PART IV

Stories Behind the Data: Initiatives of National Statistical Systems to Provide Actionable Insights Through Timely Data

Overview

The provision of timely and reliable data is crucial in making informed policy decisions. Development planners turn to data as they design programs and policies to help improve the lives of the poor and promote inclusive and sustainable growth. By showing which policies and programs work, as well as highlighting those that do not, knowledge gained from data also helps improve service delivery. Thus, the importance of data in both formulating plans and tracking progress towards the 2030 Agenda for Sustainable Development cannot be overstated.

The 2019 High Level Political Forum on Sustainable Development highlighted the challenges in generating the data and statistics needed for tracking progress towards the Sustainable Development Goals (SDGs) and associated targets (ECOSOC 2019). For example, the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) has reported that, for 2020, only about 49% of the indicators have sufficient data for tracking progress (UNESCAP 2021). This raises an important question: How can the SDGs be achieved when high-quality data are lacking in guiding policy decisions?

In addition to accuracy, reliability, and granularity, the Fundamental Principles of Official Statistics cites timeliness as an important attribute of data (UNSD 2014). Uneven progress in SDG and other development targets underscores the need for timely data to make real-time decisions on critical policies and programs to achieve global and regional development goals by 2030. Thus, there is an urgent need to advance efforts to provide high-quality and timely data for policymaking.

The COVID-19 pandemic has brought into sharp focus the importance of high-quality and timely data in daily life. Infection rates, the number of deaths, and vaccination rates now influence the decisions of governments to constrain or allow freedom of movement and economic activity. In a dynamic environment where scenarios change rapidly, appropriate data are also crucial to promptly assess the impacts of restrictions on peoples' lives and livelihoods, and to develop suitable responses to the health crisis.

Ironically, however, lockdowns and other pandemic restrictions have seriously impeded the traditional methods of data collection used by national statistical systems (NSSs), hindering statistical capacity worldwide and curbing the ability to produce high-quality data and statistics in a timely manner. This has spurred NSSs to embrace and accelerate alternative data collection strategies such as the use of digital technology, which provides new options for faster collection, processing, and dissemination of data.

In line with this trend, the Economic Research and Regional Cooperation Department's Statistics and Data Innovation Unit (EROD-SDI) of the Asian Development Bank (ADB) conducted a survey on initiatives that national statistics offices (NSOs) have undertaken over the years to provide more timely data. This request for information generated detailed responses from 28 of the bank's regional member economies[1]. The survey shows that, even before the COVID-19 pandemic, NSOs had already begun using new tools, such as big data and innovative data capture, to access more timely information. The EROD-SDI was then able to assess whether existing NSO initiatives were accelerated because of the pandemic, and to identify further efforts to promote agile and resilient statistics systems amid a period of uncertainty.

Why Do We Need Timely Data?

Timely data are important both in designing policies aligned with specific objectives and goals, and in monitoring and evaluating those policies for appropriate calibration when needed. This was clearly illustrated when the COVID-19 pandemic struck, as governments needed timely data to react quickly to evolving scenarios and to strike a balance between reducing the spread of the virus and minimizing the impacts on the economy and human well-being.

In developing economies, national data and statistics systems often work with limited capacity and resources, affecting their ability to provide timely data in rapidly evolving situations. To address these data gaps, NSSs used forecasts and simulations to assess the socioeconomic impacts of the COVID-19 pandemic, and these data proved essential in developing preliminary intervention programs and plans for recovery. However, later comparisons between the initial forecasts and latest statistics released by NSSs and other relevant government ministries revealed that, in some instances, there were significant differences between the two. It is therefore important to continuously fine-tune methods of data compilation, estimation, and forecasting in order to ensure that the timely release of accurate data and statistics is not compromised, ensuring actionable insights for policymaking.

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[1] The EROD–SDI survey garnered responses from the following economies: Afghanistan; Armenia; Azerbaijan; Bhutan; Brunei Darussalam; the Cook Islands; the Federated States of Micronesia; Fiji; Georgia; Hong Kong, China; Indonesia; Kazakhstan; Malaysia; Mongolia; Nepal; Pakistan; the Philippines; the People's Republic of China; the Marshall Islands; the Republic of Korea; Singapore; Solomon Islands; Sri Lanka; Taipei,China; Thailand; Uzbekistan; Vanuatu; and Viet Nam.

Background on Data Collection Capacity in Asia and the Pacific

Box 4.1 summarizes the datasets commonly compiled by NSSs, while Figure 4.1 shows how frequently these data are collected in the economies surveyed by the EROD-SDI. In general, collecting comprehensive data requires significant resources. One estimate suggests that the cost of conducting a household income and expenditure survey, for instance, is approximately $1.7 million (UNSDSN 2015). For many developing economies of Asia and the Pacific, these high costs create a barrier to conducting comprehensive data collection as frequently as needed.

Figure 4.1: Frequency of Surveys and Censuses in Developing Economies

A significant proportion of developing economies in Asia and the Pacific conducted surveys and censuses too infrequently or not at all.
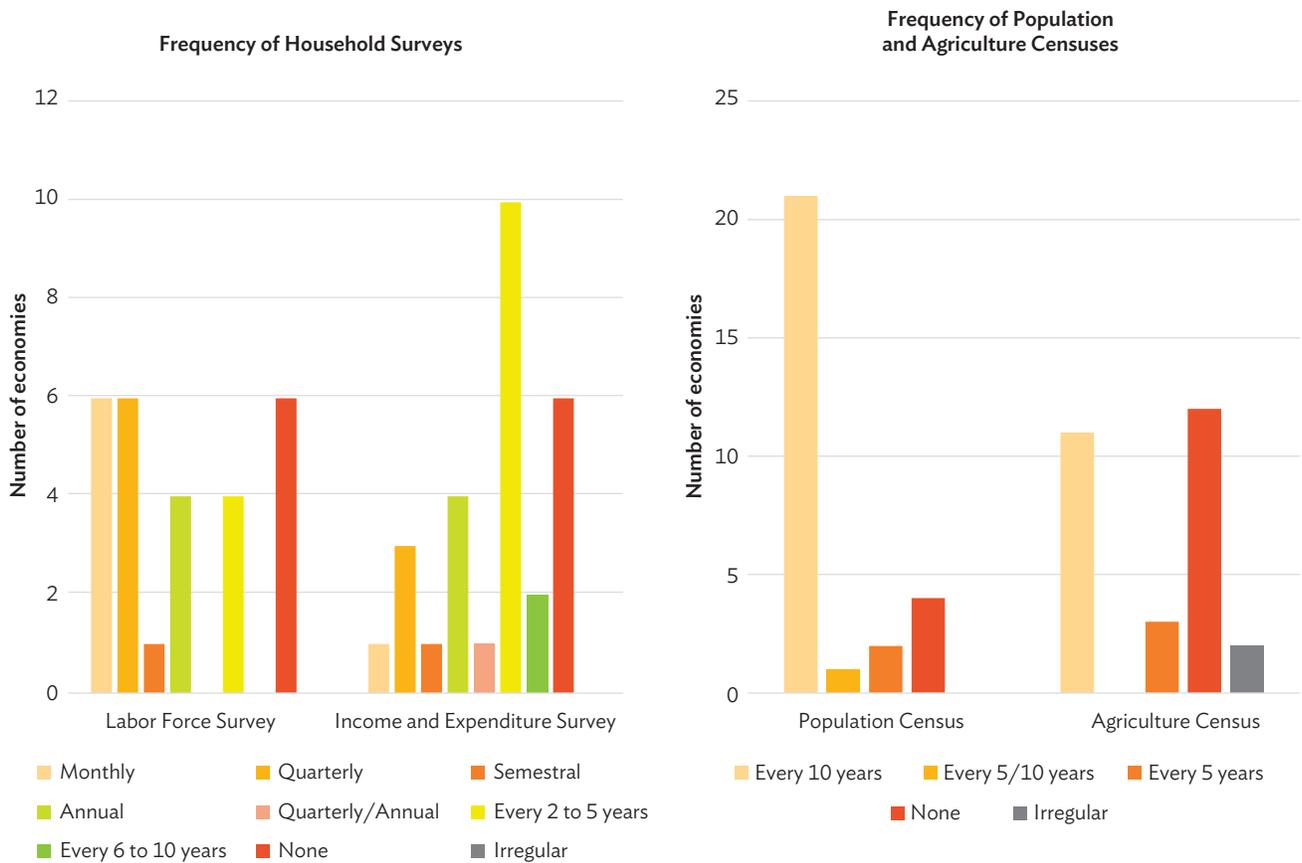
Note: The analysis uses results from 28 regional member economies of the Asian Development Bank.
Source: Asian Development Bank estimates using data from the Survey on National Statistics Offices' Initiatives to Enhance Timeliness of Data and Statistics.

Box 4.1: Conventional Data Collection Initiatives by National Statistical Systems

Censuses, surveys, and administrative data are three sources of data conventionally used by national statistical systems (NSSs) to provide socioeconomic data. Sample surveys, such as those conducted on households and enterprises, constitute a major data source for Sustainable Development Goal (SDG) targets and other development indicators (DHS Program 2017). Examples of household surveys include household income and expenditure surveys, demographic and health surveys, and labor force surveys.

Each data source has its advantages and limitations. Since a census gathers information from a complete set of all units of a target population, it is accurately representative and can be used for more granular disaggregation. However, while a census serves as a fundamental source of baseline information on the structure and key characteristics of the population over time, collecting data from a larger population is resource-intensive and involves lengthy analysis and a longer time frame for publication. Meanwhile, a sample survey collects information from a subset of a target population and often relies on census data in setting sample weight. Hence, compared to a census, it generally takes less time and expense to conduct a sample survey and publish the data. Surveys also collect more detailed information than do censuses.

Sample surveys are, by definition, subject to sampling errors. Response rates greatly affect the survey results and the quality of responses. Interviewees may have difficulty recalling correct answers, or may not be totally honest, and this affects the quality of their responses. Periodic reviews of a survey's sampling design are also needed so that samples and weights correctly represent the population. As with censuses, comparability over time is also a challenge, given how estimates of key variables may require similar designs and methods that are highly unlikely to be perfectly replicated. Furthermore, adequately trained personnel are necessary to administer the survey with the least deviation from the standard.
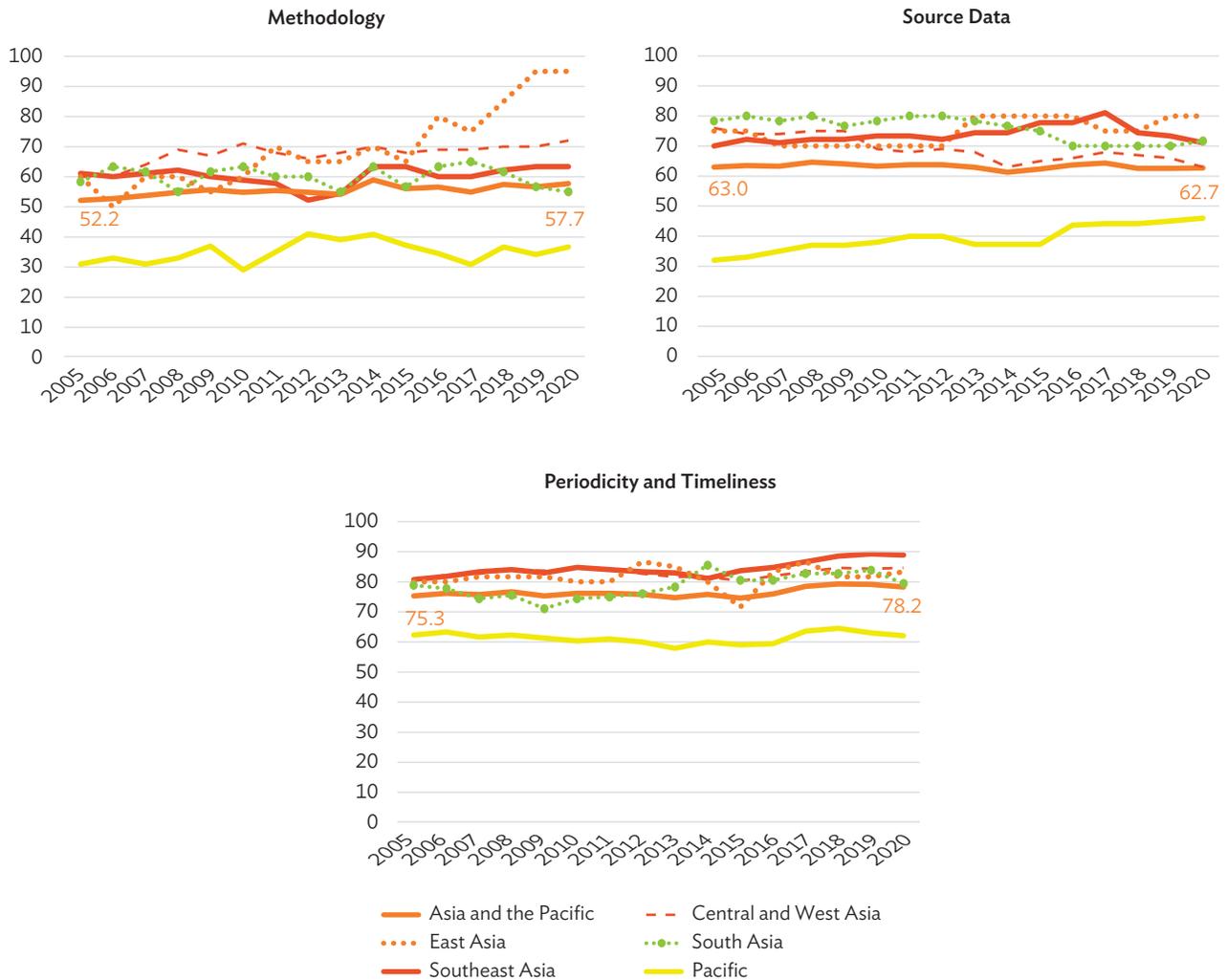
In addition to censuses and sample surveys, NSSs are using administrative data as a main or supplementary source of information for several SDG indicators. Using administrative data has several advantages. First, administrative data usually contains a complete count of units, which can derive disaggregated data from smaller areas of interests. Second, making use of existing data costs less than designing a new data collection initiative to serve specific data needs. Third, readily available data through administrative registers have proved their significance during crises. For example, the COVID-19 pandemic highlighted the importance of timely data in order to prepare well-informed interventions to support the people affected by the crisis. However, the use of administrative data is sometimes limited to a specific administrative purpose and might not be suitable for another statistical purpose due to its comparability and confidentiality. NSSs therefore need to carefully select different data sources to complement censuses, using only applicable sample surveys and administrative data.

Reference: Demographic and Health Survey (DHS) Program. 2017. *Measuring the SDGs: The Role of Household Surveys.* 11 January. https://blog.dhsprogram.com/measuring-sdgs/.

Asia and the Pacific has made some progress on conducting regular and timely data collection.

The Statistical Capacity Indicator (SCI) compiled by the World Bank provides additional insights on the capacity of the region's NSSs to provide timely data. In general, the SCI measures the capacity to collect, analyze, and disseminate high-quality data. Scores are based on three important dimensions: (i) statistical methodology, which measures an NSS's ability to adhere to international statistical standards and methods; (ii) source data, which reflects capacity to collect data in line with internationally recommended frequency and whether administrative data can be used for purposes of statistical estimation; and (iii) periodicity and timeliness, which scores an NSS on the basis of availability and periodicity of key socioeconomic indicators (World Bank 2021a). Recently, the World Bank developed an updated set of measurements, the Statistical Performance Indicator (SPI), which considers five pillars: data use, data services, data products, data sources, and data infrastructure. The SPI is set to be more comprehensive and forward-looking than the SCI (World Bank 2021b). However, the SCI, which has time series data, is still being used to show the trend of how statistical capacity is evolving in the subregions of Asia and the Pacific over time (Figure 4.2).

Figure 4.2: Statistical Capacity Indicator in Asia and the Pacific, by Subregion
Some aspects of Asia and the Pacific's statistical capacity have improved over time.

Methodology

Source Data

Periodicity and Timeliness

- Asia and the Pacific
- - Central and West Asia
- East Asia
- South Asia
- Southeast Asia
- Pacific

Note: The analysis uses data from ADB regional member economies for which estimates of the Statistical Capacity Indicator are available.
Source: Asian Development Bank estimates using data from World Bank. Statistical Capacity Indicator. https://datatopics.worldbank.org/statisticalcapacity/SCIdashboard.aspx (accessed 22 December 2020).

Figure 4.2 summarizes how Asia and the Pacific's statistical capacity has evolved since 2005. Data show that overall statistical capacity in the region has improved steadily over time, although variations across individual economies exist.

Assessing the three SCI dimensions, Asia and the Pacific scored highest on periodicity and timeliness, with signs of improvement over time. However, the most significant improvement for the region as a whole was observed in statistical methodology. Meanwhile, the region's scores on source data went down marginally from 2005 to 2020. By subregion, East Asia posted strong improvement in methodology and the most significant improvement in overall score, while the Pacific posted an improvement in source data, albeit from a lower base than other subregions. Southeast Asia maintained the highest score for periodicity and timeliness.

Impacts of the COVID-19 pandemic on statistical activities in three economies

Well before 2020, the statistics community of Asia and the Pacific had increasingly recognized that a lot of the data needed for effective policymaking and evaluation were not readily available. For a number of years, NSSs in the region have been working on initiatives to exploit alternative data sources and digital methods of collection. The many and varied disruptions caused by the COVID-19 pandemic have prompted NSOs to speed up some of their initiatives in these areas, as has been observed in Malaysia, the Philippines, and Thailand.

Malaysia

Even before the pandemic, the Department of Statistics Malaysia (DOSM) was exploring mixed-mode approaches to providing timely data. In implementing its surveys, the DOSM has gradually been moving away from traditional data collection to computer-assisted personal interviewing (CAPI), drop off and pick up of self-administered questionnaires, and email communication. These strategies have reduced field work costs and enhanced the department's ability to analyze and disseminate data quickly.

When the pandemic began, the DOSM recognized its role in helping craft policies responsive to an environment with many uncertainties. It produced quick surveys, such as those gauging households' ability to survive during lockdowns, without jobs and sources of income. Similarly, it conducted surveys among businesses and enterprises to assess their pandemic needs. The DOSM also came up with weekly and daily statistics to keep policymakers informed on various indicators, e.g., the number of visitors at recreational or theme parks, business outlets opened in certain areas, weekend occupancy rates in budget hotels, and the number of people on particular streets.

To leverage existing administrative data, the DOSM integrated information from the employees' provident fund and the inland revenue board, which covers 70% to 80% of Malaysia's population. This provided policymakers with immediate snapshots of how the pandemic was affecting the labor market. The DOSM has also started to explore nontraditional data sources such as gathering data from media outlets and web-scraping for its price surveys. More granular export and import data at the local level, specifically by province, are now available due to big data initiatives.

Other initiatives by the DOSM include: (i) data usually released quarterly (e.g., agriculture administrative data) are now available on a monthly basis; (ii) quarterly gross domestic product (GDP) broken down into monthly estimates to better assess the impacts of different pandemic response policies; (ii) additional indicators of underutilization in the labor market, i.e., time-related underemployment and skill-related underemployment; (iv) a quarterly labor market review; and (v) labor force statistics by state on a quarterly basis and district-level statistics on annual basis.

The DOSM faced enormous challenges in conducting the 2020 Population and Housing Census (MyCensus 2020), commenced on 7 July 2020. However, adopting technology in the pre-pandemic planning of the census—principally by developing the Malaysia Integrated Population Census System—created opportunities to use technology-based data collection. MyCensus 2020 is now in the final stage of online data collection and the DOSM is leveraging administrative data to complement and cross-check census data.

The DOSM continues to play a prominent role in steering policy direction through its membership in the Higher Level Task Force of the National Employment Council, which was set up in October 2020 to address labor market issues across Malaysia. The DOSM provides the most recent data to inform the work of the council in shaping policy and monitoring government initiatives. Along this line, the DOSM is also involved in providing vital information to the members of the Economic Action Council, especially with respect to unemployment and underemployment.

Malaysia is also in the process of forming a statistics council, headed by the Prime Minister, to assist evidence-based policymaking.

The Philippines

The Philippine Statistics Authority (PSA) has long been undertaking initiatives to capitalize on technology-based solutions for data collection and dissemination. Through its adoption of CAPI and computer-assisted telephone interviewing (CATI) processes, the time lag between conducting the labor force survey and releasing the statistics was shortened from 40 days to 35 days; the time lag on the survey of information communication and technology declined from 2 years to 1 year; and the difference between data collection and release of statistics from the annual survey of business and industry fell from 1 year (or longer) to 8 months.

Since the onset of the pandemic, innovative initiatives have helped the PSA deliver its data publications without delay. For example, initiatives to train enumerators in using customized CAPI methods have ensured that data are released on time. Moreover, the authority experimented with web-scraping in the capital region for its price survey. As the pandemic prevented enumerators from reaching store outlets, due to lockdowns and fear of face-to-face interviews, this kind of initiative to access online prices is expected to aid in validating more than half of the commodity prices the PSA surveys monthly.

There have, however, been some limitations in areas where there is still low internet activity or where computer literacy of households and respondents is less advanced. Moreover, the PSA's agricultural survey was postponed due to difficulty in hiring statistical researchers and unavailability of transportation to some areas due to geographical lockdowns.

To address repercussions of community quarantines on the labor market, the PSA started to produce more frequent labor force surveys—from quarterly to monthly.

To improve targeting and prioritization of social assistance, the authority, together with local government units (LGUs), is also preparing for the roll-out of a community-based monitoring system by 2022. The PSA is leveraging its expertise in conducting censuses to help the LGUs shepherd this initiative. However, the authority recognizes that some LGUs might have difficulties in operating the system and is encouraging development partners to collaborate with these government units.

Thailand

The efforts of the National Statistical Office of Thailand (NSO) to improve timeliness of data began with a shift to CAPI from traditional pen-and-paper methods before pandemic. Around this time, the NSO also started shifting to CATI and computer-assisted web interviewing (CAWI). Additionally, the office cross-referenced its surveys or censuses and, where possible, merged questions to streamline data collection processes.

Initially scheduled in April 2020, Thailand's Census of Population and Housing was seen as an excellent opportunity to employ various digital initiatives and benefit from associated time and cost efficiencies. One of the proposals was to use tablets for faster data consistency checks, reduction of response processing times, and immediate uploading of survey information to the cloud. However, the census was subsequently postponed due to pandemic restrictions and business closures. In response, the NSO allocated B10 million to study the implementation of a register-based census to become more resilient to disruptions in field operations. Research on the feasibility of using big data for forecasting population numbers is also underway.

The NSO has helped pioneer the use of satellite population maps to provide detailed population data, which is especially useful in times when face-to-face data gathering is not feasible. The technique, which has been researched in partnership with the Asian Development Bank, can deliver more reliable and geographically granular population density maps than conventional methods (Tatem et al. 2007).

In particular, the study applied the method proposed by Stevens et al. (2015) to compile granular population data for 2020. It attempted to forecast gridded population distribution in the Thai provinces of Udon Thani, Uthai Thani, and Samut Songkhram (Figure 4.3).

The methodology entailed combining census data with publicly available spatial data such as land cover classes, elevation, slope, and nighttime lights, then estimating a random forest model to obtain population density estimates at the 100 meter by 100 meter grid-level. Using the information on average annual population growth in Thailand from

Importance of timely data. Socioeconomic planners and policymakers need timely and reliable data upon which to base their decisions.

Figure 4.3: Forecasts of Population Density in Three Thai Provinces, 2020
Population density estimates derived from satellite imagery of *Udon Thani, Uthai Thani,* and *Samut Songkhram* provinces.
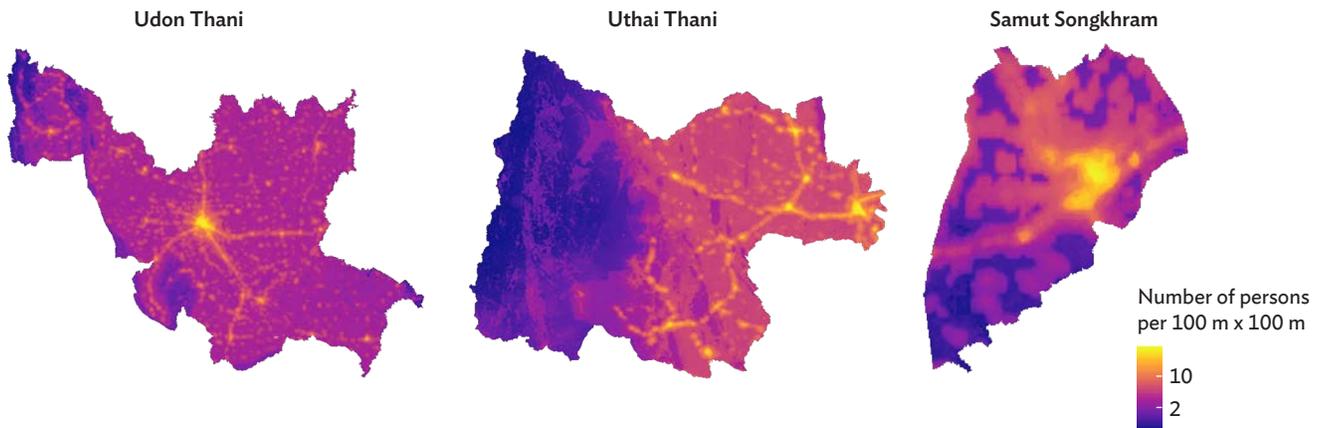
m = meter.
Source: T. Mitterling, K. Fenz, A. Martinez, J. Bulan, M. Addawe, R. Durante, and M. Martillan. Forthcoming. *Compiling Granular Population Data Using Geospatial Information.*

2013 to 2017, another model was trained to predict population growth beyond 2017. After applying these predicted growth rates to grid-level population data from 2017, granular forecasts of population density for 2020 were obtained. Nevertheless, further research is needed to assess the accuracy of such forecasts once official population numbers are available.

In response to the pandemic, the NSO also had to recalibrate arrangements for its other data collection activities. For instance, instead of collecting price data directly from stores, current prices were obtained through telephone interviews or from relevant websites. Similarly, enterprise surveys used telephone interviewing, questionnaires by post or e-mail, and data from business registers. Imputation techniques were applied to supplement missing survey samples.

Together with exploring strategies on how to provide timely data and statistics amid the COVID-19 pandemic, examining the impact of those strategies on data quality is equally important. For example, given that census results are used as population frames for other surveys, it is important to ensure that new ways of collecting census data still deliver high-quality results. Additionally, given that administrative data systems are playing a more important role in producing data and statistics for development, the NSO recognizes the need to develop the skills of other government ministries that manage such administrative databases, to ensure they follow the same scientific rigor required when collecting, processing, and analyzing other types of data commonly handled by the NSO. For instance, administrative data sets and registration records produced by various ministries require skills in eliminating duplication and error. The NSO acknowledges the need to develop the skills of ministries' information technology officers in dealing with administrative data.

## How the Pandemic Influenced Data Capture More Broadly

Only with accurate, trustworthy, and timely data can governments and institutions fight the COVID-19 pandemic and mitigate the short- and long-term socioeconomic effects of containment measures.

Figure 4.4 illustrates the relationship between statistical performance (using the SPI) and the proportion of scheduled activities that were fully implemented or encountered just minimal delays in 2020 (using data from the EROD-SDI survey).[2] The results suggest that, although there is a positive association between the two measures, the value of the SPI is not a strong predictor of whether or not scheduled data collection activities were completed. In fact, a majority of the surveyed economies —including Indonesia, Fiji, Kazakhstan, Malaysia, the Philippines, Singapore, and others—were able to push through with more than half of their scheduled data collection activities.

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[2]   Surveyed economies that did not have SPI values for the reference period were: Brunei Darussalam; the Cook Islands; Hong Kong, China; Palau; and Taipei,China.

Figure 4.4: Association between the Statistical Performance Indicator and Scheduled Data Collection Activities
Many national statistical offices pushed through with data collection activities scheduled for 2020.
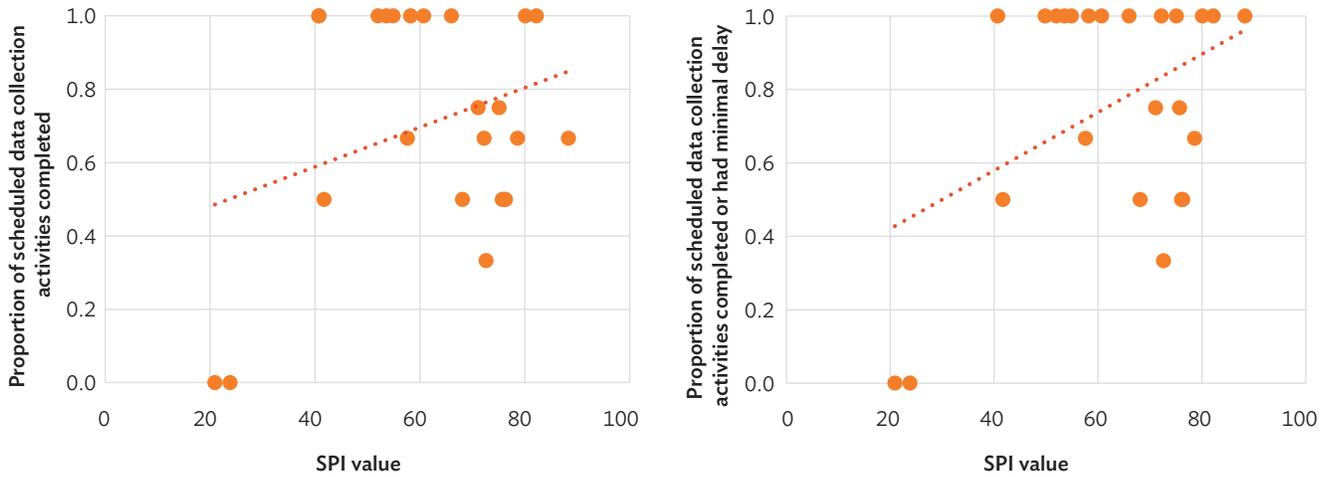
SPI = Statistical Performance Indicator.
Sources: Asian Development Bank estimates using data from the Survey on National Statistics Offices' Initiatives to Enhance Timeliness
of Data and Statistics; and World Bank. Statistical Performance Indicators. https://databank.worldbank.org/source/statistical-
performance-indicators-(spi) (accessed 27 July 2021).

Initiatives such as the shift to technology-assisted data collection enhanced the capacity
to generate timely data, in spite of lockdowns, work-from-home arrangements, and
concerns of field staff about face-to-face interviews.

NSOs undertook new initiatives to calibrate data collection, compilation, and
dissemination of activities to adapt to the pandemic situation. This was to ensure
continuity of critical data series such as economic output, employment, prices,
household income and/or consumption, and poverty. These strategies provided
important lessons in building more resilient statistical systems.

Population and housing censuses were severely impacted by the pandemic.

As a census entails a complete enumeration of the population in a specific economy or
area, it is considered one of the most complex and massive data collection activities,
requiring rigorous planning. In many economies, a census of population and housing is
conducted only once every 10 years due to the time and resources needed for planning
and implementation. Despite this long lead-in, many NSOs in developing economies of
Asia and the Pacific still encounter challenges when conducting a census. For instance,
high staff turnover often prompts NSOs to largely focus on training their staff on
collection and processing of data, and less time is provided on strengthening their
capacity to do in-depth analysis of census data. Such limited capacity contributes to
delays in releasing census results (UNFPA 2017).

Nevertheless, improvements have been made in how economies conduct census operations. As observed in the 2010 round of the World Population Housing Census Programme—one of the longest-standing global statistical initiatives of the United Nations—technology solutions were already being applied in census preparations and data capture. Several economies were using geographic information system (GIS) mapping technologies to digitize maps of census enumeration areas. Some NSOs had started using scanners for data entry, while others adopted electronic questionnaires through tablets.

As economies prepared for the 2020 round of the World Population and Housing Census Programme, adoption of technological solutions increased severalfold, and this paved the way for census data being released earlier than usual. For instance, based on the EROD-SDI survey, the gap between field operations and dissemination of key results shortened by up to a year for a number of economies, mostly because of the advanced methods of data capture.

Globally, 120 countries and economies were scheduled to conduct their respective population censuses in 2020, but these activities were either interrupted, delayed, postponed, or cancelled (UNCTAD 2021). NSOs worldwide were forced to adjust and look for workarounds to push through with their census activities. Some rescheduled their census activities by a few weeks or months, while some changed their mode of data collection. In Asia and the Pacific, the EROD-SDI survey showed that among 10 economies that had scheduled their censuses in 2020, six were forced to reschedule field operations for either later in 2020 or into 2021.

Economies that were able to push through with the 2020 census had to adopt mixed data collection approaches. Some transitioned to telephone interviews and web-based data collection, while others utilized postal services to drop off and pick up questionnaires when needed. Some Asian economies moved towards an approach where the initial data source will come largely from existing administrative data and be further enhanced by results from field enumeration, which has included a shift from full pen-and-paper interviewing to CAPI and CAWI. This initiative is seen to be the first step towards a register-based census. By previously investing in a resident registry with biometric verification technology, some economies were able to leverage their administrative data to produce a cheaper and timelier census without compromising data quality.

Despite the strides NSOs have taken to improve and hasten the conduct and release of census results, many statistics offices still recognize that there are obstacles in data collection. These include inconsistencies in administrative data, lack of internet availability in some areas, insufficiency of server performance and memory of tablet devices, and lack of preparedness of enumerators and respondents in transitioning to technology-based interview methods. To address these issues, some economies have continued to pursue capacity-building initiatives, especially in the use of new methods to facilitate timely census data compilation.

Use of nontraditional datasets to provide richer insights into economic activities has accelerated.

Compiling a set of economic indicators is a crucial first step to understanding the economy. This requires the collection of multiple types of data. For instance, agricultural surveys and censuses provide information on areas cultivated with different types of crops, animal production, expenditure, and number of agricultural workers; while enterprise surveys and censuses produce specific information on nonagricultural establishments, sales and revenue, expenditure, and size of nonagricultural employment. Furthermore, administrative data sources, such as the financial statements of businesses, also provide vital information when compiling economic indicators.

Economic indicators help policymakers and planners weigh the benefits and potential downsides of alternative investments, make business decisions, design economic policies, and monitor national progress. To ensure data harmonization, the System of National Accounts (SNA), an internationally agreed set of recommendations on how to measure economic activity, provides a conceptual framework that economies can follow in compiling statistical sources. The latest version is the 2008 SNA (UNSD 2008).[3]

The results of the EROD-SDI survey reflect the challenges faced by NSOs in collating timely economic statistics during the pandemic. A number of NSOs (e.g., the Republic of Korea, Singapore, and Thailand) adapted imputation techniques, while others (e.g., Sri Lanka and Hong Kong, China) turned to alternative data sources such as firms' annual reports to complement missing data.

In particular, NSOs have faced several challenges in compiling official GDP estimates, which are usually released with a certain time lag, since statistics agencies need time to compile national accounts estimates using available data from regular surveys, administrative data, and other sources of information. The estimates have therefore traditionally been released quarterly, semi annually, and/or annually.

Faced with challenges in data collection because of pandemic restrictions, as well as an escalating requirement to produce and release reliable and timely GDP numbers more frequently, NSOs have explored alternative collection methods and new data sources.

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[3] Given the important role of economic indicators in supporting policies promoting economic growth, international development institutions usually support initiatives that strengthen the capacity of national statistics systems in compiling such data. For instance, the National Accounts Section of the United Nations Statistics Division contributes to the international coordinated development and updating of the SNA. The section also undertakes methodological research to address some of the issues outlined in the SNA's research agenda (UNSD 2008). Other development and multilateral institutions such as the International Monetary Fund, PARIS21, the World Bank, etc., also contribute to similar initiatives. In Asia and the Pacific, ADB's EROD-SDI provides technical assistance to a number of developing economies in compiling supply and use tables and input-output tables used as the basis for compiling a wide range of economic accounts. This year's special supplement of *Key Indicators for the Asia and the Pacific* also presents ADB's recent work on measuring the digital economy, which broadly aligns with the SNA research agenda since, currently, digital transformation is largely invisible in the core economic accounts.

One alternative method employed to produce early GDP estimates is the use of big data for macroeconomic "nowcasting".

Big data—including information on financial markets, electronic payments, mobile phone usage, satellite images, online prices, online searches, and social media postings—may be used to complement existing data from surveys and administrative data sources (Buono et al. 2018). In nowcasting GDP growth, initial estimates are calculated at the start of the reference period and then continually updated as new information becomes available, using statistical models such as time-series autoregressive models or mixed data sampling regressions.

The Organisation for Economic Co-operation and Development has been publishing a weekly tracker of GDP growth to provide real time high-frequency indicators of economic activity. It applies a machine learning model to a panel of Google Trends data for 46 economies, including India, Indonesia, and the People's Republic of China, then aggregates information about search behavior related to consumption, labor markets, housing, trade, industrial activity, and economic uncertainty (OECD 2021).

In addition to the use of big data, there have also been efforts to enhance the use of conventional data sources such as establishment surveys and/or censuses. For example, the Reserve Bank of India used real-time tracking of high-frequency activity indicators to provide timely information on the state of the economy and give directional movements in quarterly GDP growth ahead of official releases, which generally happen 7–8 weeks after the end of the reference quarter (RBI 2020). This nowcasting of GDP growth is based on an economic activity index estimated from 27 monthly indicators using a dynamic factor model.

Studies have also explored the use of satellite images and spatial data to complement conventional GDP estimation, specifically the presence of night-lights as a proxy indicator of economic growth. Within the satellite imagery, increases in nighttime luminosity over time depict the transition of countries or regions into more economically developed areas (Hu and Yao 2019). For instance, in a study by the Reserve Bank of India, a statistically significant relationship between night lights and value-added in agriculture and private consumption expenditure was found, together with a strong correlation between night-lights and the gross state domestic product (Prakash et al. 2019).

Technology-based collection of labor and employment data has supplemented traditional methods.

Among NSOs from Asia and the Pacific that responded to the EROD-SDI survey, some indicated postponement or temporary suspensions in conducting their labor force surveys (LFS). In most developing economies of the region, face-to-face interviews remain the primary mode of labor survey data collection, either through pen-and-

Figure 4.5: Association between the Statistical Performance Indicator and Use of Computer-Assisted Data Collection
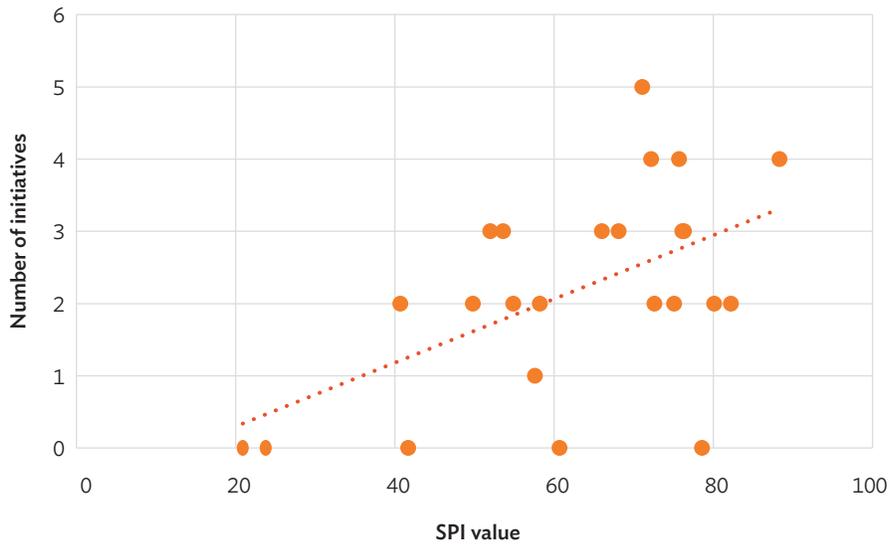
SPI = Statistical Performance Indicator.
Sources: Asian Development Bank estimates using data from the Survey on National Statistics Offices' Initiatives to Enhance Timeliness of Data and Statistics; and World Bank. Statistical Performance Indicators. https://databank.worldbank.org/source/statistical-performance-indicators-(spi) (accessed 27 July 2021)..

paper interviewing or CAPI. These modes of data collection have been greatly affected by restrictions imposed to curb the spread of COVID-19. In response, economies that already had existing systems for telephone or web-based interviewing shifted to alternative data collection methods such as CATI and CAWI, sometimes in combination with face-to-face interviews.

Some economies applied different data collection methods where different pandemic restrictions were in place. For example, in COVID-19 red zones, Indonesia used drop off and pick up of self-enumerated questionnaires or CATI, while continuing face-to-face interviews in COVID-19 green zones. In Sri Lanka, field data collection scheduled for March and April was postponed until May, with data collection in lockdown areas performed using CATI (a first for Sri Lanka's LFS). Meanwhile, some economies implemented certain adjustments for sampling errors (e.g., Armenia used re weighting procedures).

In higher-income economies, where use of CATI and CAWI was already part of regular operations, the pandemic had less impact on data collection processes. For example, Singapore and Hong Kong, China simply used a higher proportion of online participation and phone interviews and completed their LFS on schedule.

The challenges and limitations in conducting field survey operations during the pandemic highlight the need for NSOs to improve their systems in terms of data

collection and to explore other estimation methodologies that utilize big data to complement data from standard LFS or administrative reports.[4]

Figure 4.5 shows the relationship between the World Bank's SPI and number of data collection activities (LFS and non-LFS) that employed computer-assisted interview methods in economies surveyed by EROD-SDI.

Data integration methods are enhancing compilation of household income, poverty, and other socioeconomic development statistics.

Data on household income, consumption expenditure, and poverty comprise an integral part of designing, monitoring, targeting, and evaluating poverty alleviation programs.

However, considering the costs and length of time it takes to collect and process household income and expenditure surveys or living standards surveys using conventional techniques, NSOs have continuously explored using data integration methods to provide data in more timely and cost-effective ways. For instance, efforts to complement household survey data with big data for poverty estimation have been increasing, with such initiatives being especially useful and relevant during times of pandemic and other crises.

Based on a 2017 survey conducted by ADB and UNESCAP, the use of big data (such as geospatial and social media data) helps improve the granularity, accuracy, and timeliness of statistics on poverty and welfare (Albert et al. 2019).

The use of data from satellite images and the application of machine-learning technologies have also been studied as applications for estimating poverty. For example, an ADB study in 2016 assessed the use of satellite imagery to analyze the correlation between nighttime lights and socioeconomic indicators, including headcount poverty rates. Empirical data on the official headcount poverty rates, along with other socioeconomic indicators from the Philippines, and data from satellite images were used in the analysis. Results showed that, over time, average luminosity had increased and the areas covered by lights had expanded, which may indicate economic growth and improvements in living standards (Martinez 2016).

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[4]   In addition to technology solutions in collecting data on work and employment, studies have explored nowcasting methods that use big data, such as social media postings as reference indicators of unemployment. These alternative methodologies could provide timelier data on labor market indicators, owing to the real-time availability and frequency of the information. For example, in estimating the number of hours worked, the International Labour Organization (ILO 2020) applied principal component analysis using the latest available data from labor force surveys; administrative labor market data (e.g., registered unemployment); up-to-date mobile phone data from Google Community Mobility Reports; the most recent Google Trends data; and COVID-19 Government Response Stringency Index, including data on COVID-19 incidence. Use of social media data, such as Twitter posts and Google searches, as well as smartphone global positioning system (GPS) data, were also explored to track and predict unemployment rates (ILO 2020). The use of massive location data from smartphones (GPS log data) was found to be useful in nowcasting unemployment rates and predicting the status of labor markets in Japan (Moriwaki 2019).

The initiative was further expanded by including information from daytime satellite imagery. Machine-learning algorithms were combined with data from satellite imagery to try to predict official poverty estimates. The approach was tested using official poverty statistics and satellite data for the Philippines and Thailand (ADB 2020; ADB 2021).

While the focus of such study is to produce poverty statistics that are more granular than what can be derived from using household surveys alone, in principle, similar techniques can be explored to enhance poverty data, since satellite images are available more frequently than household surveys can feasibly be conducted. In other economies, there are attempts to integrate different types of data (including telecommunications data) to provide more dynamic poverty maps (Jean et al. 2016; Engstrom et al. 2017; Newhouse 2016).

In addition to big data-related research on enhancing the quality of poverty statistics, including timeliness, the EROD-SDI survey also highlighted initiatives undertaken by some economies to enhance survey-based estimation of poverty. Many economies in the EROD-SDI survey have been utilizing technology in enhancing their data collection methodologies. Economies that were initially using paper-based survey forms and face-to-face interviews have moved to using telephone and web interviews (CATI and CAWI), while others have taken the additional step of ensuring that surveys are self-administered and can be accessed online. For example, Taipei,China has started linking its household survey to other available databases to facilitate timely release of data.

When the COVID-19 pandemic struck, some economies transitioned to digital technologies for data collection, given mobility restrictions and reluctance to conduct face-to-face interviews. For example, in Armenia; Bhutan; Georgia; Hong Kong, China; and Mongolia, lockdowns halted several field operations, hence, NSOs moved towards conducting phone interviews. Challenges were not just in data collection; NSO employees also had to adapt to changes brought by the pandemic. In Indonesia, for example, NSO enumerators had to go through various instructor and enumerator trainings. Moreover, work-from-home arrangements were a challenge for NSO employees in Indonesia and Sri Lanka as they had to do data cleaning and verifying of survey results from their homes.

Development institutions have played a key role in helping statistics offices bridge gaps in consumer price data.

The COVID-19 pandemic caused changes in individual and household consumption and spending patterns, and these changes could affect specific items in the fixed consumer price index (CPI) basket. For example, due to lockdowns and travel restrictions, spending on transportation and accommodation was significantly reduced. Meanwhile, as people shifted to work-from-home arrangements, spending on food for home consumption increased and spending at restaurants fell. Hence, the question arises of whether CPI weights should be adjusted to capture these changes in household or personal expenditure patterns.

To address the potential measurement bias of consumer price inflation brought by possible changes in CPI weights, some studies—including one by the International Monetary Fund (IMF)—recommended that, in estimating inflation during the COVID-19 pandemic, adjustments to CPI weights can be applied only if there are data to support them, since there is still incomplete information related to pandemic expenditure patterns (Reinsdorf et al. 2020).

In economies such as Australia and New Zealand, CPI weights were adjusted only for specific expenditure items, following advice from international bodies that CPI weights should not be adjusted for short-term fluctuations and that adjustments should only be made if there are enough data to support the adjustment. In the case of New Zealand, CPI weights were adjusted for international airfares and overseas accommodation, which generally had high weights in the country's CPI. However, due to border closures, there was significant reduction in spending on these items (Stats NZ 2020). Similarly, in Australia, adjustments were made only for specific categories, including international holiday travel and accommodation, child care, restaurant meals, and grocery items, to capture the price changes during the pandemic (ABS 2020).

Restrictions in face-to-face data collection also meant challenges in terms of collecting price data to estimate CPI in economies of Asia and the Pacific.

One alternative method in gathering price data for CPI estimation, already implemented in higher-income economies, is the use of live scanners, specifically for fast-moving consumer goods such as grocery products. Scanners can be used to estimate price indices in real time, providing up-to-date information on inflation risks, especially during economic crises. Furthermore, because data can be collected in real time, this facilitates timely tracking of variations in spending patterns to help in monitoring inflation risks (Jaravel and O'Connell 2020).

In 2020, Japan started to use web-scraping and expanded the use of scanner data to estimate its CPI. However, one drawback has been that the range of goods or services for which scanner data are available is limited and the adjustment of product quality is necessary (Watanabe and Watanabe 2014).

In addition, another IMF study recommended imputing for missing price data as a result of temporary business closures caused by the pandemic, by using the short-term relative change in available collected prices of similar varieties within the elementary aggregate. If an entire index is missing, either the next level up in aggregation or the "All Items" index is used to impute for the missing index. The All Items index is then compiled using the imputed and collected subcomponent indices (IMF 2020).

The EROD-SDI survey shows that many economies in Asia and the Pacific (e.g., Armenia; Bhutan; Georgia; Hong Kong, China; Indonesia; the Philippines; and Singapore) applied the imputation technique for locked-down outlets or carried forward when

prices were not available. These adjustments made use of alternative data sources and exploited available data (Ducharme et al. 2020). In Bhutan, for example, the inability to physically go to stores and collect prices was augmented by using online prices. The IMF recommendations were also applied to ensure the continuity of price data (e.g., in Uzbekistan), where some price data were not collected. Economies often verified the imputed price with suppliers of goods and services and with other experts.[5]

Addressing the Sustainable Development Agenda Beyond the COVID-19 Pandemic

In 2019, the United Nations launched Data For Now (Data4Now), a global initiative to increase the use of robust methods and tools that can improve the timeliness, coverage, and quality of data for development. The initiative works through collaboration and partnership, technical and capacity support, and information sharing. Developing Asian economies participating in this project include Bangladesh, Mongolia, and Nepal.

In Bangladesh, two important development indicators have been prioritized: the first is the ability to estimate annual poverty indicators at the local level; the second is to generate data to support climate action initiatives. In pursuing the advancement of these indicators, innovative solutions to maximize use of traditional and nontraditional data have been utilized (UNSD 2020). Mongolia, on the other hand, identified the need for more timely data in terms of land use and crop yields. Meanwhile, Nepal concentrated on its need to produce more robust data on domestic tourism and urban–rural migration (GPSDD 2019). Data4Now is planning to expand its collaboration with at least 10 additional economies by 2023.

ADB is also contributing to strengthening the capacity of NSOs to provide up-to-date and timely data that can be used to monitor the development targets. These initiatives relate to the use of CAPI and other technologies for data collection, enhanced data compilation under the International Comparison Program (ICP), and adopting international standards of sharing data to ensure better flow of information (Box 4.2).

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[5]   Other steps were undertaken during the pandemic to address the disruptions in price data collection activities, although a number of such initiatives may be considered extensions of earlier initiatives. Prior to the pandemic, a number of economies (e.g., Armenia; Hong Kong, China; and the Philippines) advanced the shift from pen-and-paper interviewing to CAPI. The shift from face-to-face interviewing to telephone or internet-based surveys was also implemented (e.g., in Malaysia and Viet Nam). In particular, the pandemic accelerated economies' adoption of survey methods that do not require personal interviews (e.g., in Indonesia and Malaysia). To ensure that respondents participated in the various censuses and surveys conducted, some NSOs resorted to sending reminders via SMS or letters. Some economies also used live scanner data in addition to survey data. For example, Azerbaijan and Taipei,China used scanner data from the database of trade network and web-scraping data, respectively. Despite hurdles faced by NSOs during the pandemic, some economies continued to pursue capacity-building initiatives, especially in the use of new data collection methods. This will prove advantageous to NSOs in developing Asia.

Box 4.2: How ADB's Statistical Initiatives Support Compilation of Timely Data

Computer-Assisted Personal Interviewing and Other Technology Solutions

Information technology has transformed field data collection methods by using computer-assisted techniques in personal, telephone, and web interviewing (known as CAPI, CATI, and CAWI, respectively). These techniques are invaluable during health crises as they allow for contactless data collection. Furthermore, with built-in data checks, navigation tools, easy data transfer options, and the ability to capture information (such as global positioning system coordinates and photos), CAPI, CATI, and CAWI not only reduce the overall time to produce a clean dataset, but are also expected to improve data quality.

A study by the Asian Development Bank (ADB) in Sri Lanka and Viet Nam to quantify the benefits of these techniques, particularly CAPI, showed that there was a reduction in the number of errors by 6.2 per interview in Sri Lanka, and 0.8 per interview in Viet Nam (ADB 2019). Both economies have also adopted CAPI in their recent surveys and censuses. ADB is looking at replicating and extending the work on CAPI, CATI, and CAWI in the Pacific's household income and expenditure surveys conducted across Nauru, Samoa, and Tuvalu. Meanwhile, ADB has conducted three iterations of massive open online courses on CAPI. The latest iteration in 2021 saw a total of 1,692 registrants from 112 different economies. From these, a completion of 30%, or over 500 individuals, was achieved. A fourth iteration is planned for 2022, and will feature more information on CATI and CAWI.

International Comparison Program

ADB is the regional agency coordinating implementation of the International Comparison Program (ICP) in 22 economies of Asia and the Pacific. The region covers over half of the world's population and about one-third of global gross domestic product in purchasing power parity terms.[a] The ICP requires collection of prices of more than 1,300 well-defined goods and services, representing household consumption, government consumption, construction, and machinery and equipment, across all participating economies. Purchasing power parities (PPPs) from the ICP are meaningful and useful only if they are estimated using reliable and accurate price data to ensure "like with like" comparisons. This requires rigorous statistical validation and verifications of prices within and across all economies.

Recognizing the data quality and timeliness requirements of ICP operations in economies with varying statistical capacities, ADB has been providing technological support to national implementing agencies through a data management tool: the ICP Asia Pacific Software Suite (ICP-APSS). The ICP-APSS facilitates multiple data management functions such as timely data quality checks, verifications at various levels, minimization of nonsampling errors, and efficient data preparation allowing more time for validation and analysis.

For the ongoing 2021 ICP cycle, the ICP-APSS has been developed into a web-based application, incorporating several new features and modules for all ICP surveys. As the national implementing agencies continue to implement price surveys for the 2021 cycle, amid the constraints of the COVID-19 pandemic, the ICP-APSS provides operational resilience and acts as a valuable tool for data management and submission of high-quality and timely price data to ADB.

**Statistical Data and Metadata Exchange**

ADB is assisting in the implementation of the Statistical Data and Metadata Exchange (SDMX), an international initiative aimed at standardizing the mechanisms and processes for the exchange of statistical data and metadata.

The SDMX will promote efficient sharing of data, both within and across national statistics systems, and with external partners and/or organizations. Establishing and adhering to a set of internationally recognized standards for access to data and metadata will ensure that such exchanges are timely, easily understandable, reliable, and user-friendly.

ADB is coordinating with SDMX sponsor organizations and development partners in the region to support the bank's developing member economies in implementing the SDMX.

Reference: Asian Development Bank. 2019. *The CAPI Effect: Boosting Survey Data Through Mobile Technology: A Special Supplement of the Key Indicators for Asia and the Pacific 2019.* Manila: ADB. DOI: https://dx.doi.org/10.22617/FLS190429-3.

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[a]   The ICP is the largest global collaborative statistical undertaking, with 176 economies participating in its 2017 cycle. The ICP follows an integrated work program at the national, regional, and global levels to facilitate the compilation of PPPs and PPP-based expenditure estimates for gross domestic product and its expenditure.
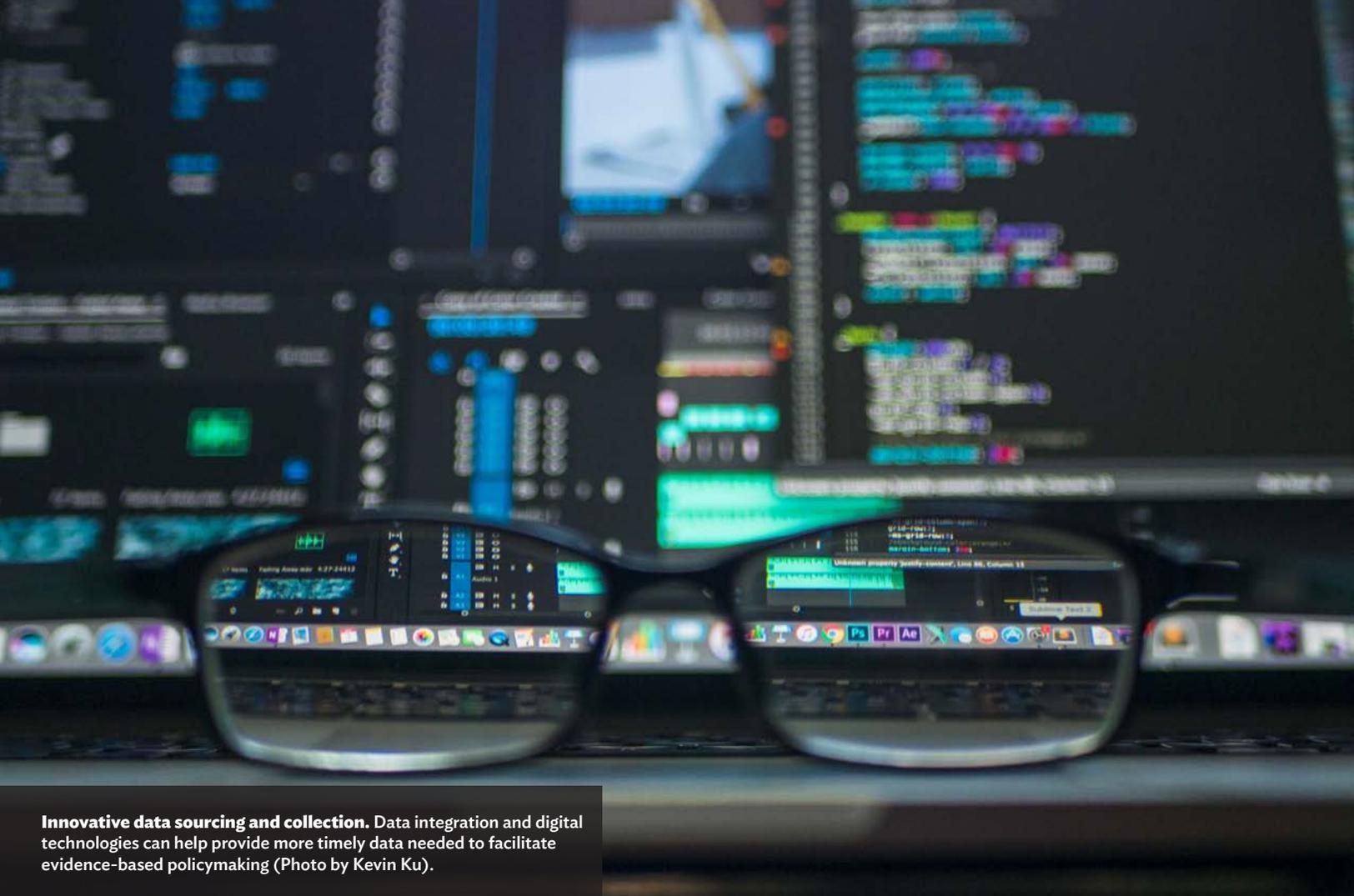
Innovative data sourcing and collection. Data integration and digital technologies can help provide more timely data needed to facilitate evidence-based policymaking (Photo by Kevin Ku).

Summary and Conclusion

Even before the COVID-19 pandemic, Asia and the Pacific's national statistics offices were exploring innovative methods for providing timely data.

The 2030 Agenda for Sustainable Development was laid out to *"end poverty, protect the planet, and improve the lives and prospects of everyone, everywhere."* In monitoring progress toward the agenda's goals and targets, the provision of quality, accessible, timely, and reliable disaggregated data is critical.

As such, part of the agenda aims to strengthen the capacity of NSOs and other organizational bodies responsible for compiling development indicators to ensure high-quality data. However, for several of the Sustainable Development Goals, many developing economies do not have internationally comparable data or, when they do, these are produced infrequently and with substantial time lags.

Prior to the COVID-19 pandemic, efforts were already being made to modernize and expedite the process of collecting and encoding data in a number of economies that responded to the EROD-SDI survey. As a result, traditional pen-and-paper surveys were shifting to the CAPI, CATI, or CAWI techniques.

In addition to adopting more modern data collection methods, there were initiatives to use nontraditional data sources. For instance, in estimating economic and poverty statistics, an increasing number of NSOs were planning to use, or had already started using, satellite imagery and other types of big data.

However, providing timely data should not come at the cost of data quality. In the EROD-SDI survey, it was evident that NSOs, with assistance from development institutions, had made efforts to improve both timeliness and data quality prior to the pandemic. As a result, the time from conduct of censuses and surveys to release of information shortened in many economies. Specific initiatives in data collection, processing, and dissemination also improved the quality of data being produced.

At the height of the pandemic, national statistics offices in the region stepped up to deliver timely data.

When the COVID-19 pandemic pushed economies into lockdown in the first quarter of 2020, data collection and statistical operations in national statistical systems were obviously affected.

To ensure continuity of key data collection activities, NSOs acted immediately by adopting innovative solutions such as (i) hastening the shift from traditional face-to-face interviewing to virtual data collection methods such as CATI, CAWI, and web-based self-reporting; (ii) employing statistical techniques to facilitate representativeness of incomplete data; (iii) designing secure data access and exchange architectures; and (iv) accelerating efforts in collecting and/or integrating information from nontraditional data sources such as big data.

National statistical systems provided vital data assessing the impact of the pandemic on various sectors of the economy as well as socioeconomic data to identify the most vulnerable segments of the population. This information provided a basis for designing targeted policies and support measures. Moreover, the solutions implemented by some NSOs have provided important lessons for other economies in the region.

Moving forward, data integration and digital technologies can provide impetus for statistical innovation.

As technology continues to advance and become more ubiquitous, and while the world's key development issues remain unresolved, the role of data becomes more vital in designing policies, monitoring programs, and ensuring good governance.

The COVID-19 pandemic has shed light on the importance of timely statistics and the need to invest in the agility and resilience of information systems. While Asia and the Pacific's national data and statistics systems had already started to adopt innovative

digital technologies to provide timely data, the pandemic provided an opportunity to accelerate more innovative solutions such as the integration of big data.

As the world begins to recover from the COVID-19 pandemic, NSOs need to constantly evaluate their resources and technical capacities so that they can continue to make investments in innovative solutions that can provide timely yet high-quality data. Such solutions may draw on a combination of traditional and modern data sources and techniques to deliver accurate data for effective policymaking. Furthermore, the use of innovative data sources and disruptive digital technologies may require navigation of issues such as need for new business models, public-private partnerships, and data confidentiality concerns.

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