 **Assessing Data Quality of the Households Surveys Carried Out during COVID – 19 Pandemic Using Computer Assisted Telephone Interview Mode of Data Collection - Palestine Case**

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**Abstract.** The paper studies the change in data collection approach in using [Computer Assisted Telephone Interview](https://www.ourkik.com/en/expertise/quantitative-research/cati-interviews/)(CATI) mode adopted by the Palestinian Central Bureau of Statistics (PCBS) due to COVID – 19 restrictions. In addition, It shed the light on the impact of this mode on the quality of official statistics regarding the following surveys: “Impact of COVID-19 Pandemic on the Socio-economic Conditions of Palestinian Households Survey, 2020”, and “Labor Force survey 2020”. The assessment of data quality is based on several standard tools for measuring data quality, such as: The Development of a Self-Assessment Program (DESAP), Quality Reports and Indicators (based on quality dimensions), and the European Statistics Code of Practice (COP). The assessment process includes a comparison of the results of these surveys with previous cycles using data quality measurements. The paper aims to come up with recommendations regarding the use of CATI mode in surveys during a challenging time when the need for timely and high quality data is highly increasing.

**Key words**: data quality assessment, household surveys, CATI, COVID-19, DESAP, COP.

1. **Introduction**

During the COVID-19 pandemic and the associated lockdowns; many constraints for producing reliable and timely data have tightened, as the interviewers cannot be able to conduct fieldworks due to the risk associated with face-to-face interviews. In this sense, the need for an alternative method of data collection has arisen, and Computer Assisted Telephone Interview (CATI) approach seems to be the available alternative at the time. This paper presents two household surveys conducted by the Palestinian Central Bureau of Statistics (PCBS) through the quarantine period of COVID-19 pandemic, which are: “Impact of COVID-19 Pandemic on the Socio-economic Conditions of Palestinian Households Survey, 2020” (COVID-19 survey)[[1]](#footnote-1), and “Labor Force survey, 2020” (LFS)[[2]](#footnote-2).

CATI mode of data collection in conducting surveys is used in a wide range by many countries even before COVID-19 pandemic. As a review of the literature on “Quality report of the European Union Labor Force Survey 2017” reveals that, the percentage of interviews using CATI mode for this household survey reached 46.8% among the European Union countries[[3]](#footnote-3). However, this mode of data collection in PCBS is a recent use. The need for this kind of approach arises through the time of COVID-19 pandemic to be used as the main tool of data collection in many surveys. It mainly depends on using the phone to contact the respondent, where the interviewer can conduct the interview with the respondent in the form of a telephone conversation, and the interview is conducted through an application on the tablet device that reflects the survey form. The application is designed to collect data over the phone, and allow the researcher to move automatically through questions whenever needed. Data can be easily entered and submitted to PCBS headquarter for the purpose of data checking and auditing.

This paper discusses the effect that CATI approach have on data quality through studying some of the standard tools for measuring data quality, such as: The Development of a Self-Assessment Program (DESAP), Quality Reports and Indicators (based on quality dimensions), and the European Statistics Code of Practice (COP). It also studies data quality measurements for both “Impact of COVID-19 Pandemic on the Socio-economic Conditions of Palestinian Households Survey, 2020”, and “Labor Force survey 2020” compared to previous cycles that was conducted using Computer-assisted personal interviewing (CAPI) which are: Socio-Economic Conditions survey 2018 (SEFSec) that has the same sampling units as COVID-19 survey, and LFS 2019.

1. **Data Quality Assessment**

A deeper understanding of how the adopted data collection approach affects data quality is crucial. Data quality assessment throughout the survey life cycle according to the Quality Assurance Framework of the European Statistical System (ESS QAF)[[4]](#footnote-4) goes through the following stages: Institutional environment; Statistical processes; Statistical output. Data quality principles for each of these stages contains various dimensions and associated indicators that must be undertaken in data quality assessment of any survey. The principles of statistical output are: Relevance, Accuracy and Reliability, Timeliness and punctuality, Coherence and Comparability, Accessibility and Clarity based on the European Statistics Code of Practice (ES CoP)[[5]](#footnote-5). One of the quality dimensions this paper focuses on is “Accuracy” and the associated indicators for this dimension are: coverage error, measurement error, non-response error, sampling error (CV, Variance, SE) of key estimates based on the National Guidelines for Data Quality in Surveys[[6]](#footnote-6) for both COVID-19 and Labor Force surveys 2020.

The Palestinian Central Bureau of Statistics (PCBS) seeks to apply and use many international tools and standards that aim to assess the quality of the produced official statistics to ensure continuous improvement and increase their quality. In this sense, PCBS regularly submits quality reports, as a tool of monitoring and examining the quality of statistical surveys operations and data. These reports are based on a set of follow-ups contained in the Generic Statistical Business Process (GSBPM) standard model. This model comprises three levels: the statistical business process; the eight phases of the statistical business process; the sub-processes within each phase. The paper studies the extent to which the indicators measured to assess the quality of Labor Force Survey of the third quarter of 2020 operations and data are achieved. Also, it studies the differences between this cycle with the previous cycle of 2019 that was conducted using Computer-assisted personal interviewing (CAPI) mode of data collection through the related quality reports.

Since 2009, PCBS is very keen to apply The Development of a Self Assessment Program (DESAP) on each implemented survey. This program is a checklist for regular assessment data quality of surveys, translated from the European Self-Assessment Checklist for Survey Management. This checklist is designed as a tool for projects and surveys managers to assist them in evaluating the quality of the statistics they produce and to consider possible actions to improve and develop these statistics. The paper examine the percentage of commitment to quality indicators at the level of both COVID-19 and Labor Force surveys for the year 2020.

The paper comprises three main themes regarding data quality assessment, which are:

* Data assessment through accuracy dimension.
* Data assessment through quality reports.
* Data assessment through DESAP.  
  1. **Data Assessment through Accuracy Dimension**
     1. **Data Quality Measurement**

A review accomplished by Groves on survey error and data quality reveals four identifiable sources of error: coverage, non-response, sampling and measurement or response error (Leeuw, 2008).

As we focus in this paper on the “Accuracy” dimension, we consider the following indicators regarding this dimension based on (ESS QAF):

* Achieved Coefficient of Variations (CVs) of key variables in domains of interest.
* The rate of over-coverage: The proportion of units accessible via the frame that do not belong to the target.
* Response and non-response rates.

***Achieved CVs of key variables in domains of interest:***

We consider comparing the computed CVs for both COVID-19 survey 2020 and Labor Force survey 2020 with the previous cycles that implemented using CAPI mode. In order to do so, we choose some of the key variables of both surveys and compared their computed CV values with the ones of previous cycles’ key variables.

Regarding Covid-19 survey we considered the following key variables:

* Percentage of households in Palestine that receive assistance from one of the social protection programs.
* Percentage of households that declaring a state of emergency because of COVID -19 pandemic is the main reason that made the main income earner to stop working during the lockdown period (March-May), 2020.
* Percentage of households that the monthly household income decreased by the half or more during the lockdown period (March-May), 2020.
* Percentage of households that no internet available at home is the main reason for children do not participate in educational activities.

While for SEFSec 2018 survey, the following key variables are considered:

* Percentage of households that government wage and salary is the main source of income
* Percentage of households that private sector wage and salary is the main source of income
* Percentage of households that wages from Israeli labor sectors is the main source of income.
* Percentage of households in Palestine that receive assistance.

The value of computed CVs for the key indicators of COVID-19 survey ranges between 2.1% and 5.4%, while the value of computed CV’s for the key indicators of SEFSec 2018 survey ranges between 2.9% and 6.3%.

On the other hand, regarding LFS of 2019 and 2020 we considered the following key variables:

* Percentage of employed population in Palestine.
* Percentage of unemployed population in Palestine.
* Percentage of population inside labor force in Palestine.
* Percentage of population working in construction in Palestine.
* Percentage of wage employee in Palestine.

The value of computed CVs for the above key indicators are as follow:

**Table 1:** Computed CVs of Labor Force Survey

|  |  |  |
| --- | --- | --- |
| key indicators | LFS 2019 | LFS 2020 |
| Percentage of employed population in Palestine. | 0.7 | 0.6 |
| Percentage of unemployed population in Palestine. | 1.9 | 1.7 |
| Percentage of population inside labor force in Palestine. | 0.6 | 0.7 |
| Percentage of population working in construction in Palestine. | 3.8 | 4.0 |
| Percentage of wage employee in Palestine. | 0.9 | 1.0 |

Source: Palestinian Labor Force Survey - Annual Report: 2019, 2020

Out of those results, one can notice that the value of the CV’s for the mentioned surveys lies within an acceptable range (Survey Data Interpretation Guide)[[7]](#footnote-7). This indicates that there is relatively little variation in responses which indicates a more reliable estimate. i.e. the estimates accurately describe the population. This also indicates that both surveys are consistent with previous cycles despite the change in data collection mode between both surveys.

***The rate of over-coverage:***

Coverage errors result from inadequate representation of the target population based on the units in the sampling frame. Over-coverage occurs due to the inclusion of units that do not belong to the target population.

Factors contributing to over-coverage rate regarding both COVID-19 and LF surveys are:

1. The phone number of the household is out of service.
2. The phone number of the household is incorrect.

Where the calculated over-coverage rate through those factors of the total sample is considered an estimate of the whole sample frame.

The results are as follow:

**Table 2**: Over Coverage Rate

|  |  |  |
| --- | --- | --- |
| COVID-19 Cycles |  |  |
|  | SEFSec 2018 | COVID-19 2020 |
| Over coverage Rate | 6.3% | 5.6% |
|  |  |  |
| Labor Force Cycles | | |
|  | Labor Force 2019 | Labor Force 2020 |
| Over coverage Rate | 0.7% | 3.2% |

Source: Socio-Economic Conditions Survey, 2018 - Main Findings, Ramallah – Palestine. Impact of COVID - 19 Pandemic (Coronavirus) on the Socio-economic Conditions of Palestinian Households Survey (March-May), 2020. Palestinian Labor Force Survey - Annual Report: 2019, 2020

The Over Coverage Rate regarding the Cycles of both surveys indicates that the sampling frame is adequately representative of the target population.

***Response and non-response rates:***

The term response usually refers to the level of participation in survey or interview research. Nonresponse error represents the gap between the sample and the respondents (Liu, 2012). In the case of COVID-19 survey and LFS 2020, the cases of completed or partially completed households are considered response cases. Whereas, non-response cases are attributed to different factors, which are:

1. The household refuses to cooperate.
2. The phone of the household is switched off.
3. No one of the households’ member answered the call.
4. The respondent is an unqualified member to give answers.

The results are as follow:

**Table 3**: Response and Non-Response Rates

|  |  |  |
| --- | --- | --- |
| COVID-19 Cycles |  |  |
|  | SEFSec 2018 | COVID-19 2020 |
| Response Rate % | 90.2 | 93.6 |
| Non-Response Rate % | 9.8 | 6.4 |
|  |  |  |
| Labor Force Cycles |  |  |
|  | Labor Force 2019 | Labor Force 2020 |
| Response Rate % | 83.4 | 76.8 |
| Non-Response Rate % | 16.6 | 23.2 |

Source: Socio-Economic Conditions Survey, 2018 - Main Findings, Ramallah – Palestine. Impact of COVID - 19 Pandemic (Coronavirus) on

the Socio-economic Conditions of Palestinian Households Survey (March-May), 2020.

The results show high values in response rate in favor of COVID-19 survey; this can be explained by the period of which this survey was conducted in. Due to the lockdowns across Palestine in that period, many households were forced to stay home. In this sense, one can come up with a theoretical conclusion that households were more likely to be a respondent than a non-respondent. On the other hand, the LFS of 2020 cycle showed a higher non-response rate than the one of 2019, which may refer to the presence of non-response cases associated to non-reachable households due to wrong dialed numbers. Yet. The response rate of LFS 2020 indicates that the sample itself is representative and the possibility of a bias is very slight when comparing to the non-response rate of LFS with some of the European Union’s countries such as Sweden (43.4), Denmark (45.0), and Netherlands (48.4)[[8]](#footnote-8), as 46.8% of the European Union’s conducted the LFS through CATI mode of data collection in 2016 – 2017, based on the Quality report of the European Union Labor Force Survey 2017.

In general, we can conclude that data quality is not significantly affected by using CATI approach. On the contrary, results of both data assessment and data measurement of the accuracy dimension, showed that this mode is of a good quality as CAPI mode. However, several constraints can affect data quality of CATI-based surveys other than the one we discussed in this paper. One of the important indicators must be taken into account regarding data quality is the response burden indicator[[9]](#footnote-9), which is used to measure and compare the average length of completion of the questionnaire. This indicator is a crucial one in assessing CATI-based surveys as the length of the questionnaire plays a major role in the interview made by telephones, this we may discuss in other studies or papers.

* 1. **Data Assessment through quality reports**

The quality of data and operations of all statistical surveys conducted by PCBS is being monitored and documented through quality reports that include all operations and indicators that were checked and monitored during the implementation of the surveys, covering all stages of the standard model (GSBPM) which are: the stage of setting goals and needs, design, construction, data collection, data processing, data analysis, dissemination, documentation and evaluation. In general, quality reports are being used as a tool of evaluation and improving the quality of statistical survey data and operations.

Considering the quality reports of Labor Force survey of 2019 and 2020, the total number of indicators to be evaluated based on the above-mentioned stages are 50 indicators. The results are as follow:

**Table 4:** Evaluation of Labor Force survey based on GSBPM

|  |  |  |  |
| --- | --- | --- | --- |
| Indicator Status | Completely Satisfied | Partially Satisfied | Not Satisfied |
| Labor Force 2019 (44 indicators of which are applicable) | | | |
| No. of indicators | 41 | 2 | 1 |
| Percentage % | 93 | 5 | 2 |
| Labor Force 2020 (29 indicators of which are applicable) | | | |
| No. of indicators | 26 | 1 | 2 |
| Percentage % | 90 | 3 | 7 |

Source: Quality Report of Labor Force Survey Operations and Data Third Quarter 2019, 2020

The results show that both cycles almost satisfied the overall indicators related to GSBPM stages. On the other hand, the difference in percentages for non-satisfied indicators between both cycles as in Labor Force 2020 survey there was no fieldwork activities due to the lockdown forced by COVID-19 restrictions. Therefore, the indicators relative to the evaluation of the respondent and the interview environment as well as the monitoring of fieldwork activities are not applicable in this case.

* 1. **Data Assessment through DESAP**

PCBS adopts the self-evaluation of project managers’ program as a tool of data quality assessment based on the European Self-Assessment Checklist for Survey Management projects and surveys managers. The translated questionnaire related to this program focuses on the basic indicators that are directly related to the quality indicators.

The basic indicators related to the accuracy dimension addressed in the questionnaire are:

• Over Coverage.

• Under Coverage.

• Classifications used.

• Auditing of raw data.

• Coefficient of Variation.

• Total non-response.

• Partial non-response.

Considering the results of the project managers' self-assessment at the level of accuracy dimension for both COVID-19 and LFS 2020 through the related indicators, the percentage of commitment to the accuracy dimension found to be 83% for both surveys. The results based on each indicator between two different cycles of both surveys are illustrated below:

|  |
| --- |
|  |

**Fig. 1** The percentages of commitment to accuracy indicators of COVID-19 survey, 2020, 2021

|  |
| --- |
|  |

**Fig. 2** The percentages of commitment to accuracy indicators of LFS 2019, 2020

These results show that both COVID-19 and LF surveys have a high level of commitment to accuracy indicators. Also, it’s worth noticing that there is a slight difference between the two cycles of both surveys.

1. **Conclusion and Recommendations**

The experience of PCBS in using CATI mode is one of many others around the world, and it has been a successful experience based on the results issued in this paper through the assessment process. Yet, there are some opportunities for improvement to work on during the coming period, as it is possible to take into account the use of CATI mode in data collection as an auxiliary tool for data collection when implementing surveys and censuses in particular; which will save us a lot of time and effort..

The current crisis is somehow serving to steer our thinking to keep looking for the alternatives even after the age of COVID-19 pandemic, where the world wild nowadays is talking about the new normal in data collection modes. Some of the recommendations to take in consideration in the foreseen future are:

* Considering the use of CATI mode in carrying out households surveys either as an auxiliary or main tool of data collection.
* In case of using CATI mode, it’s worth reconsidering the length of the survey questionnaire, as the questions must be brief and short, in order to reduce the burden on the respondent.
* It is necessary to follow an automated verification mechanism for landline numbers entered according to the questionnaire, and match it with an approved landline database, in order to avoid the wrong entering of numbers. This mechanism would reduce the cases of non-response associated with wrong numbers.
* Regarding LFS of 2020, it is essential to follow a method for checking data consistency for repeated samples of previous cycles.

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