

Introduction to Quality and Performance Indicators

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From ToR

- Examination of pattern of non-response for last five years
- The examination of pattern of item and unit non-response for the last five year will be carried out for HEIS and LFS.
- The examination of the will take outset in actual survey data collected by DoS over the last five years, and relevant quality and performance indicators will be calculated taking outset in ESS guidelines for the implementation of quality and performance indicators (QPI's).



What is QPI?

- Numerical representation of central aspects of statistical products (quantitative description)
- Central document: ESS Guidelines For The Implementation of the ESS Quality And Performance Indicators (QPI)
- Must be supplemented with qualitative description (text explaining other issues)



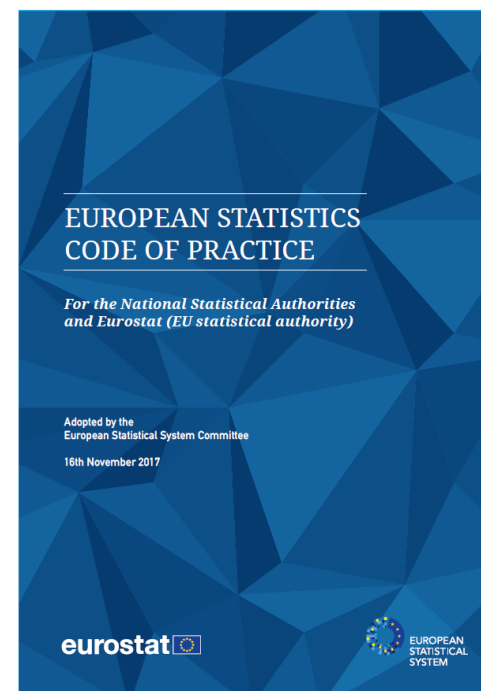
Quality and performance indicator

- R1. Data completeness – rate
- A1. Sampling error - indicators
- A2. Over-coverage - rate
- A3. Common units - proportion
- A4. Unit non-response - rate
- A5. Item non-response - rate
- A6. Data revision - average size
- A7. Imputation - rate
- TP1. Time lag - first results
- TP2. Time lag - final results
- TP3. Punctuality - delivery and publication
- CC1. Asymmetry for mirror flows statistics - coefficient
- CC2. Length of comparable time series
- AC1. Data tables – consultations
- AC2. Metadata - consultations
- AC3. Metadata completeness - rate



Meaning of abbreviation prefix

- R1, A1, A2, etc. refers to European Statistics Code of Practice
 - R = Relevance (principle 11)
 - A = Accuracy and Reliability (p.12)
 - TP = Timeliness and Punctuality (p.13)
 - CC = Coherence and Comparability (p.14)
 - AC = Accessibility and Clarity (p.15)



Useful for users and producers

- Comparison at several levels with standardised QPIs:
 - Within statistical product over time
 - Within national statistical institute (NSI)
 - Between countries (in the case of European statistics)
- For users
 - Transparency
 - Evaluate fitness for use
- For producers
 - Monitor production proces

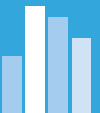


General advice

- Use standard QPIs
- If needed supplement with product specific QPIs
- Store centrally such that various comparisons can be made
- Make integral part of production proces – not something that should be done afterwards (more difficult)
- Integrate QPIs in quality reports
 - Part of SIMS – Single Integrated Metadata Structure

Calculation of QPIs

- ESS document is a starting point, but some product specific interpretation is almost always needed
- Some are mathematically quite simple (like punctuality), some are quite complex (like sampling error)



Quality and performance indicator

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- AC1. Data tables – consultations
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Structure of ESS document

Name:	A4. Unit non-response - rate
Definition:	The ratio of the number of units with no information or not usable information (non-response, etc.) to the total number of in-scope (eligible) units. The ratio can be weighted or un-weighted.
Applicability:	The unit non-response rate is applicable: - to all statistical processes (including direct data collection and administrative data, the terminology varies between statistical processes, but the basic principle is the same; it may in some cases be difficult to distinguish between unit non-response and undercoverage, especially for administrative data sources (in the former case units are known to exist but data are missing, e.g. due to very late reporting or so low quality that the information is useless – in the latter case the units are not known at the frame construction); - to users and producers, with different level of details given.
Calculation formulae:	The non-response rate has three main versions written in one and the same formula as the weighted unit non-response rate NRr_w $NRr_w = 1 - \frac{\sum_R w_j}{\sum_R w_j + \sum_{NR} w_j + \alpha \sum_Q w_j}$ <p>R the set of responding eligible units NR the set of non-responding eligible units Q the set of selected units with unknown eligibility (un-resolved selected units) w_j weight of unit j, described below α The estimated proportion of cases of unknown eligibility that are actually eligible. It should be set equal 1 unless there is strong evidence at country level for assuming otherwise.</p> <p>The three main cases are: Un-weighted rate: $w_j = 1$ Design-weighted rate: $w_j = d_j$ where basically $d_j = 1/\pi_j$, meaning that the design weight is the inverse of the selection probability. Size-weighted rate: $w_j = d_j x_j$ where x_j is the value of a variable X.</p> <p>The variable X, which is chosen subjectively, shows the size or importance of the units. The value should be known for all units. X is auxiliary information, often available in the frame. Examples are turnover for businesses and population for municipalities.</p> <p>For the unit non-response rate all three alternatives are frequently used, see Interpretation below.</p> <p>The design-weighted rate is mainly used for samples surveys, but it may apply also, e.g., for price index processes or processes with multiple data sources. The weight d_j is a "raising" factor when unit j represents more</p>

10

Version 1.4

	than itself. Otherwise d_j is equal to one. Hence, when dealing with administrative sources the un-weighted and the size-weighted versions of the rate are normally the interesting one.
Target value:	The target value for this indicator is as close to 0 as possible.
Aggregation levels and principles:	<ul style="list-style-type: none"> MS: the indicator is to be calculated at statistical process level EU: rather than aggregating this indicator over countries or to calculate a mean, lower and higher unit non-response rates can be shown by Eurostat for a given variable at statistical process level.
Interpretation:	<p>Unit non-response occurs when no data about an eligible unit are recorded (or data are so few or so low in quality that they are deleted).</p> <p>The un-weighted unit non-response rate shows the result of the data collection in the sample (the units included), rather than an indirect measure of the potential bias associated with non-response. If $\alpha=1$, it assumes that all the units with unknown eligibility are eligible, so it provides a conservative estimate of A4 with regard to other choices of α.</p> <p>The design-weighted unit non-response rate shows how well the data collection worked considering the population of interest.</p> <p>The size-weighted unit non-response rate would represent an indirect indicator of potential bias caused by non-response prior to any calibration adjustments.</p> <p>Note overall that the bias may be low even if the non-response rate is high, depending on the pattern of the non-responses and the possibilities to adjust successfully for non-response.</p>
Specific guidance:	<p>Non-response is a source of errors in survey statistics mainly for two reasons:</p> <ul style="list-style-type: none"> - it reduces the number of responses and therefore the precision of the estimates (this may be particularly relevant when samples are used); - it might introduce bias. The size of bias depends on the non-response rate but also on the differences between the respondents and the non-respondents with respect to the variable of interest, furthermore on the strength of auxiliary information.
References:	<ul style="list-style-type: none"> ESS Handbook for Quality Reports – 2009 Edition (Eurostat). ESS Standard for Quality Reports – 2009 Edition (Eurostat). U.S. Census Bureau Statistical Quality Standards, Reissued 2010. Trépanier, Julien, and Kovar. "Reporting Response Rates when Survey and Administrative Data are Combined." <i>Proceedings of the Federal Committee on Statistical Methodology Research Conference 2005</i>.

11

Version 1.4

Structure of ESS document

- Definition
- Applicability
- Calculation formulae
- Target value
- Aggregation levels and principles
- Interpretation
- Specific guidance
- References

A4. Unit non-response - rate

$$NRr_w = 1 - \frac{\sum_R w_j}{\sum_R w_j + \sum_{NR} w_j + \alpha \sum_Q w_j}$$

R the set of responding eligible units

NR the set of non-responding eligible units

Q the set of selected units with unknown eligibility (un-resolved selected units)

w_j weight of unit j , described below

α The estimated proportion of cases of unknown eligibility that are actually eligible. It should be set equal 1 unless there is strong evidence at country level for assuming otherwise.



Choice of w_j – three main cases

- Un-weighted rate: $w_j = 1$
- Design-weighted rate: $w_j = d_j$ where $d_j = 1/\pi_j$, meaning that the design weight is the inverse of the selection probability.
- Size-weighted rate: $w_j = d_j x_j$ where x_j is the value of a variable X for unit j .
 - The variable X , which is chosen subjectively, shows the size or importance of the units. The value should be known for all units. X is auxiliary information, often available in the frame. Examples are turnover for businesses and population for municipalities.



Interpretation (1/2)

- Unit non-response occurs when no data about an eligible unit are recorded (or data are so few or so low in quality that they are deleted)
- The un-weighted unit non-response rate shows the result of the data collection in the sample (the units included), rather than an indirect measure of the potential bias associated with non-response. If $\alpha=1$, it assumes that all the units with unknown eligibility are eligible, so it provides a conservative estimate of A_4 with regard to other choices of α



Interpretation (2/2)

- The design-weighted unit non-response rate shows how well the data collection worked considering the population of interest.
- The size-weighted unit non-response rate would represent an indirect indicator of potential bias caused by non-response prior to any calibration adjustments.
- Note overall that the bias may be low even if the non-response rate is high, depending on the pattern of the non-responses and the possibilities to adjust successfully for non-response.



Simple implementation

$$NRr_w = 1 - \frac{\sum_R d_j}{\sum_R d_j + \sum_{NR} d_j}$$

- Where
 - R the set of responding eligible units
 - NR the set of non-responding eligible units
 - d_j is the design weight

Unit NR (A4) versus Item NR (A5)

- Unit non-response
 - The ratio of the number of units with no information or not usable information (non-response, etc.) to the total number of in-scope (eligible) units.
- Item non-response
 - The item non-response rate for a given variable is defined as the ratio between in-scope units that have not responded and in-scope units that are required to respond to the particular item.
- Both ratios can be weighted or un-weighted.

