18-34 years, 35-54 years, 55 years or more
- Kinship with the household head : head, husband/wife, son/daughter, other relative, other non-relative.
- Place of birth : in the city of the survey, in other city of the same Casanare state or in a city of Boyaca state, outside Casanare and outside Boyaca.
- Economic activity : have worked during the previous year, have not worked.

The first chapters of the survey were used to select the person to be applied the life history chapter. Therefore, the selection was made after the first five chapters were done which refer to all the members of the household. The defined quotas were considered in each defined domains of each city. The supervisors had an specific format to be able to control the application of the defined quotas at the end of each day during the field work.





• **life history information :**

Special emphasis must be given to the consistency of the different life domains of the life history information. On one hand, it is very important to gather the different events in each life domain in the correct chronological order. It may be impossible in some cases to obtain exact dates, but the chronological order must be exact.

On the other hand, the matrix design of the chapter on life history must facilitate the gathering of the information through the interrelationship between life domains. This may improve the quality of the gathered information.

## **II.2. The interview**

The application of the questionnaire started after a brief introduction done by the interviewer explaining the main objectives of the study and the confidential characteristic of the information to be collected.

## **II.3. The respondent in the interview**

The questionnaire was applied to a household head or to other adult person who was habitual resident of the household. This person could answer the questions related to the housing, the household and all the members of the household. If, for any reason, this person could not answer some of those questions, the interviewer should have asked for the specific person to gather the required information. In the case of non-relative members to the household head, the information was given directly by them.

The life history chapter was applied to a household member according to the quota system mentioned before. In this case, the selected person was who directly answered the chapter.

## **II.4. The questionnaire**

The questionnaire has six chapters :

- Chapter I : Identification
- Chapter II : Characteristics of the building
- Chapter III : Characteristics of the housing
- Chapter IV : Characteristics of the household
- Chapter V : Characteristics of the household members
- Chapter VI : Life history

The first chapter is general and it has to do with the identification. The next three chapters (**II Characteristics of the building, III. Characteristics of the housing, and IV. Characteristic of the household**) are devoted to the living conditions : type of building, year of construction,

type of housing, number of households, area and number of rooms, floor and wall material, access and frequency of the public services, occupation status of the terrain and the housing, access conditions to the housing property.

Part of the next chapter (V. - A, B y C) gather information on the **demographic and socio-economic characteristics of the household members** : sex, age, marital status, educational level, characteristics of primary and secondary occupation. Besides, two series of questions are made on the daily movements residence - education place, and residence - working place. These movements are described in spatial terms (localization of the destination place), with the type of transportation used, and with the time spend.

The section V.-D (**Migration events**) has as main objective to gather a summary of the residential trajectory from the time of birth up to the moment of the survey for all members of the household. This is done through a simple matrix which allows to register the different migration events in a chronological order. The places of residence are described as it was explained in II.1.b. This matrix gives the necessary information to define and characterize specific events: place of birth, year leaving the place of birth, first arrival to Casanare, previous place of residence, last arrival to the studied city, previous residence, arrival to the actual housing, previous housing. Besides, it allows to compute the total number of years lived in Casanare.

Section V.-D also gives the necessary information to estimate the migration flows to and flows inside the studied cities and to characterize them according to the demographic, education and economic information. Since the migration events are gathered for all members of the household, it allows to introduce the family as unit of analysis.

The objective of Section V.-E (**Residential system**) is to identify two-residential or multi-residential practices of the population based on temporary migration. It identifies other housings (different to the surveyed housing) where the person has lived during the previous year, the location of that housing and the type of activity done there. The minimum stay in a housing to be considered «other housing» is 28 days (continuous days or not) during the previous year. This information allows to analyze the space and time dimension of the residential practices.

Section V.-F (**Work system**) has the main objective to identify and characterize temporal and/or permanent work done during the previous year. The minimum work duration must be 28 days in order to be able to associate residential and work system. This section is important in the Casanare context given the oil activities of the region.

Contrary to chapter V, chapter VI (**Life History**) is only applied to one member of the household who is selected according to the quota system defined before.

The life history chapter is conformed by two matrices:

- one matrix designed for the gathering of residence, education and work life histories of the selected individual;

- one matrix designed for gathering the family events and coresidence with the closest relatives of the selected individual.

Both matrices have a common time calendar, located in the first column of the first matrix, which allows to use calendar years or ages as the time reference according to the information provided by the interviewed person. The minimum time unit considered in the life history is one year independently of the type of information gathered.

#### • **Residence, education and work life history**

The **migration history** has the main objective to register the places where the person has lived at least one year (continuous year). In the case of simultaneous residences (more than one residence at the same time), the interviewer should register that residence where the individual spent most of the time of the year. Each change of residence (migration event) should be marked with an X in the «stage» (etapa) column at the level of the corresponding year or age and it is described in the columns country to «barrio». The places of residence are described as it was mentioned in section II.1.b. Changes of residence of residence are defined according to the following criteria:

- inside the studied city : every change of housing is considered as migration and then it must be registered in the migration history (even movements in the same barrio).
- outside the studied city but inside its municipio : movements between the urban part of the city and its rural areas and within the rural areas are considered migration and the name of the rural area (vereda) must be registered in the migration history.
- outside the studied city and outside its municipio : movements between municipios, between urban and rural areas are considered migration and must be registered in the migration history but the name of the rural area (vereda) is not registered. Movements inside rural areas or inside urban areas of the same municipio are not considered migration.

Besides the migration history, the life history matrix gather information on the **kinship** with the head of the household where the person was living, and the **occupation condition** of the household. This information allows to analyze the process of housing access and it allows to analyze the relationship of spatial mobility with the individual life cycle.

The **Education** column describes de studying periods of the individual. Non-formal education courses are also registered. The **Occupation** history describes, at each age or each calendar year, the occupation the individual has had at least during a continuous year. The unemployment or inactive periods are empty spaces in the occupation column.

#### • **Family and coresidence**

The family and coresidence section of the life history has the main objective of introducing the family as the unit of analysis in the spatial mobility and of gathering information on the life cycles of the individual. The design of this section of the questionnaire is as follows:

- one column for each one of the closed relatives of the interviewed : parents (2), husband/wife (up to 3), and children (up to 8).
- each column has three parts:
  - 1) Superior part : birth year of the parents and the husband/wife(s), and sex of the children.

2) Central part : 3 sub-columns integrate this part. They are designed to register, according to the time calendar of the interviewed person, the information on:

- «**Life**»: year of birth and year of death (if it is the case) for each the closed relative (parents, husband/wife(s) and children).
- «**Nuptiality**» : information on the legal and common law unions (date of the union, and date of termination of the union (if it is the case)) for each of the closed relatives.
- «**Corresidence**» : information indicating if the interviewed person lived with each one of the closed relatives.

3) Inferior part : It gathers information on the actual place of residence, educational level and actual occupation of each one of the closed relatives if they are still alive and if they do not live in the interviewed household. If any of the closed relatives is already dead, the required information must be referred to the situation just before he/she died. Additionally, this section gathers information on the «income transfers abroad» done by the interviewed, during the previous year, to any of the closed relatives who are still alive and do not lived in the interviewed household.

The matrix design of the life history chapter allows the interrelationships of all the life domains : migration, education, work, demographic events and corresidence through the common calendar (year or age). This interrelationships helps to the remembering of past events and helps to improve the quality of the gathered information.

#### 11.5. Definition and selection of the time of reference

The time reference is not the same along the whole questionnaire. It varies as follows:

- Chapter V.-D (Migration events) : the minimum time duration for a movement to be considered as a migration event is the year.
- Chapter V.-E (Residence system) : the observation period correspond to the previous 12 months (before the date of the survey) and the minimum time duration for a housing to be considered «other housing» is 28 days (continuous days or not). The time duration in the considered housing is given in days.
- Chapter VI. (Life history) : The minimum duration of an stay in a place to be considered a migratory event is one year (the only exception is the place of birth since it is always registered even if the person did not lived there one year). The same rules for the occupation and corresidence histories. In the case of multiple residences or multiple occupations during the same year, it is registered the one (residence or occupation) where the person spent most of the time of the year.



### **III.- THE FIELD WORK**

#### **III.1. Treatment of non-responses**

In the cases of non-response for reasons of temporary absence or refuse of the selected household, the supervisor had instructions to substitute the initially selected household for the household with the next number in the list of households previously done for the selected block side.

The non-response rate was relatively low given the duration of the interview. It had similar variation by socioeconomic stratum that the observed in other longitudinal surveys: the non-response rate was higher the higher the socioeconomic stratum. The higher non-response rate in particular housings as well as in hotels was observed in Yopal (6%), and it was concentrated in the high socioeconomic stratum (16.7%). In this stratum, besides the difficulties found in any survey, there were negative reactions to some of the questions. The city with the lowest non-response rate was Tauramena (2.4%).

#### **III.2. Development and duration of the interview**

The time necessary to apply the questionnaire varied with the interviewer, with the size of the household and with the complexity of the life history of the interviewed. The mean duration of an interview, in the case of particular households, was approximately 75 minutes. Almost half of the time was spent on the life history and the other half was spent on the remaining chapters of the questionnaire. In the case of households in hotels, the mean duration of the interview was about 30 minutes.

When the member of the household selected for the life history chapter were not present at the moment of the interview, the interviewer had to do an appointment for a second visit or a third visit if it was necessary. This second/third visit had the only purpose of obtaining the life history information whereas the information on the other chapters had been gathered in the first visit.

#### **III.3. Complementary primary information**

As it was mentioned before the research program on spatial mobility in the Casanare cities includes three elements:

- a demo-statistical survey, which has been analyzed here.
- an in-depth observation with a qualitative anthropological approach.
- an observation on environmental conditions in the three cities done at the barrio level.

The in-depth observation and the environmental observation complement the information from the demo-statistical survey.

• **The in-depth observation**

Fifty open interviews with a qualitative anthropological approach are done in Yopal and Tauramena. Only these two cities were selected given that they have the appropriate characteristics for this type of study. The main objective is to go deeper in the different aspects of population mobility : understand the individual and family strategies of migration, find out the life plans and how they change along the migrant lifetime, identify the migrants' perceptions on their places of origin.

The in-depth observation is applied to a sample of three types of individuals: one sub-sample of the demo-statistical survey; one group representing recent migrants (randomly selected from people in transportation terminals and from people in hotels); and one group representing regional actors (government representatives, oil employees, oil employers, policy makers).

The in-depth observation is being applied from March to April by Maria Cristina Hoyos and Oscar Ivan Salazar from the Anthropology department at Los Andes university. A pre-designed open format is been used. The interviews are recorded and then analyzed.

• **The environmental observation**

The main objective of the environmental observation is to find the relationship between the spatial mobility characteristics of the population and the particular characteristics of the urbanization process in each studied city. We intent to analyze the relationship between individual migration events, their location patterns in the destination cities and the urban transformations of the barrios. The environmental observation may contribute to the analyses of the relationships between spatial mobility patterns and the work and residential systems.

One format is applied to each barrio of each city with the objective of getting the physical, environmental and social setting to be able to identify then the conditions of life quality of the barrio. It gathers information on: the access of the barrio to public services, physical risk conditions, public space, social services, formation history of the barrio. This information along with the households' access to the public services may allow us to infer the environmental conditions and their interrelationship with the population quality of life.

### III.4. Questionnaire evaluation

In relation to the application of the demo-statistical questionnaire, some observations can be made based on the interviewers evaluations. First, the questionnaire as a whole was very efficient and the questions sequence worked well. The sections of the questionnaire devoted to gathering the

spatial mobility information did not present problems in their application : the chapters on migration events (V.-D), residence systems (V.-E), work systems (V.-F) and the life history (VI) did get the proposed objectives.

Chapter V.-D devoted to get a summary of the **migration events** was the chapter most difficult to be applied. The use of the small matrix to register the different places the person has lived on at least during a continuous year did show some memory problems although there was a chronological sequence of events. This problem could be solved during the interview itself through the comparison of the different migration matrices of the different household members or through the comparison with the complete life history matrix of the selected person. These checking process improved the quality of the information on migration events of the members of the household. These type of problems evidence that not only the chronological order of events is an obligated step to get quality in longitudinal data but that it is necessary to related the different events of the different life domains to be able to get higher quality in life history data.

**Chapters V.-E and V.-F** devoted to residential and work systems did not show particular problems and they showed an efficient design. The graph representation of housings and works through a calendar was a fundamental element. On one hand, the graph is the way the interviewer understand the residence (or work) system as a combination of different residential places (or works). On the other hand, the graph allows to make corrections on the information on presence or absence in a given housing (or work duration). Besides, the fact of having the graph representation of the residential system in a parallel way to the work system facilitated the identification of multi-residential systems associated with specific work systems. In fact, it showed a closed interrelationship between the residential and the work systems.

In relation to Chapter VI. on the **life history**, there is an agreement among the interviewers that this section is long but it is not difficult to be applied. The graphic design with a common calendar allows the interrelationship between events along the individual life and it facilitates remembering past events. Besides, this chapter generated a particular interrelationship between the interviewed and the interviewer : the reconstruction of the main life events on the matrix generated a dialogue between interviewed and interviewer which produced an active participation of the interviewed in the elaboration of his/her life history. In the other chapters, on the contrary, the questions are fixed and closed and the interviewed get bored with them.

It is necessary to insist on the importance of the graphic solutions to handle time or the different life domains of an individual or the different components of a family. It is also necessary to mention that the questionnaire contains multiple internal controls to be able to evaluate the internal consistency of the data.

## IV.- DATA TREATMENT

### IV.1. Data coding

Critique and coding of the data started just after the field work ended. In order to use the supervisors' knowledge of the questionnaire, they were the responsible of the critique and coding activities. Four persons participated in this activity : the two supervisors, the director of the field work and the responsible of the application of the environmental form. Two groups were formed with one supervisor in each group critiquing and coding the questionnaires applied by the other supervisor and her group of interviewers.

Since most of the questions were pre-coded, the open questions to be coded were relatively few : age, places of residence (country, department (state), municipio, barrio, vereda), occupation, branch of economic activity, time duration in other housing and time duration in other work.

The gathered information on residential and work systems was coded using a synthetic variable which was defined in terms of the main types of residential movements (frequency and duration of the movements) or the main type of work duration (and its frequency). The objective was to capture the principal residential and work rhythms during the previous year.

In the case of the life history, the coding was as follows:

- mark with a circle the date in the column Date corresponding to the observed event in the different life dimensions;
- mark every migration event with a cross in the column Stage (etapa) of the life history 2 (place of residence);
- code the place of residence (country, department (state), municipio, barrio, vereda);
- code the kinship (in the biography 3) and occupation condition of the household (in biography 4) in the corresponding starting year of the stage;
- code education level (biography 5), and the occupation, occupational position and economic branch of activity (biography 6) at the corresponding starting year of the stage;
- in the family and coresidence biography (biography 7), register the corresponding codes of each event.

Eight weeks of work were needed for the four persons to complete the critique of coding of the 2.057 questionnaires.

### IV.2.- Recording of the data and definition of the time variable :

The data has been recorded using a CLIPPER program written by Argemiro Morales at CEDE. The program was first written for the Bogota spatial mobility survey and it was adjusted for the Casanare survey. Therefore, it has the advantages described for the Bogotá survey as it follows:

- the different files can be simultaneously opened in an automatic way. This fact permits to follow the sequence of the chapters to recorder the data as it appears in the questionnaire. None transformation of the data is needed but coding is the only activity before recording.
- the identification of the household is recorded once for the first file (HOGARV or HOGARH) and it is automatically repeated in the other files.
- there is automatic range controls for the variables during the recording process.
- some variables receive automatically a value according to the questionnaire flows (for example the variable country for the places located in Colombia).

According to the recording method used, the produced files have an adequate structure to control for internal consistency and to facilitate the processing of the data.

- **Data structure** : The structure of the gathered data satisfies two objectives. First, it allows a direct recording of the data with few coding and none data transformations. Second, it directly produces files with an adequate structure for processing and analyses. These objectives lead to define three sets of files: one for the households in particular housing, one for households in hotels, and another one for characteristics of hotels. The two sets of files for households in particular housing and households in hotels are formed by 12 files (1 for households, 2 for individuals, and 9 for the biographies corresponding to the different sections of the life history). This structure allows the individual level analysis, the analysis at the family level, and the statistical analyses of the longitudinal life history data. The information on hotel characteristics is recorded in only one file with one register for each hotel.

- **The time variable in the files :**

- Chapter V.-D (Migration events) : the small matrix gives the number of years the person has lived in the different places. This information permits to calculate the total number of years the person has lived in Casanare.

- Chapter V.-E and chapter V.-F (Residential and work systems) : the number of days and the synthetic variable created during the coding give the frequency (rhythm) of residence and work systems.

- Chapter VI. (Life history) : the used structure is the standard one used with this type of data. It correspond to a register per event including the information to characterize the event: identification , date of initiation, date of ending, describing variables.

#### **IV.3.- Selection of the time unit for the analyses :**

The unit of analysis correspond to the options just described.

- the year for the analyses of Chapter V.-D (Migration events) and Chapter VI (Life history) along the lifetime of the individual.

- the number of days and the frequency of the residential and the work systems for the analyses of Chapter V.-E and Chapter V.-F. A residential density can be calculated from the number of days living in each of the three identified households, and different residential systems can be identified (complex, simple ones).

#### **IV.4. Computer programs used**

Program for data recording : CLIPPER

Control and internal consistency : program written in FORTRAN

Data correction : EXCELL, DBASE IV

Data analyses :

Chapters II to IV : mainly SPSS.

Chapters V and VI (life history data) : SPSS, STATA, BMDP, CASA.

#### **IV.5. Potential users of the data**

Researcher demographers from the CEDE-ORSTOM research group.

Researchers from CEDE.

Students : In the Master program in economics at Los Andes University.

Government officers from the urban planning offices at the local region.

#### **IV.6. Main themes of analyses**

The plan of analysis, starting in April 1997, is as follows:

##### **• Preliminary results (to be done by June 1997)**

Parallel analyses of the demographic and statistical survey, the in-depth observation and the environmental observation.

This first phase of the data analysis has two main objectives : 1) to do a socio-demographic analysis of the three studied cities during the 1993-1996 period; 2) to analyze the different types of spatial mobility in relation with the labor market.

To develop this two objectives, it is necessary to carry out the following activities:

- Construction of synthetic variables as: household type, socio-occupational categories, migratory trajectory, residential system, work system.

- Construction of life history indicators as : individual characteristics at the moment of occurrence of an important event (for example, first arrival to the studied city), summary measures of

duration or state characteristics (for example, number of migration events from time of birth to first arrival to the studied city).

- Production and analysis of tables by survey theme, for each studied city, as : demographic characteristics of the individuals and characteristics of the households, residential mobility (permanent and temporary migration to and inside the studied cities), economic activity (relationships between the residential and the work systems).

• **Specific analyses (to be done by December 1997)**

The analyses will be developed on three main elements :

- analyses on the behavior of specific sub-populations : for example, oil employees, recent migrants, people with complex residential system.
- life history data analyses : for example, types of trajectory migration,, interrelationships between spatial mobility and other dimensions of the life history (work, family).
- integration of the demo-statistical information and the other two types of observations, the in-depth qualitative observation and the environmental observation, to do multi-level analyses to be able to: 1) understand the individual and family spatial mobility strategies; 2) identify the relationships between the spatial mobility patterns, residential and work patterns, and the urbanization process followed in each studied city.

## V.- SURVEY EVALUATION

The field work gives elements to do a first evaluation of the survey as it was presented in section III.4. The phase of consistency and internal control of the data gives a complementary evaluation of the data. The data consistency and internal control is done with a program written in FORTRAN by Argemiro Morales at CEDE. The program finds and lists the detected errors by questionnaire.

For households in particular housing there are four types of data control :

- for all the members of the household: controls for chapters I to V.
- for persons to whom the life history was applied : internal controls between the life history data and the data from the remaining chapters of the questionnaire.
- for relatives non-members of the interviewed household : internal controls.

For the information on hotels, there are controls on chapters I to III.

Given that we are at this moment starting the data correction and control phase, we still do not have results to evaluate the survey besides the data field evaluation already done.

### **V.1. Things that went well**

- **Chapter V.-E and Chapter V.-F (Residential and work systems) :**

The design used for the questionnaire showed to be efficient, in particular the graph representation for the residential and working calendar. As it was mentioned before, this graphic solution allowed the representation of complex residential systems as well as it allowed to capture temporary work and temporary migration.

- **Chapter VI. (Life history) :**

The use of a matrix to gather the life history information allowed to register the events and their characteristics showing an efficient design. Besides, it allows the internal consistency of the information from the different life domains. This design is more efficient than a design with sequential questions.

It is necessary to mention the efficiency of graph solutions to gather longitudinal data and the different life domains of a person, or to gather the different components of a family : the residential system information and the coresidential information in the life history matrix give a global vision of the family as a unit and its evolution through time.

### **V.2. Modifications to be done :**

Additional evaluations of the questionnaire and evaluations of the gathered data are needed to be able to suggest modifications to the actual questionnaire. The recording of the data finished on March 6th and we are starting the consistency and internal control of the data. However, the sequence questions could be improved if chapters V.-E and V.-F (residential and work systems go first than chapter V.-D (migration events), just after chapter V.-C (actual work). The reason is that chapter V.-C has the last week as time of reference, chapters V.-E and V.-F has the previous year as the time of reference, and chapter V.-D has the whole life as the time of reference. Then, this order goes with an increasing time of reference and may improve the data gathering.

### **V.3. Things considered errors :**

Training of the supervisors and interviewers are quite important for the quality of the gathered data and for the time duration of the field work. Since some interviewers quit in the middle of the field work for violence problems in the region, we had to recruit new interviewers who had few time for training. The quality of the data gathered by this new group was substantially lower than the observed in the remained interviewers. The main reason been the short time devoted to training. It would have been better to finish the field work with an small well trained group although it could have implied a larger number of days of field work.



