ONDH Household Panel Survey:

Methodological overview

Introduction

Morocco dispose of a national statistical system rich in economic, social and environmental information. This system contains routine data produced by different departments and economic actors, household surveys and population censuses. Being conducted in irregular and cross-sectional way on households socio-economic aspects, they just provide a situation of the moment and do not allow dynamic analysis of social phenomena that require longitudinal data.

In this context, and in order to fulfill the needs of its missions to evaluate public policies on human development, the National Human Development Observatory (ONDH) has set PU a household panel system consisting of conducting surveys on a sample of households and household members who will be followed on each passage for a long period at fixed and regularly spaced occasions of two years. The households of this panel sample arechos en to represent all categories of households in Morocco. This survey, the first of its kind in Morocco, was launched in 2012. Since then, four waves had been completed (2012, 2013 and 2015) and the fourth ended in July 2017.

The Household Panel survey covers the main aspects and dimensions of human development (demography, education, health, employment, housing and housing conditions, participation, exclusion, subjective poverty, expenditures and consumption, incomes, etc.) to observe the evolution with the same individuals in time.

This paper presents the basic elements of the methodological aspects of the ONDH Household Panel Survey (EPM).

1. Presentation of the survey

The first section, concerns the presentation of the objectives, the design and the various components of the household panel survey, its sampling plan, the data's collection method and the human and material resources mobilized for the survey.

1.1. Objectives of the survey

The main objective of the design and the implementation of a "Household Panel" survey for the first time in the country, is to be able to monitor and analyze the dynamics of human development in Morocco. The purpose of this panel is to observe the units "housing" and "household" and to follow the unit "household's individual" in time.

It will be used to carry out several types of analysis and evaluations of public policies for human development, including the evaluation of the short, medium and long-term impact of these policies on the population.

This system of permanent periodic surveys on the different dimensions of human development, the incomes and living conditions of households and individuals has several objectives, notably the possibility to product various indicators that the Interactions and correlations between them can be analyzed. It meets to needs in terms of statistical information on income and living conditions and deepens the themes relating to employment, working conditions, education (literacy and education), the quality of education, Housing and the environment, health, financial situation of households and individuals, household food consumption and non-food expenditures.

1.2. Scope of the survey

The scope of the survey concerns all private households residents in Morocco and the information to be collected refers to the household as well as to each of its members. However, to be excluded from the scope of the survey:

1. the homeless people and nomads;

2. the foreign population who are members of the diplomatic corps and resident in consulates and embassies;

3. the persons (nationals and foreigners) who are residents in Morocco, traveling abroad for an actual or probable period greater than or equal to 6 months;

4. the persons ofthe population counted separately. This category includes:

a. The military, housed in barracks, quarters and assimilated camps;

b. Persons in treatment in hospitals for a period of six months or more;

c. Prisoners in penal institutions for a period of six months or more;

d. Residents of supervised educational institutions;

e. People gathered in charitable houses, hospices and asylums.

1.3. The question sheet

In order to carry out this survey, a questionnaire was developed. It includes standard sectionsthat do not change from one passage to another and a one variable that is introduced during a given passage to answer social problems. The main sectionsof the panel are:

section0: Identification and geographical location of the household

section 1: Identification and characteristics of household members

sectiont 2: Level of education and literacy

section 3: Employment

section 4: Health insurance and anthropometric measures

section 5: Morbidity and health care

section 6: Fertility (women aged 15-49 who declared being “married” or to be “other” in the marital status) and child mortality less than five years

section 7: Household food consumption

section 8: Non-food Household Expenditures

section 9: Household equipment and assets

section 10: Farmland owned by the household

section 11: Borrowing

section 12: Public perception of human development aspects

sectiont 13: Subjective Poverty

section 14: Housing and living conditions

section15: Annual household income

section 16: Telephone numbers, e-mail address of household members aged 15 years and over and other contact persons.

1.4. the data collection method: Interviews and method of filling out questionnaires

The survey consists of field data by direct interviews with data subjects using simultaneous computer data entry (Computer Assisted Personal Interviewing "CAPI" approach). This method involves the design of a computer application showing the interviewer the questionnaire of the survey he is conducting with the interviewed household in the order in which the questions are answered, while directly capturing the answers provided on a microcomputer on Which the application was preinstalled.

The CAPI computer application is developed in a way that integrate validity and consistency tests which allow an immediate control of the data at the time of their entry.So, for a given question, the expected answers are listed.

The mobilized teams will conduct the interviews and the data collection by entering the answers reported by the respondents to the various parts of the questionnaire set PU for this purpose directly on microcomputers according to the correct rules.

The computer application offers a direct advantage of checking the validity and the consistency of the data entered. It also saves a lot of time used before to reenter data at the time when the interviews were registered on the paper. In addition, the data then entered directly on the microcomputer can be quickly transmitted for processing.

However, this requires more efforts from the interviewers. Indeed, in addition to the mastery of the interview techniques of classical surveys and the organizational aspects of the usual fieldwork, the interviewer must have sufficient control of the computer tools and especially the computer application serving as the basis for the interviews with the respondents.

2. Sampling

2.1. Overall size of the 2017 panel and its distribution by region and rural/urbain classification

It should be noted that the size of the ONDH household panel chosen since the first wave in 2012 is 8 000 households selected from the master sample created from the General Census of Population and Housing 2004, considering the administrative subdivisionof Morocco into 16 regions. As the objective of the present passage of the ONDH household panel survey is to provide reliable estimates at the urban and rural regional level, it is necessary to check whether the current size of the panel is sufficient to achieve this objective, especially since the administrative subdivision has

gone from 16 regions to 12 regions. In case the 8,000 households of the sample are not sufficient to achieve this objective, what should be the sample minimum size to achieve the objective?

2.2. The minimum overall size sample calculation for the EPM / ONDH 2017

The sampling design used to select the ONDH household panel is based on stratified three-stage sampling. We will therefore consider the cluster effect in the calculation of the minimum number of households to be selected in the panel. Thus, based on an intra-cluster correlation coefficient ρ (also referred to as a cluster effect) estimated at 0.02 (estimate obtained using data from the third passage of the panel in 2015) and an average size n_0 of households selected from Each US equal to 20, the designeffect defined by :

$$DEFF=1 + \rho(n_0 - 1)$$ is evaluated at 1.38.

In the case of a multi-stage stratified sampling, to estimate a proportion ***P*** with a relative margin of error not exceeding ***d*** and a confidence level of 95%, the minimum size of the overall sample n * to be selected from a population of size N is given by:

$$n^* = \frac{1{,}96^2 N \frac{1-\hat{p}}{\hat{p}} DEFF}{Nd^2 + 1{,}96^2 \frac{1-\hat{p}}{\hat{p}} DEFF}(1+\tau)$$

Where $\hat{p}$ and τ are, respectively, prior estimates of P and thenon-response or attrition rate, estimated from previous surveys. In the case of the ONDH's panel of households, the estimates of τ are the attrition rates by region and by urban/rural of Panel I between 2012 and 2015.

As a consequence the results obtained clearly show that the current size (8 000 households) of the household panel can only provide reliable estimatesat the national and urban / rural levels. If reliable estimations are to be made at the urban and rural regional level, the current size of the panel is therefore insufficient, and it's recommended to strengthen the overall sample to get a size, which should not be less than 14 709 households. This size corresponds to a relative maximum margin of error at the urban and rural regional level of 15% for any indicator whose value is greater than or equal to 0.30.

However, the determination of the overall sample size must also take into account the distribution of selected households by region and area of residence, and the fact that there is a fixed panel (no renewal is expected during each wave) which usually leads to an attrition problem.

Indeed, the distribution of Panel II households by region and areaof residence must be such as to complete the composition of Panel I while being as independent as possible of it. Therefore, Panel II alone must be able to provide estimates of reliable indicators at a given level (national or regional). For this purpose, Panel II households were allocated among the strata in such a way that the following conditions were met:

1. The household size of the overall panel (combined of the two panels I and II) must be sufficient to obtain estimates of indicators at the urban and rural regional level with a relative margin of error not exceeding 15%.
2. If Panel II is considered alone to estimate the indicators, its size should be sufficient to allow estimates to be obtained at the regional level with a relative margin of error not exceeding 15%.

Table 1 below presents the distribution of Panel II households by region and urban/rural to ensure estimates of indicators at the urban and rural regional level with a relative margin of error not exceeding 15%.

The data in Table 1 show that to reach the level of precision corresponding to a relative margin of error of no more than 15%, it is necessary to select 7,900 households in Panel II to reach an overall household size of 15,872 for the panel I and Panel II. It should be noted that with this sample size, the Combined Panel will allow to ensure estimates with relative margins of error not exceeding 10% at the regional level and 5% at the national urban and rural level. In addition, the 7,100 Panel II households are allocated to the strata in such a way as to guarantee regional estimates with a relative margin of error of no more than 15% if Panel II is used alone for these estimations.

Table 1: Distribution of Panel Sample in 2017 by Panel Type, Region and Area

Of residence (margin of error equal to 15% with P_{min} = 0.30)

Region	size of the household sample								
	Panel I			Panel II			Panel Combined		
	Urbain	Rural	Total	Urbain	Rural	Total	Urbain	Rural	Total
Tanger-Tetouan-Al Hoceima	472	353	825	380	280	660	852	633	1485
Oriental	351	182	533	280	480	760	631	662	1293
Fes-Meknes	608	434	1042	380	220	600	988	654	1642
Rabat-Salé-Kenitra	788	434	1222	440	180	620	1228	614	1842
Beni-Mellal-Khénifra	354	296	650	300	320	620	654	616	1270
Casablanca-Settat	978	466	1444	460	160	620	1438	626	2064
Marrakech-Safi	450	574	1024	280	320	600	730	894	1624
Draa-Tafilalt	102	222	324	560	360	920	662	582	1244
Souss-Massa	304	334	638	340	260	600	644	594	1238
Guelmim-Oued Noun	113	26	139	520	580	1100	633	606	1239
Laayoune-Sakia El Hamra	72	29	101	480	80	560	552	109	661
Eddakhla Oued Eddahab	28	2	30	160	80	240	188	82	270
Total	4620	3352	7972	4580	3320	7900	9200	6672	15872

2.3. The sampling frame and method

The sampling design used to select the ONDH household panel is a probability sampling design. The selection of a sample according to this type of design can only be done if a sampling frame is available to identify the individuals of the population while containing information on the characteristics of these individuals. This information is very useful for developing a sample design to select a representative sample of the population known characteristics.

2.3.1. Sampling frame

As it was for the first wave of the ONDH household survey, the most suitable sampling frame for drawing the household panel IIis the master sample (2015) of households designed by the High Commission for Planning (HCP) from each General Census of Population and Housing (RGPH). It's a large sample, called the master sample which is representative of Moroccan households, serving as the sampling frame for each post-census household probability survey.

The master sample is made of geographical areas, called Primary Units (PU), in which, sub-samples can eventually be selected for a various post-census surveys. Indeed, following the RGPH of 2014, the national territory was divided into random, independent and complete zones, called "Primary Units (PU)".

A PU consists on average of 2 Census Districts (CD) and its average size is equal to 300 households. Note that an PU can belong to only one region and groups CDs belonging to the same housing strata. The PUs were subjected to cartographic decomposition in geographical zones of 50 households on average, called secondary units (SU).

The 2012 household Panel-I were selected from the master sample of the 2004 RGPH. For the second panel, households will be selected from the 2015 master sample elaborated on the basis of RGPH 2014 data.

2.3.2. Sampling method

To select the 7,900 households of Panel-II, we adopted the same survey design used to select Panel-I, which is the three-stage stratified sampling design. Given the difference between the urban and rural areas, the variable used for the construction of strata for the urban is different from that used for the rural:

1. Urban: stratification is obtained based on the Housing type where four strata are considered: Luxury and Modern, New Medina, Old Medina, Precarious and Clandestine.

2. Rural: the strata are constructed on the basis of the Provinces / Prefectures so that in each one a sample of households is selected with proportional probabilities to its size.

Therefore, within each strata, the three degrees of the sample design used are as follows:

i. First degree: selection of a random sample of PU from each of the strata considered.
ii. Second degree: the selection of a Secondary Unit (SU) from each of the PU selected at the first degree.
iii. Third degree: the selection of a random sample of 20 households from each SU choosed at the second degree.

Note that the selection of a sample of 7,900 households requires the drawing of 395 PU in the first degree, which implies the selection of 395 SU in the second degree (selection of one SU from each PU selected in the first degree). The distribution of these 395 PU / SU by region is given in Table 2 below.

The drawing of the395 PU / SU Panel-II sample and the calculation of inclusion probabilities in the sample will be done in collaboration with the HCP.

Table 2: Distribution of Panel II PU / US Selected, by Region

Region	Urbain	Rural	Total
Tanger-Tetouan-Al Hoceima	19	14	33
Oriental	14	24	38
Fes-Meknes	19	11	30
Rabat-Salé-Kenitra	22	9	31
Beni-Mellal-Khénifra	15	16	31
Casablanca-Settat	23	8	31
Marrakech-Safi	14	16	30
Draa-Tafilalt	28	18	46
Souss-Massa	17	13	30
Guelmim-Oued Noun	26	29	55
Laayoune-Sakia-El Hamra	24	4	28

Eddakhla-Oued Eddahab	8	4	12
Total	**229**	**166**	**395**

2.3.3. Sampling technique

Given the difference between the urban and rural areas in terms of stratification of the sample frame, the technique of drawing to be used will be different from one area to another:

- ✓ **Urban**

At the level of each Region, the sample of urban households is drawn using the following method:

- ❖ Primary units (PU) are classified into four exhaustive and exclusive strata according to the housing strata criterion (Luxury and Modern, New Medina, Old Medina, Precarious and Clandestine).
- ❖ Within each of the four strata:
  - o The PUs are sorted according to the Provinces / Prefectures and the communes.
  - o Selection of a sample of PU according to a single-start systematic drawing. The number of PUs to select from each strata.
- ❖ Random drawing with equal probabilities of a secondary unit (US) from each selected UP.
- ❖ Within each choosed US, a sample of 20 households is selected using the single-start systematic method with equal probability.

- ✓ **Rural**

At the level of each Region, the sample of rural households will be drawn using the following method:

- ❖ Rural Primary Units are classified by Provinces / Prefectures.
- ❖ Selection of a sample of rural PUs based on a single-start systematic drawing. The number of PUs to be selected from each region is given in Table 5 above
- ❖ Random drawing with equal probabilities of a secondary unit (SU) from each selected PU.
- ❖ Within each choosed SU, a sample of 20 households is selected using the one-time systematic method with equal probability.

However, given that the samples from both panels are taken from two sampling frames (2004 and 2014 HCP Master Samples) deferred in time, the ONDH and the survey expert are aware of the risk of Secondary units overlapping between the two panels.

This question has already been discussed, by ONDH officials and consultants, with Mr. Pierre Lavallée, expert and specialist in panel surveys, during his mission to the ONDH in July 2015. In this context, although the probability of overlap is negligible, a comparative analysis on the choosed sample units in the two panels is undertaken in order to make the possible arrangements for the draw. This technical investigation is currently being carried out in full consultation with the heads of the HCP Statistics Department.

3. Training of survey staff

The staff mobilized to carry out the fieldwork of this operation consists of experienced interviewer, controllers and supervisors. As in the case of previous waves, the choice of this staff is made by technicians with good experience in similar surveys carried out at national level.

Before going to the field for data collection, members assigned to this survey (including reserve personnel) undergo comprehensive and adequate training (theoretical and practical) in order to familiarize themselves with the methodology and the survey materials . To carry out this data collection mission, the selected service providers must mobilize sufficient staff of interviewers for the entire period of implementation.

4. Training period

The training of supervisory staff, monitoring and data collection of the Panel takes place in two periods

- A first period of training of at least 10 days carried out by the ONDH panel team and concerns, for each of the service providers, the experts and the people of the permanent team of monitoring, control and validation of the files Of collected data;
- the second training period is provided to the field staff by the experts and members of the permanent team of monitoring, control and validation of the data files collected from each of the service providers in the presence of the ONDH panel team.

The duration of the last training at the level of each of the service providers concerned is at least 21 days for experienced staff. It may be extended if the ONDH panel team deem it necessary in view of the supervision that will be carried out at the time of the training and concerning the control, by the collection staff, of the methodology for filling out the questionnaires, anthropometry and the proper manipulation of the CAPI computer application.

The training of the survey staff is carried out under the supervision of the members of the ONDH team. This training covers all aspects of data collection, while focusing on the computerised aspects of direct computer capture.

5. Survey data collection activities

The survey takes place in all regions of the Kingdom and affects both urban and rural areas. The sample of households in the survey of the two panels comes from the 2004 master samples for Panel 1 and 2014 for Panel 2.

The use of the CAPI method must be fully assimilated by the interviewers and team leaders and verified during staff training and in the field. Providers must ensure the executing staff's perfect assimilation at the end of the training and before the start of collection operations. The computer hardware must be very adequate to guarantee the success of the operation.

5.1. Duration of field work

Data collection work takes place from March to July of each wave. Every passage of the panel, the same schedule is maintained for the data collection. The households in the sample are distributed over the entire period of the survey. Additional delays will be given to the collection staff in order to find and interview households and members of households who have moved between the last and the new survey wave, according to an optimal timetable which will be decided by the ONDH with the offices of studies.

5.2. Monitoring of field data collection

A first complete control of the collected data and their coding is carried out by the field teams before leaving the zone in which they work. The computer application developed and executed is with a control module that detects inconsistencies and errors.

5.3. Human resources and equipment

The human and material resources mobilized to carry out this operation (including the reserve) consist of : 6 supervisors, 48 controllers, 124 investigators, 31 drivers and 46 vehicles.

II. Exploitation and Analysis of Panel Data: Some Uses for Human Development Evaluation of Public Policies

2.1 Monitoring's situation of Panel members

At the end of the panel data collection operation in 2015, the use and analysis of cross-sectional and longitudinal data for monitoring individuals since 2012 reveals the following state:

- From the 37,444 individuals surveyed and validated in 2012, only 34,847 were successfully surveyed in 2013, with attrition at the second wave of 6.9%. In addition, out of the same 2012 individual's number, 4783 were not interviewed in 2015 for one reason or another, bringing the attrition rate in 2015 to 13.7%.

- In addition, the number of new individuals who arrived and cohabited with individuals (new births, migrant or married adults, etc.) in households increased from 2094 in 2013 to 4783 in 2015. The following table shows the evolution of the panel and cohabiting individuals numbers.

Table 2: Number of Panel survey Individuals between Waves 2012, 2013 and 2015

Waves	individual type		
	Longitudinal	Cohabitant	Transversal
2012(validated)	37.444	-	37.444
2013(validated)	34.847	2.094	36.941
2015 (validated)	32.331	4.783	37.114
Balance Attrition rate en 2013	-2.597 (6,9%)		
Balance Attrition rate en 2015	-5.113 (13,7%)		

2.2 Reports and studies based on Household Panel data

As part of its work on analyzes and studies concerning the human development, ONDH Panel data have been and would be more useful for assessing progress in development. Thereby, in order to finalize a study on the dynamics of development main dimensions aiming to enhance the Panel data in these first waves, at least at cross-section level, these data served as a reference for the following works:

- Report of the Household Panel Survey 2012 results.

- Report on human development and multidimensional poverty based on the results of the 2012 survey;
- Measuring poverty in Morocco 2012,
- Report on education and health in 2013;
- Report on employment in 2013;
- Report on spending and inequalities in 2013;
- Report on housing conditions and access to basic services in 2013;
- Synthetic and comparative report of the main results of the two passages 2012 and 2013;
- Study on the situation of the elderly in Morocco and prospective aging, 2015;
- Study on the Analysis of Child Poverty, 2015;
- RAMED Targeting's Study 2015;
- Evaluation of the Tayssir program on school support 2015;
- Study on the evaluation of medical coverage (RAMED and AMO) in Morocco 2015;
- Human development dynamics in Morocco;
- Poverty dynamics in Morocco.

2.3. Collaboration with the university and laboratory of rechers

In terms of categorizing the various partnerships and collaborations established by the ONDH, a distinction is made as follows:

2.3.1. Partnerships with national administrative institutions

- ✓ Ministry of Health
- ✓ Ministry of Education;
- ✓ Ministry of Social Development;
- ✓ National Instance of Evaluation (Higher Council for Education);
- ✓ National Agency of Health Insurance (ANAM);
- ✓ National School of Public Health.

2.3.2. Partnerships with national scientific institutions:

- ✓ University Mohamed V of Rabat;
- ✓ University Moulay Ismaël of Meknès;
- ✓ University Ibn Zohr of Agadir;
- ✓ University Abdelamalek Essaadi of Tétouan;
- ✓ University Hassan II of Mohammedia,
- ✓ University Mohamed The First of Oujda,
- ✓ Polytechnic University Mohamed V –Governance school of Rabat
- ✓ National Institute for Urban and Territorial Planning (INAU),
- ✓ International University of Rabat (UIR),

- ✓ University Sidi Mohamed Ben Abdellah of Fès,
- ✓ Moroccan Association of Economic Sciences;
- ✓ Moroccan Association of Evaluation.

2.3.3. Partnerships with international multilateral and / or regional organizations

- ✓ United Nations Agency (PNUD, UNICEF),
- ✓ World-Bank
- ✓ Office of Economic Cooperation for the Mediterranean and the East (OCEMO),

2.3.4. Partnerships with foreign organizations

- ✓ Research Institute for Development (RID) France,
- ✓ CONEVAL (Mexique),
- ✓ Swiss Foundation for Social Science Research (FORS),
- ✓ Institute of Tropical Medicine, Anvers,
- ✓ Statistics Canada.

It should be mentioned that, the ONDH structuring nature of certain partnerships, such as that undertaken through the ONDH / UNO program, has given a rise to a consequent institutional support, a capacity building and a revitalization of studies and Scientific work on the human development profiles in Morocco, which have helped to consolidate the scientific foundations of the ONDH databases.