



Economic and Social Council

Distr.: General
3 June 2021

English only

Economic Commission for Europe

Conference of European Statisticians

Sixty-ninth plenary session

Geneva, 23-25 June 2021

Item 2 (b) of the provisional agenda

Post-Covid: sustaining organisational and product innovation in national statistical offices.

Innovation in national statistical offices organization and working arrangements

Covid-19 and its effects on the production of statistics at the National Institute of Statistics and Geography of Mexico (INEGI)

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Summary

The document presents the effects of the Covid-19 pandemic on the production of statistics at the National Institute of Statistics and Geography of Mexico (INEGI) during the Covid-19 pandemic.

The document is presented to the Conference of European Statisticians' session on "Post-Covid: sustaining organisational and product innovation in national statistical offices - Innovation in national statistical offices organization and working arrangements" for discussion.



I. Introduction

1. The Mexican National Institute of Statistics and Geography (INEGI, for its acronym in Spanish) faced significant challenges in generating timely and reliable information during the health crisis associated with the Covid-19 pandemic. Although the institute had already anticipated the need to collect information through alternative means to face-to-face interviews, due to the high cost they represent, the 2020 health crisis forced the authorities to promote the generation of socio-demographic, economic, and government statistics through alternative methods, which not only would help make processes more efficient, but also would comply with the health guidelines imposed by authorities during the pandemic. The results are surprising, and this note gives an account of some of the many changes that were necessary to implement to maintain the flow of relevant information in the country in a time of crisis.
2. The new methodologies to generate relevant, timely and reliable information have represented an enormous challenge of creativity, which has paid off. INEGI emerged strengthened from the situation with the certainty that the generation of information does not stop in the country in times of trouble.
3. Besides, not only were the consolidated methodologies adapted, but new statistical projects were developed to satisfy the emerging information needs demanded by authorities and society to understand the impact of the pandemic in the different spheres of life. Below, as the first set of cases to be exposed, are the most relevant cases of change in methodology to face the Covid-19 health crisis.

II. Consolidated statistical projects

A. Evolution of the National Occupation and Employment Survey

4. An example of the effect of the pandemic on the production of statistics at INEGI is the transition experienced by the National Occupation and Employment Survey (ENOE, for its acronym in Spanish). ENOE is the main source of information on the Mexican labor market, providing monthly, quarterly and annual data on the labor force, employment, labor informality, underemployment, and unemployment. For this reason, it is one of the largest and most important continuous statistical projects in the country.
5. Traditionally, ENOE was carried out through face-to-face surveys; however, the COVID-19 pandemic suddenly disrupted how statistical information was generated. The social distancing imposed by the health authorities to mitigate the contagion forced the suspension of household interviews, a situation that affected historical continuity and left an information vacuum at crucial moments.
6. In response, alternatives were sought to obtain the interviews, maintaining the generation of crucial statistical information for decision-making, even in the context of the pandemic, and providing the authorities with the necessary support tools for the design of appropriate public policies.
7. The main challenge was to move from a face-to-face survey methodology to a remote one in which there was no direct interaction between informant and interviewer. The main strategy was based on the establishment of a telephone sampling frame that was sufficiently robust to be representative of the situation in the country during the confinement stage.
8. To maintain the generation of ENOE indicators, it was decided to develop a telephone survey methodology, taking advantage of the rotating panel of the sample and extracting the telephone number of the households that had provided it in the interview before the first quarter of 2020. This made it possible to maintain the generation of information on the labor market at the national level, without altering the conceptual framework. Thus, the Telephone Occupation and Employment Survey (ETOE, for its acronym in Spanish) was conducted from April 15 to 30, 2020, and subsequent surveys were carried out in May and June.

9. Given the relevance of information on occupation and employment during the social distancing and the gradual restart of operations, INEGI, in mid-June, restarted the traditional ENOE survey (face-to-face), but maintained the telephone interviews due to the advantages that this survey model offered. This hybrid model, which maintains the conceptual, methodological, and statistical design of the ENOE, is called the New Edition.

10. The experience in the development of alternative methodologies allowed us to know the virtues of these surveys. After having developed several exercises to test the quality of the information collected by telephone, it was decided to maintain the hybrid survey scheme that combines face-to-face interviews with telephone interviews of the ENOE (New Edition). Given the relevance of its indicators, the introduction of telephone interviews was submitted to public consultation following the provisions of the law governing INEGI. The use of this new type of interviews went from being a reactive alternative to a proven and approved methodology for the collection of one of the most important statistical projects at the national level; such was the impact of COVID-19 on INEGI's socio-demographic statistics.

B. National Economic Surveys

11. The suspension of activities involving face-to-face interaction also impacted the national economic surveys, which could affect the maintenance of the uptake levels required for the processing and generation of results that address the activity of the construction, manufacturing, commerce, non-financial private services, and business opinion sectors.

12. The problem presented four fundamental aspects that needed to be resolved. First, it was necessary to promote the use of the Internet for the provision of information by the economic units that used traditional means, through a face-to-face interview (printed questionnaire or using a mobile computing device).

13. Secondly, it was necessary to maintain close communication with informants, through electronic means, to monitor data collection and ensure the supply of information promptly.

14. Third, it was of utmost importance to provide follow-up to the economic units that presented operational problems because of the pandemic (temporary closure and/or permanent closure).

15. Finally, and as a fourth point, it was needed to permanently review and update the procedures of the processing phase impacted by the pandemic and to establish adequate communication with the users of the statistics.

16. In this sense, the challenges presented found a solution in a plan made up of four aspects:

- Design and implementation of an operational strategy based on electronic media, prioritizing remote monitoring and capture, using the Internet, email, video calls, social networks, and telephone calls.
- Design and development of an electronic format to capture additional information to that of the questionnaires, referring to the operational condition, level of personnel employed, wages paid, and working time, for use in the information processing phase.
- Review and update the imputation methods used to reflect the reality of the economic units in the sample, considering the list of essential and nonessential activities decreed by the health authority, as well as the operating condition itself and the additional information captured.
- Design of criteria for the identification of domains with estimation reserves, based on the set of statistical precision indicators, which contributed to the elaboration and dissemination of notes to users on this aspect.

17. In this context, and based on the experience acquired, among the strategies that should be permanent is the promotion of the use of the Internet as the main means of attraction, as well as the dissemination of notes with domains reserved for users.

18. It is also necessary to update contingency plans to reflect critical situations so that statistical programs and processes minimize risks in the event of such contingencies.

C. Price Indices during COVID-19: Consumer Price Index and Producer Price Index

19. Other consolidated projects that were affected by the pandemic are the national price indexes; in this regard, in March 2020, price collectors were requested to update the information of the sources being sampled, web page, email, and telephone and cell phone numbers. Thus, by the second half of March, the price collectors had their product baskets online and some tests were carried out for quotes. To have information on how the situation resulting from the COVID-19 pandemic was being addressed, contact was maintained with the statistical offices of Italy and Spain, the United States Bureau of Labor Statistics (BLS), the International Monetary Fund (IMF), the Economic Commission for Latin America and the Caribbean (ECLAC) and the European Statistical Office (Eurostat).

20. Due to the suspension of face-to-face data collection, Consumer Price Index (CPI) data collectors were instructed to obtain the information via telephone, email, and the Internet, from the establishment website and some takeout apps.

21. In this context, we faced the challenge of the lockdown of economic activities, which is the main source of information, the restrictions on human mobility, and, consequently, the limitations faced by the labor force, in addition to the problem of quoting the same sample without losing the characteristics of the products to maintain comparability.

22. A strategy was necessary to have better information about missing prices, which would be classified into three categories: a shortage of items, mandatory business closures, and mobility restrictions. In this way, users were informed in time about the products with the greatest price shortages. An informative note on the results was presented every fifteen days.

23. Likewise, our sources were informed that due to the pandemic situation, they would be contacted by other means to continue quoting prices. In addition, a post-isolation employee mobility guide was implemented.

24. With the passage of time and gradual reestablishment of the new normality, in-person data collection has been recovering, based on the recommendations of government authorities, and it has been possible to publish the Consumer Price Index (CPI) and the Producer Price Index (PPI) as planned. In the case of the sources that were closed, it was decided that they should be the first to be visited, to verify their current situation, as well as those that had problems in quoting prices and being contacted; the above, of course, based on the traffic light system.

25. In case of some products, the price will continue to be collected online and, in all cases, the directory of origin will be kept up to date. It was also proposed to accelerate the implementation of the scanner data and web scraping projects.

III. Emerging statistical projects

A. Business Demography Study (BDS) 2020

26. Given its characteristics, the Business Demography Study (BDS) cannot be carried out with innovative remote measures because it is necessary to certify in the field, face to face, the demographic situation of the economic units (survivors, births, and deaths). This constituted a great operational challenge at the national level to coordinate the work in each one of the states according to the COVID-19 related restrictions determined by the Federal Government for the opening or not of certain businesses (according to their economic activity) that form the universe of study for the BDS; on the other hand, another challenge was to guarantee the safety of both the personnel and the informants.

27. In the context of the measures implemented by the Federal Government to contain the COVID-19 pandemic, the results from the 2019 Economic Census, recently conducted, constituted the most complete sampling frame to study the demographic dynamics in a close period and as timely as possible for national and international users from both public and private sectors. However, the pandemic itself put at risk the validity and usefulness of the data provided by the 2019 Economic Census because, to a large extent, they would no longer reflect the national reality of 2020, a situation that prompted the realization of the 2020 BDS study, aimed at capturing information for 2019 and specific periods of 2020 aligned to the phases of the health emergency and with harmonized variables between the Statistical Business Register of Mexico (RENEM, for its acronym in Spanish), the conceptual framework of the 2019 Economic Census and with the study of demography carried out in 2012 by INEGI.

28. Therefore, the BDS 2020 has provided useful and especially updated figures by state and economic sector for micro, small and medium enterprises during the difficult times of COVID-19 pandemic.

B. Nowcasting and the Timely Indicator of Economic Activity

29. As a consequence of mobility restrictions generated by the COVID-19 pandemic and the temporary closure of all non-essential economic activities, the Global Indicator of Economic Activity (IGAE, for its acronym in Spanish), the proxy variable of the monthly Gross Domestic Product (GDP) of Mexico, drastically dropped. The annual percentage variations of IGAE during April, May, and June were -19.8%, -21.5%, and -14.5, respectively. Given these unexpected conditions of uncertainty, it was necessary to have reliable and timely statistical information. IGAE is released 8 weeks at the closure to the respective current month, which is not timely. Consequently, INEGI generated a nowcasting model to obtain accurate and timely IGAE estimates until 5 weeks before the official data released.

30. To generate the nowcasting model, the macroeconomic, financial, and non-traditional variables were selected by using the criteria of timely and contemporaneous correlation concerning IGAE. Although the nowcasting model is not structural, the selected variables are economically related to the GDP according to the literature review. Additionally, we focus on generating a nowcasting model that is very competitive with respect to other econometric and computational alternatives in a relatively short time.

31. The nowcasting model is based on Dynamic Factor Models (DFMs). Specifically, the procedure consists of the following steps: i) build a timely and correlated database by using economic and financial time series and real-time variables such as social mobility and significant topics extracted by Google Trends; ii) estimate the common factor ¹ using the two-step methodology of Doz et al. (2011);² iii) use the common factor in univariate time-series models for test data; and iv) according to the best results obtained in the previous step, combine the statistically equal better nowcasts to generate the current nowcasts. The approach is named Timely Indicator of Economic Activity (IOAE, for its acronym in Spanish). IOAE has been very well accepted by researchers, economists, policymakers, journalists, among many others, even influencing movements in the financial markets.

32. IOAE is now used in official statistics to obtain preliminary estimates for IGAE up to 5 weeks before the official results. Consequently, IOAE influences informed decision-making. Additionally, IOAE allows generating a social matrices model that disaggregates the nowcasting results in around 80 different economic activities. The future research is related to the automatization of all the steps to generate real-time estimates according to the update of the variables in DFMs.

¹ This assumption was verified according to the criteria of Onatski (2010).

² Doz, C., Giannone, D., and Reichlin, L. (2011). "A two-step estimator for large approximate dynamic factor models based on Kalman filtering". *Journal of Econometrics*, 164(1):188-205.

C. Compilation of information on public cemeteries in Mexico's metropolitan areas

33. In addition to the pressing challenges of adapting to the regular activities at the Institute, the COVID-19 pandemic also led to new statistical information needs, including a detailed understanding of the increase in mortality resulting from reported fatalities due to this disease. Despite the information available on the country's cemeteries (obtained through government censuses at the municipal level, economic censuses, or the cartographic layers themselves), there was no public information on the infrastructure available to deal with the drastic increase in the mortality rate. In addition, given the lack of timely administrative records on the subject, it was urgent to seek alternative sources (although incomplete), such as public cemetery records.

34. Thus, INEGI initiated a special program dedicated to the collection of statistics related to the administration, capacity, and maintenance of public cemeteries called *Compilation of Information from Public Cemeteries in the Metropolitan Areas of Mexico* (RICPZMP, for its acronym in Spanish), whose general objective was to obtain and produce information on the administration and capacity of municipal cemeteries in the country's metropolitan areas belonging to the public sector, as well as the number of burials and cremations registered by these sites, from January to June 2020. In addition, this exercise aimed to assess the perception of changes in the activity of cemeteries and the expansion of facilities and services provided during the first half of 2020.

35. The first challenge of the project was to emergently design the questionnaire and manage the terms under which the increased workloads would be addressed for the staff, who would develop the tasks respecting the already scheduled deadlines. In terms of obstacles during the collection process, four aspects were persistently present. First, in the context of the suspension of activities, it was problematic to find and contact informants. Second, non-existent or inaccurate records hindered the current status of public cemeteries, including basic information, as well as their geolocation, e.g., some cemeteries although physically located in one municipality were registered in another. Third, the administrative records were poorly systematized within the cemetery, i.e., sometimes they did not have an official figure for the number of graves, nor the number of occupied and available burial pits. Finally, when the above data existed, most of it was recorded on paper, being notorious for the lack of technological infrastructure and technical capacity to have a backup copy of the necessary and relevant information.

36. The strategy to achieve timeliness was to prioritize some municipalities in which the information would be collected. In this context and considering that 81.5% of the deaths registered by COVID-19 had occurred in the metropolitan areas of the country, the selection of municipalities covered those where the problem of contagion was concentrated, as well as the majority of deaths, which would also suffer a greater saturation of cemeteries. Thus, 417 municipalities were selected (16.9% of the total), which make up the 74 metropolitan areas of the country. The information collection process was carried out from June 29 to August 7, 2020, that is, the data covered the first half of 2020. Also, during the collection process, although most of the work was done remotely, staff had face-to-face meetings (depending on the pandemic situation of each state) to locate the appropriate informant and collect the information accurately. Occasionally, a physical count per tomb was necessary to ensure the reliability of the information. After the collection, it was emphasized that one of the qualities of this compilation, and in large part one of the reasons it could be done on time, was the simplicity of the questionnaire. Overall, institutional management capabilities and resilience were demonstrated.

37. RICPZMP is now planned as a regular project (integrated into the National Census of Municipal Governments) because of its relevance as a monitoring instrument for the COVID-19 pandemic, but also because of its relevance to the forensic agenda in Mexico. For example, its information will be especially valuable for the forensic search and documentation of unidentified burials, as well as for the National Exhumation Plan by the National Attorney General's Office and the National Commission on Missing Persons.

38. Among the statistical challenges to be addressed in the next waves of the project, it is desirable to extend the collection of information to all public cemeteries in the country along with strengthening the capacities of the cemeteries to secure information by sharing appropriate guidelines with the authorities. In addition, part of our interest lies in achieving statistical relevance in forensic services (common, individual, or mass burial graves), as well as in the safeguarding of remains exhumed in these spaces. This would simultaneously contribute to validate consistency with the number of corpses documented by forensic medical services in the country that were not identified or when identified, were not claimed. In addition, INEGI will strive to improve the identification of cemeteries, using satellite images, to build a geographic information layer that integrates a repository of information on cemeteries, through a single, consolidated catalog.

D. National Survey of Funeral Agencies facing COVID-19 (ENAF)

39. In the same sense, the National Survey of Funeral Agencies facing COVID-19 (ENAF, for its acronym in Spanish) was developed during May and June 2020, to generate statistical information on the effects originated by COVID-19, regarding the way of operating of the companies dedicated to the provision of funeral services in the country.

40. The survey is characterized by having a probabilistic sampling scheme, which allows generalizing the results to the entire population; in addition, it provides information at the national level and by the size of the company referred in a general way to April 2020, about the following topics: funeral services performed, installed capacity, the behavior of total income and total employed personnel, increase in fixed assets, care of dead bodies due to COVID-19, closures or changes in the service, shortage of supplies, modification of protocols, and sanctions for non-compliance with protocols and official regulations.

IV. Concluding remarks

41. INEGI has made significant progress in generating statistics in times of crisis. The Covid-19 pandemic represented an opportunity to improve the generation of statistics in the country, but significant challenges remain. For example, the institute should promote a greater use of digital technologies in the elaboration of diverse products. The pandemic made it clear that the modernization of information generation methodologies is possible. Clearly, INEGI is today better prepared to face the future.

42. The pandemic highlighted the need to diversify and consolidate collection methodologies to meet the demands for information capable of adapting to the new normal. The use of more flexible methodologies will make it possible to respond to any type of crisis, whether of public health, environmental or socio-political.
