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CHAPTER 7

OF THE HANDBOOK ON RURAL HOUSEHOLD, LIVELIHOOD AND WELL-BEING: STATISTICS ON RURAL DEVELOPMENT AND AGRICULTURE HOUSEHOLD INCOME.

Paper submitted by the Task Force
on Statistics for Rural Development and Agriculture Household Income*

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VII. RECOMMENDED CORE SET OF INDICATORS AND EXTENDED SETS

VII.1 Introduction

The main purpose of this chapter is to provide a statistical framework to identify and to construct a core set of indicators useful to describe the rural phenomena. At the end of the chapter a list of suggested indicators is provided, mainly based on feasibility and an operational point of view.

VII.2 Analytical and summary indicators for the rural phenomena

A large number of statistical indicators are nowadays feasible to measure socio-economic phenomena and a variegate supply is put forward in publications and on web-sites by national, international and independent institutions. Any indicator provides a signal on some characteristics of the phenomena under observation but reasons related to the correlation of the variables and to the measurability of the categories elaborated by the theory suggest a reasoned selection of the statistical indicators. The selection have to be done in relationship to the particular phenomena considered in this Handbook: the rural phenomena.

The “rurality” is a socio-economic dimension of the human organisation, that is present in any area of the world but with different degrees of relevance and development. It follows that a particular attention have to be turned on the feasibility of the measurements and on the confrotability of the same indicators across largely different areas of the world.

Summary indicators are also necessary to have an overall view of the phenomena and will be considered in this chapter. It is important, dealing with this family of indicators, to understand their composition to be aware of the limitations due to their peculiar way of construction.

Two sets of indicators will be suggested in this chapter in relationship to the two approaches to the definition of rural phenomena addressed in this Handbook: the sectorial and the territorial approach. To both cases will be indicated the purpose and the characteristics that the indicators should fulfil. Finally a reasoned graduation of the indicators will be suggested in relationship to their relevance in relationship to the rural phenomena.

VII.3 Two overlapping sets of indicators in relationship to the two approaches to the definition of the rural phenomena

A first partition of the rural indicators can be done in relationship to the two approaches to the definition of the rural phenomena adopted in this Handbook.

In the sectorial approach, where rural households are first defined, it is possible to apply rural indicators to this sub-population of households and compare them between different regions or with respect to the non-rural sub-population of households.

In the territorial approach, once rural areas are identified, it is possible to apply to them all available indicators defined for standard regional statistics. In terms of indicators it is possible to compare rural areas each other or with respect to non-rural ones.

Most of indicators can be applied in both cases. Difficulties and costs of measurability are the main reasons why there is a limited number of indicators that can be applied only in one of the two approaches.

VII.4 Rural indicators for developed and developing countries

The wide difference of development with respect to several areas of interest in different geographical areas of the world suggest to consider, beside the core set of indicators, some special focuses. A few themes are more relevant to developed countries, as natural environment conservation and sustainability in the rural areas, while other themes are more relevant to developing countries, as poverty reduction and health care.

A work in this direction is already done by international organisations, in particular with respect to developing countries where the question of rural development is strictly related to the problem of the general development. Anyway, to guarantee the essential task of inter-areas or inter-groups of households confrontability, these focuses have to be a limited departure from a common set of indicator.

VII.5 Areas of interest covered by rural indicators

The observation of the rural phenomena can be done from several perspectives, indicated by the theories of development. The corresponding areas of interest could be considered for the construction of the rural indicators. Some of them are already part of the national and international statistics.

The selection of topics suggested in this chapter are the main concern in rural policy and come from a review of main publications and web-sites with web-pages dedicated to the rural phenomena:

- A. Components of rural development
 - 1. natural environment
 - 2. social well-being
 - 3. economics conditions

- B. Potential of rural development
 1. Territory with respect to population
 2. Economy
 3. Communications
- C. Special focuses to developing countries

At the end of this chapter is reported a detailed description of main topics indicators in all these areas of interest.

VII.6 Measures of the rural phenomena

VII.6.1 The model of representation of the rural phenomena

There are four sets of statistical units implied in the model of representation of the rural phenomena: geographical regions (regions, R); areas ($\sum_r A$); households ($\sum_r H$); population of individuals (population, $\sum_r P$). These sets can be disarticulated in the following subsets, considering the two dimensions of analysis in the Handbook: the rural character of units and their geographical displacement.

Subsets of statistical units:

Regions	$(r = 1, \dots, R)$
Population in region r	$(p = 1, \dots, P)$
Households in region r	$(h = 1, \dots, H)$
Areas in region r	$(a = 1, \dots, A)$
Population in area a	$(pa = 1, \dots, PA)$
Households in area a	$(ha = 1, \dots, HA)$
Rural areas in region r	$(ra = 1, \dots, RA)$
Rural population in region r	$(rp = 1, \dots, RP)$
Rural households in region r	$(rh = 1, \dots, RH)$
Rural population in area a	$(rpa = 1, \dots, RPA)$
Rural households in area a	$(rha = 1, \dots, RHA)$

Case A. Rural household is first defined and identified. This case implies that the rural population but *not* the rural areas are identified.

Region r

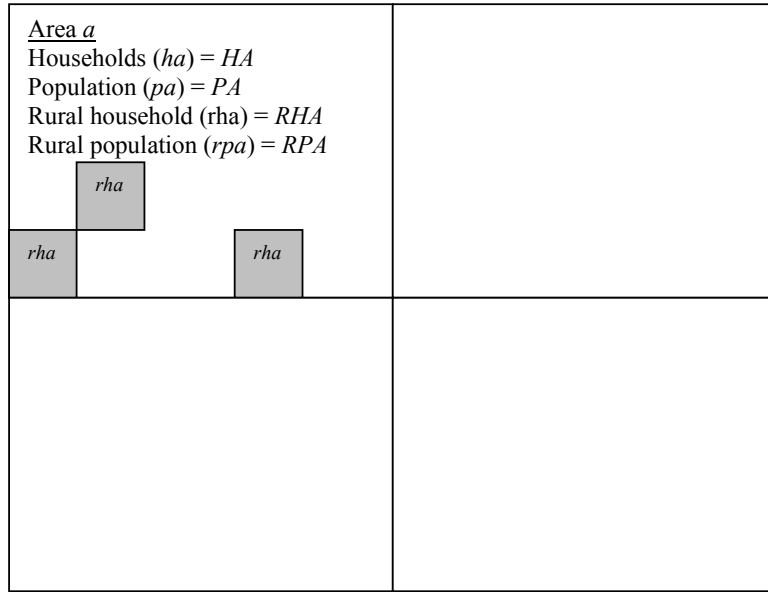
Population (p) = P

Households (h) = H

Areas (a) = A

Rural population (rp) = RP

Rural households(rh) = RH

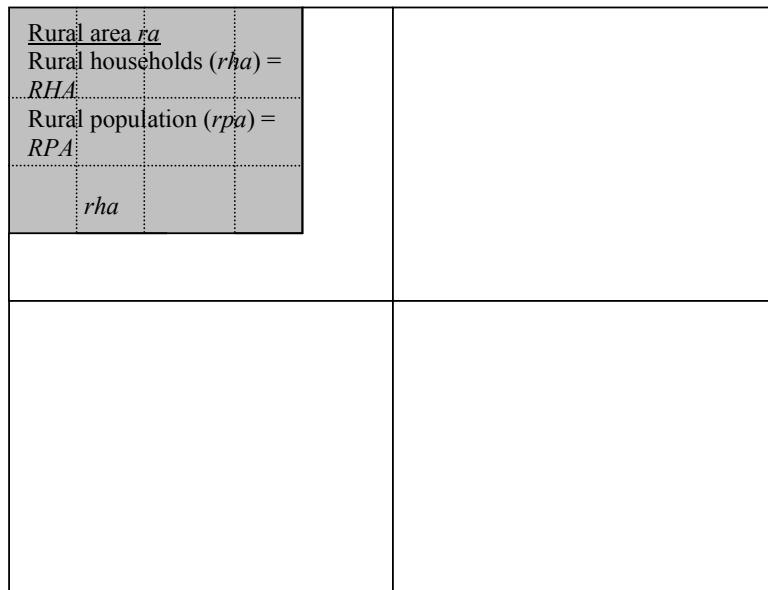


Case B. Rural area is first defined and identified. This case implies that *both* the rural population and the rural areas are identified.

Region r

Population (p) = P
 Households (h) = H
 Areas (a) = A

Rural population (rp) = RP
 Rural households(rh) = RH
 Rural area (ra) = RA



Case A'. Rural household is first defined and identified; then there is a complete overlapping of rural households and the households of one or more areas . This is an extreme and mainly theoretical case in which, after rural population identification, also the rural areas are identified as they are equal to the population of one or more standard areas.

Region *r*

Rural population (*rp*) = *RP*

Rural households(*rh*) = *RH*

Areas (*a*) = *A*

Population (*p*) = *P*

Households (*h*) = *H*

Rural area (*ra*) = *RA*

Area <i>a</i> = Rural area <i>ra</i> Rural households (<i>rha</i>) = <i>RHA</i> = <i>HA</i> = households (<i>ha</i>) Rural population (<i>rpa</i>) = <i>RPA</i> = <i>PA</i> = Population (<i>pa</i>)	
$rha = ha$	

The last case A' clearly represent the relationship and the overlapping between the sectorial and the territorial approach to the definition of the rural phenomena. The normal situations are represented in cases A and B, where the rural population or the rural areas are not identified by the standard administrative areas. Anyway, it is necessary to understand their relationship in the model of representation, to realise a feasible measurability of the rural phenomena.

VII.6.2 Definition of the characteristics that an indicator should have dealing with the rural phenomena

Statistical indicators should satisfy some properties to be feasible and effective for the porpoises they are designed. This is particularly true for the rural phenomena, as it is particular relevant in pour areas of the world with little resources for statistics and, more, because the phenomena itself has a not simple identification in terms of definition. The two approaches indicated in this Handbook set limits to the last problem of identification.

First of all, for calculation purposes, any indicator should relay on variables simple to measure and reliable. This imply that the data necessary as input in the

calculation should be cheap in terms of costs of production and straight to get from respondent.

Secondly, the feasibility of calculation of an indicator in any region of the world and its reliability is strictly related to a further requirement of an indicator: its comparability. It is important to remember that the measurement of the rural phenomena becomes relevant, in the sustainable development prospective, only in relative terms:

1. a rural area with respect to another rural area or a non-rural area;
2. rural households of a region with respect to rural households of another region;
3. rural households of a region with respect to non-rural households of the same or another region.

VII.6.2.1 Statistical requirements of a rural indicator

The following is a list of requirements for a good quality indicator:

1. Understandable: clear and brief, easily to read and to understand by users;
2. Transparent: clear the inputs and the process of production. To satisfy this requirement all side-information have to be given to users: to know exactly the way it is produced, where the information come from, how the information it is processed and how it is calculated;
3. Significant and relevant: to be informative to users with respect to the phenomena;
4. Analytical: to give a sufficient insight into the phenomena;
5. Complete: to cover the whole population of statistical units or the whole geographical area;
6. Reliable: with little statistical error or noise in the indicator;
7. Comparable: there are different levels of comparability:
 - 7.5. inside comparability: it have to be possible to compare the same indicator calculated on two sub-populations or areas;
 - 7.6. outside comparability. it have to be possible to compare the indicator with similar indicators from other sources (different data sources or different producers);
 - 7.7. inter-temporal comparability: it have to be possible to compare the indicator over time.To reach comparability, it is necessary to have clear and constant definitions and classification;
8. Coherent: to have, with respect to other information sources, the same reference period, accountancy criteria and way of calculation;
9. Continuous: to have no interruption or brakes in the time series of the indicator;
10. Accessible: easily to get by users in terms of effort, time and money costs;
11. Timeliness: to give the information to users close to the occurrence of the phenomena;

12. Not expensive: to be cheap to produce with respect to the information given to the users. The cost of production have to be minimised in terms of money and burden to respondent.

These properties have to be satisfied by the core set of indicators and can be considered as selection criterions for the indicators useful to represent the phenomena under observation.

VII.6.3 The construction of indicators

To allow the confrontation of indicators between rural areas or groups of rural households and to permit their aggregation to construct summary indicators, it is suggested to construct dimensional indicators. To construct this kind of indicators it necessary to homogenise different measurers, normalising values between 0 and 1.

The general formula for an indicator I_i calculated on a set rural households or on a rural area at time t is the following:

$$\pm I'_i = (\text{value of } I_i - \text{min. value of } I_i) / (\text{max. value of } I_i - \text{min. value of } I_i)$$

where “+” indicates a good and “-“ a bad; minimum and maximum values are found among all observed values

To construct a summary indicator it is enough to calculate a simple mean of the N indicators considered:

$$I''_i = \sum_i I'_i / N$$

VII.6.4 Different measures to represent the same characteristic of the rural phenomena

A differentiated measurement is necessary to get a full picture of the rural phenomena. The measurements of any single characteristics considered, can be summarised in the following way:

	<i>Areas</i>	<i>Households</i>
<i>State</i>	1 (min.)	2
<i>Dispersion and concentration</i>	3	4
<i>Tendency</i>	5	6 (max.)

Moving from top to down and from left to right the information provided by the indicators becomes more complete on the characteristics of the phenomena considered. The availability of data and cost-benefit consideration will determine, case by case, where to stop.

VII.6.4.1 Measures of dimension, dispersion and concentration of the components of the rural phenomena

Purpose of the statistical indicators is to highlight the aspects that are considered sufficient to characterise the rural phenomena. First of all, to summarise the phenomena it is necessary to produce some measures of dimension, about its principal and uncorrelated components, together with some measures of dispersion and concentration of its components.

In both previously indicated approaches to the rural phenomena, the rural households considered are the main population of statistical units. In the territorial approach, in some cases, the statistical unit become the rural area itself and as a consequence indicators can be calculated only on this unit.

An example of indicators calculated on rural households base is the following: the indicator of dimension of the normalised mode of per capita real income of the rural households in year t in rural area a . The dispersion and concentration of this variable can be measured by the normalised squared error from the mode and the Gini index.

An example of indicators calculated on rural area base is the following: the normalised mortality rate under-5 in year t in area a . The dispersion and concentration indicators can be calculated for all the areas of the given region.

VII.6.4.2 Measures of tendency and unbalance in rural sustainable development

Beside state measurements, it is useful to supply, for many characteristics of the rural phenomena, a measure of tendency over time. Time series data are necessary to calculate, for a characteristic, the inter-temporal rates of growth or the average of these rates over a period of time. For example, an average over five years of the rate of growth could be preferred to understand the tendency of a characteristic, excluding short-run movement.

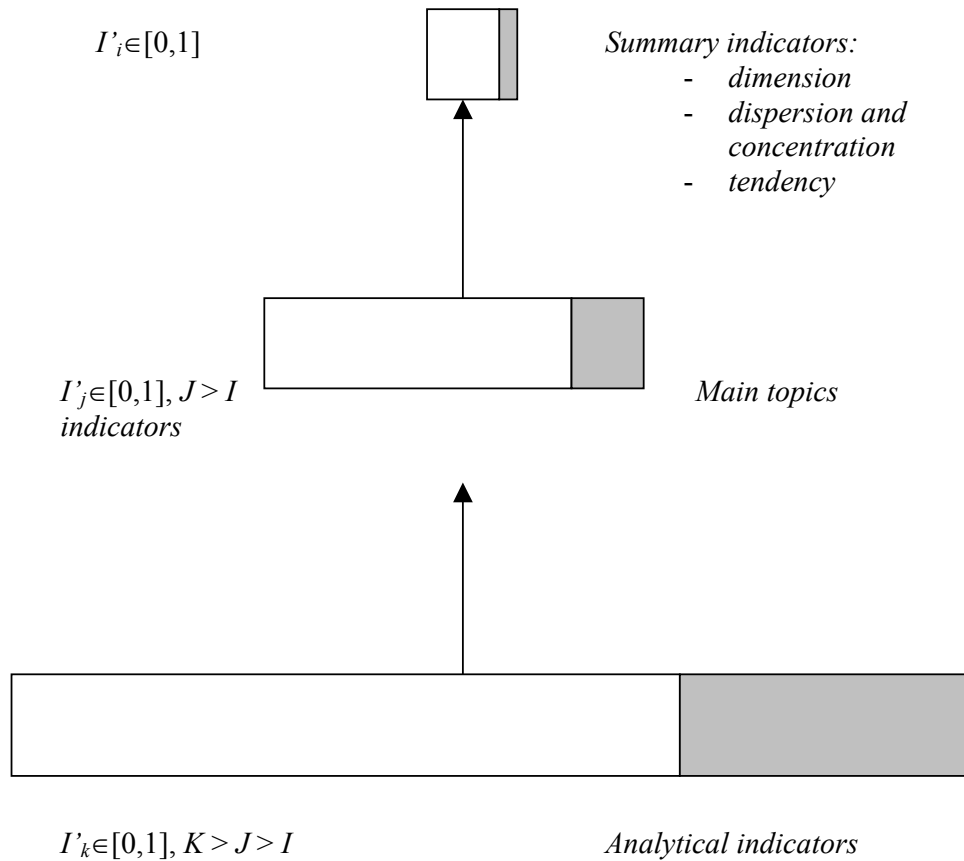
Finally, a measure of unbalance in the development of a rural area a is given by the ratio of the previously suggested indicator with respect to the average of the same indicator calculated in all areas (rural and not-rural) of a given region.

VII.6.5 A graduated sequence of sets of rural indicators

A selection of indicators have to consider that, first of all, not all indicators have the same informative capacity with respect to the phenomena under observation and, secondly, that too many indicators can create confusion and produce

misinformation to the final user. This the reason way a graduated sequence of rural indicators is suggested in this Handbook.

A reasoned hierarchy of indicators can be summarised in the following way:



VII.7 Suggested sets of summary and main-topics rural indicators

This is the set of suggested indicators to evaluate the state, tendency, variability and concentration of the rural development in a geographical region *a* with respect to the others.

The following is a reasoned sequence of topics in order of relevance. State indicators are always presented as a “good”: if the characteristic is a “bad”, this is indicated with a minus. Tendency indicators can be positive or negative: in the first case is an increase of goodness in the second case is a reduction. Finally, dispersion and concentration of the characteristic in the population is considered as a bad. Time *t* can be the year and should be the same (or the closest available) for all indicators.

The summary indicators can be calculated from main topics indicators in the way indicated before. In the calculation of summary indicators the bad enter with negative sign.

In bold type are indicated a few characteristics and relative indicators that, in case of limited information, can be considered itself as a set of *key summary indicators*.

A. Components of rural development

A.1 Natural environment

Character: Quality of the countryside and conditions of the natural environment (natural resources and wildlife), as necessary requirements to reach a good quality life and as an opportunity to enounce the economic conditions of rural population.

Data sources: rural areas (*ra*) have to be defined in advance or these kind of indicators can be only calculated on larger areas (*a*).

Suggested proxy indicators:

1. State

Per capita drinking water:

cubic metre of drinkable water at time t / population at time t

Per capita CO₂ emission:

- (tonnes of CO₂ emission at time t / population at time t)

Per capita energy consumption:

- (KWh of energy consumption at time t / population at time t)

Biodiversity index: populations of animals (farmland birds, wild beast, farm animals) at time t / square km of the surface at time t

Landscape index: - (square metre of land lost from agriculture and forestry to industrial, housing, road and other uses at time t / square metre of the surface at time t)

Waste recycling index:

Percentage of waste that is composed o recycled at time t

2. Tendency

all state indicators growth: state indicator at time t / state indicator at time $t-1$

A.2 Social well-being

Character: Quality standard of social life and welfare. A good quality means good education and health; reduced risks and vulnerability of people.

Data sources: rural areas (*ra*) have to be defined in advance or these kind of indicators can be only calculated on larger areas (*a*).

Suggested proxy indicators:

1. State

literacy rate: percentage of educated people aged 15 – 24 at time t

infant mortality rate:
- (per 1,000 live births mortality at time t)

newspaper per capita: number of newspapers sold at time t / population at time t

political rights: percentage of voting people in the last election

green areas rates: percentage of green areas at time t

2. Tendency

all state indicators growth: state indicator at time t / state indicator at time $t-1$

A.3 Economics conditions

Character: Income and wealth of people.

Data sources: rural areas (ra) have to be defined in advance or these kind of indicators can be only calculated on larger areas (a). If rural households (rha) are defined these indicators can be calculated on the rural population.

Suggested proxy indicators:

1. State

Real per capita income:

real income at time t / population at time t

2. Tendency

Real per capita income growth:

real per capita income at time t / real per capita income at time $t-1$

3. Dispersion and concentration

Real per capita income:

normalised squared error from the mean at time t

Gini index at time t

B. Potential of rural development

B.1 Territory with respect to population

Character: territory available to the rural population to live, to do cultivation (agricultural usable land) and to perform other economic activities.

Data sources: rural areas (ra) have to be defined in advance or these kind of indicators can be only calculated on larger areas (a).

Suggested proxy indicators:

1. State

Per capita territory: square metre of the surface at time t / population at time t (inverse population density)

Per capita AAU: square metre of Agricultural Area Utilised (AAU) by rural population at time t / rural population at time t

Rural pop. youth: rural population under 14 at time t / rural population at time t

2. Tendency

Rural pop. growth: rural population at time t / rural population at time $t-1$

3. Dispersion

Minorities rate: percentage of minorities in rural population at time t

Per capita territory: variance of territory available between areas in region r at time t

Per capita AAU: variance of AAU available between rural population at time t

B.2 Economy

Character: Healthiness of the economic environment of rural population.

Data sources: these kind of indicators are calculated on larger areas (*a*) or at the regional (*r*) level.

Suggested proxy indicators:

1. State

employment rate: $\text{population employed at time } t / \text{population at time } t$
(inverse of unemployment rate)

foreign debt rate: $-(\text{foreign debt in region } r \text{ at time } t / \text{population in region } r \text{ at time } t)$

2. Tendency

migration rate: percentage of net flow of population at time *t*

employ. rate growth: $\text{population employed at time } t / \text{population employed at time } t-1$

f. debt reduction: $\text{foreign debt in region } r \text{ at time } t / \text{foreign debt in region } r \text{ at time } t-1$

B.3 Communications

Character: Point of communication available to rural population with the rest of the world.

Data sources: rural areas (*ra*) have to be defined in advance or these kind of indicators can be only calculated on larger areas (*a*).

Suggested proxy indicators:

1. State

Per capita stations: $\text{number of stations (railway stations, ports and airports) at time } t / \text{rural population at time } t$

Per capita telephones: $\text{number of telephones (home, mobile and public) available at time } t / \text{population at time } t$

2. Tendency

P.c.s. rate of growth: $\text{number of station at time } t / \text{number of station at time } t-1$

P.c.t. rate of growth: $\text{number of telephones at time } t / \text{number of telephones at time } t-1$

C. Special focuses to developing countries

This is a list of characters relevant from a developing countries perspective. The construction of indicators is not indicated as it depends mainly on data availability in any country.

C.1 Market and institutions

- Food price index
- Farmers member of organisations of producers

C.2 Infrastructure

- rural population with access to electricity

C.3 Poverty

- rural population below \$ 1a day
- rural child malnutrition

C.4 Agriculture

- Agricultural productivity
- Food production index

C.5 Natural resource

- Forests and deforestation

C.6 Education

- Rural literate females with respect to male
- net rural enrolment ratio in primary education

C.7 Health

- Infection among rural population