

The uneven effects of the COVID-19 pandemic on National Statistical Offices

Evidence from the Global COVID-19 survey of NSOs

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Abstract. This paper presents an analysis of how the COVID-19 pandemic affected the operations of National Statistical Offices (NSOs), how NSOs responded and adjusted to the disruptions, and how they are transitioning to a post-pandemic equilibrium. The paper uses four rounds of the Global COVID-19 survey of NSOs conducted by The World Bank and the United Nations Statistical Division (UNSD), in coordination with the UN Regional Commissions. The paper highlights the heterogeneity of the COVID-19 disruptions among NSOs and provides evidence that statistical operations have been hardest hit in low- and lower middle-income countries. We find that NSOs with weaker Information and Communications Technology (ICT) infrastructure, and those more impacted by declines in funding tended to be more affected and lag in their recovery trajectory. These NSOs tend to be concentrated in low- and lower-middle income countries. The paper concludes that without targeted action the effects of the pandemic will exacerbate and widen pre-existing data production inequalities, despite the best efforts of NSOs that have in most cases responded to the pandemic with the adoption of innovative solutions and have ingeniously used this crisis as an opportunity to accelerate the modernization of the national statistical systems.

Keywords: National Statistical Offices, COVID-19, data inequalities

1. Introduction

“Britain’s Office for National Statistics did well during the pandemic. It did more as its job became harder”. This title from an article in the January 2022 issue of *The Economist* magazine summarizes well what National Statistical Offices (NSOs) across the globe have experienced and achieved since the novel coronavirus (COVID-19) was first identified in late 2019 and its spread eventually led the World Health Organization to declare the outbreak a global pandemic on March 11, 2020 [1]. More than two years on, at the timing of writing this article, the pandemic is still in full swing [2], but social distancing and travel restrictions are to a large extent being eased or completely lifted, with lockdowns

enforced in only a handful of countries. Enough time has passed for the global statistical community to look back at what we have collectively learnt and how the world has evolved, and to use that learning to inform a strategic approach to navigating a post-pandemic world. This paper aims to contribute to this effort by using data from the Global COVID-19 survey of NSOs conducted by The World Bank and the United Nations Statistical Division (UNSD), in coordination with the UN Regional Commissions.

NSOs around the world were not exempt from the tremendous disruptions to lives and livelihoods the novel coronavirus caused. Lockdown measures implemented by governments to protect their population from the spread of the virus upended statistical operations worldwide. At the same time, the pandemic brought an urgent need for reliable data on infections, hospitalizations, and vaccination, as well as on the social

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and economic impacts of the coronavirus crisis, which highlighted the crucial role of NSOs on producing high-quality and timely data to inform public policies. The pandemic shifted data needs and demands on NSOs in several ways. There was a heightened interest in new topics, such as the evolution of virus infections, but also the impact of the pandemic and governments' responses on a wide range of issues, including jobs, income, and mental health, or intimate partner violence [3]. In addition, timely data was needed to inform decision making in the face of a rapidly changing situation [3–7].

Major disruptions to statistical operations, and particularly those related to data collection, came from physical distancing requirements, which meant that NSOs and other actors in national statistical systems were forced to abandon in-person interviews and either postpone surveys and censuses, or switch to remote data collection. Remote data collection, whether through phone calls, text messages, the internet, or remote sensing, poses a number of challenges to which NSOs had to adapt rapidly. Respondents tend to be harder to reach through the phone or the internet, especially in places where phone ownership or access to the internet is not universal, which is the case in many low- and middle-income countries. As a result, NSOs had to contend with much higher rates of nonresponse in their remote data collection during COVID-19 [6,8]. Remote data collection also had implications for data quality and required ethical considerations around respondent privacy, safety, and consent [3,9–11]. It is important to emphasize that the disruptions recounted in this paper are in some sense conservative estimates, as additional consequences were felt on other parts of the national statistical systems laying outside of the remit of the NSOs and hence not covered by our data.

The pandemic brought organizational and technical challenges and required new solutions for data collection. While in-person surveys were suspended, NSOs also had to close offices given physical distancing requirements and implement remote work and remote training protocols. Remote data collection necessitated ICT infrastructure for transmission and storage, and new laws had to be passed to enable this kind of data processing [6,8,12].

However, different NSOs had different capacity and tools to deal with the crisis. Many low- and middle-income countries still have limited data systems and do not routinely collect important data that is crucially needed to inform policy and decision makers, reflecting funding gaps, while data quality remains a widespread problem. For instance, as of 2019, no low-income coun-

try was fully funding its national statistical plan, compared to 93 percent of high-income countries [13]. These data inequalities are also reflected in the Statistical Performance Indicators, particularly in the data infrastructure pillar, where low and lower middle-income countries scored less than half as well as high-income countries in 2019 (35.7 vs 78.1) [13]. Given these disparities, different NSOs had different concerns in the wake of the crisis. For instance, some NSOs were looking to retain funding for regular data production, while others were able to innovate and promote new sources of data collection [14–19].

During the first months of the pandemic, the Statistics Division of the United Nations Department of Economic and Social Affairs (UNSD) and the World Bank's Development Data Group (DECDG), in coordination with the five UN Regional Commissions, launched a global online survey to monitor the nature, scale, and scope of the impact of the coronavirus crisis on statistical agencies, to inform the international statistical community of where support was required, as well as to identify new data needs (hereafter referred to as the Global Survey) [20–23]. The first round was conducted in May 2020, with responses from 122 NSOs; the second round was conducted in July 2020 and included information from 112 NSOs; the third round was implemented in October 2020, with 125 NSOs as respondents; and the fourth round was conducted in May 2021 and included 118 NSOs. The Global Survey is the only data source to systematically document the impact of the pandemic on statistical operations around the globe.

This paper reports on the results on four rounds of the Global Survey as implemented in a period of about one year following the declaration of the global pandemic by the World Health Organization (WHO) in March 2020. The paper aims to inform the debate on the way forward for national statistical systems and the global efforts to support their modernization. First, we present evidence on the impact of the pandemic on NSOs, using the wealth of information provided by four rounds of survey data. Second, we explore the drivers of the differentiated impacts of the pandemic on NSOs operations using a set of multivariate regressions. The bottom line of much of this analysis is that statistical operations have been hardest hit in low- and lower middle-income countries. NSOs experiencing funding cuts and lacking the technological resources to adapt to remote work lagged in recovering from the shock, while NSOs able to improve their ICT infrastructure recovered more easily.

These findings provide important elements to understand the process of transformation and modernization

that the needs imposed by the pandemic have triggered, accelerating underlying long-term processes that were already underway, as well as the constraints and differences in an imaginary playing field across statistical offices and systems. These results can inform the process of planning, designing, and implementing actions by NSOs as well as by the international statistical community to mitigate the impacts of the pandemic on statistical activities, while avoiding that during the transition to a post-pandemic world the gaps and inequities in statistical capabilities that the pandemic may have generated or made more severe do not consolidate or expand further. As the paper highlights the differentiated impacts the pandemic had across countries, we recommend that the support should be directed to the NSOs that were most affected by the pandemic.

The remainder of the paper is structured as follows. In Section 2, we summarize the design and implementation of the Global Survey. In Section 3, we present the key insights of the effects of the pandemic on NSOs operations in a descriptive fashion. Section 4 explores the drivers of the differentiated impacts of the pandemic on NSOs operations using a set of multivariate regressions. Section 5 concludes.

2. The Global COVID-19 survey of NSOs

The Global COVID-19 survey of NSOs is a Computer Assisted Web Interviewing (CAWI) survey, developed by the World Bank and the Statistics Division of the United Nations Department of Economic and Social Affairs (UNSD) and launched in May 2020. The main goals of the survey were to monitor and assess the impact of the COVID-19 pandemic on NSOs, to inform the global statistical community on how to better respond to the immediate needs of countries facing the most urgent challenges, and to identify their needs for financial and technical support.

Four rounds of data were collected over 1 year between May 2020 and May 2021. Each round of the survey was designed to take around 20 minutes and was administered online with a web link sent via email to the Head offices of the NSOs using a contact list maintained by UNSD. Questions were kept to a level general enough for it to be reasonable to expect that the leadership of the NSO would be able to respond directly without having to engage in consultation with their staff. Yet some respondents, particularly in offices with a decentralized statistical system, sometime asked for more time to respond as they needed to gather information from different units or departments.

Table 1 describes the period when each round was fielded, the topics covered, the number of responses received, and the distribution of NSOs by countries income level. In Round 1, 33% of the NSOs that participated were from low and lower-middle income countries, 31% were from upper-middle-income countries, and 36% were from high-income countries. A similar distribution was captured in the rest of the rounds. Regarding the regional distribution of participants in Round 1, 32% of the NSOs were from Europe and Northern America, 25% were from Sub-Saharan Africa, 14% were from Latin America and the Caribbean, 11% were from Northern Africa and Western Asia, 9% were from Eastern and South-Eastern Asia, 5% were from Central and Southern Asia, and 4% were from Oceania. A similar distribution was captured in the rest of the rounds. The link to the web-based questionnaire (programmed in Survey Solutions) was e-mailed to 218 NSOs each round. The number of valid responses received was 122 NSOs in Round 1, 112 in Round 2, 125 in Round 3, and 118 in Round 4, with response rates in the range of 51 to 57 percent. Moreover, 163 NSOs participated at least in one round, and 68 NSOs participated in the four rounds [20–23].

3. Findings of the Global COVID-19 survey of NSOs

Several patterns emerge in the findings of four rounds of the Global Survey. NSOs reported on a shift in data demands due to the pandemic. Lockdown measures led to the suspension of face-to-face data collection and disrupted data production. Office closures were widespread and NSOs adapted with remote work. The pandemic boosted innovation and modernization in NSOs. However, NSOs had differential capacity to deal with the crisis.

3.1. New data demands

The COVID-19 pandemic changed data demands. As of May 2020, NSOs from all countries affirmed that data demands have increased after the COVID-19 outbreak, particularly data about health, employment, and socioeconomic indicators. However, the new requests were different according to countries' income level. NSOs from low and lower-middle income countries report that new data demands came mostly from international partners that were helping these countries to overcome the hazards deriving from COVID-19 pandemic. On

Table 1
Rounds of data collection of the Global COVID-19 survey of NSOs

Round	Period	Topical coverage	Responses received (Number)	Distribution of NSOs by income group			Distribution NSOs by region						
				High-income	Upper-middle income	Low and lower-middle income	Europe and Northern America	Latin America and the Caribbean	Northern Africa and Western Asia	Oceania	Eastern and Southern Asia	Central and Southern Africa	Sub-Saharan Africa
1	5–17 May, 2020	Impacts of the COVID-19 pandemic on statistical operations; response and support needs; use of alternative data sources	122	36%	31%	33%	32%	14%	11%	3%	9%	5%	25%
2	7–25 July, 2020	Monitoring of impacts on statistical operations; response and coordination; support received	112	40%	29%	31%	30%	14%	15%	3%	11%	7%	20%
3	23 September – 15 October, 2020	Monitoring of impacts on statistical operations; population and housing census; new information demands; partnerships.	125	36%	28%	36%	27%	14%	14%	4%	9%	6%	26%
4	16 April – 10 May, 2021	Monitoring of impacts on statistical operations; technology challenges and crisis management; statistical operations affected by the pandemic; funding and costs; data collection on population groups of interest	118	36%	25%	38%	28%	15%	14%	4%	12%	6%	21%

Source: UNSD and World Bank [20–23].

the other side, the increase in data demands in upper-middle- and high-income countries mostly came from national governments to formulate ad-hoc policies focused on vulnerable population and to guide appropriate sanitary and economic response to COVID-19, as a respondent from a NSOs from a high-income country confirms: “We are providing daily figures to the government to help guide their response to COVID-19, so our collection and analysis cycle has substantially increased”. This verbatim response comes from Round 1, which included a section with open-ended questions, including on new data demands during the pandemic.

The requests also varied by complexity. In more detail, NSOs from high-income countries were also asked to conduct additional analysis related to mortality and morbidity rates and linking these results to existing data, such as census data, to assess how the virus impacted certain groups. In addition, they received “frequent requests for random samples to test and trace COVID-19 cases in the community” or “extra demands for real time statistics in relations to business, economic, health and social data” as reported by respondents from NSOs in in upper-middle- and high-income countries.

More than half of the NSOs (57%) reported that the office had been called to serve on a government crisis response group or advisory committee at the national level as of July 2020 (63% of NSOs in low and lower-middle-income countries, 47% in upper-middle-income countries, and 60% in high-income countries). In addition, NSOs reported that they have established partnerships with different goals to bridge the data gaps resulting from the pandemic. As reported in October 2020, 69 percent of NSOs formed partnerships to access to new data sources, 56 percent of NSOs entered new partnerships to improve access to and use of technology. Low- and lower-middle-income countries built more alliances with international partners than with public sector partners and the opposite was true for high-income countries.

3.2. Suspension of face-to-face surveys and impacts on data collection

The pandemic forced many NSOs to suspend face-to-face data collection activities. In May 2020, only four percent of NSOs had not suspended face-to-face data collection. Since then, NSOs have gradually returned to face-to-faced data collection, with 44 percent resuming in full by May 2021 (Fig. 1) (United Nations and World Bank, 2021). Among the remaining NSOs, there was

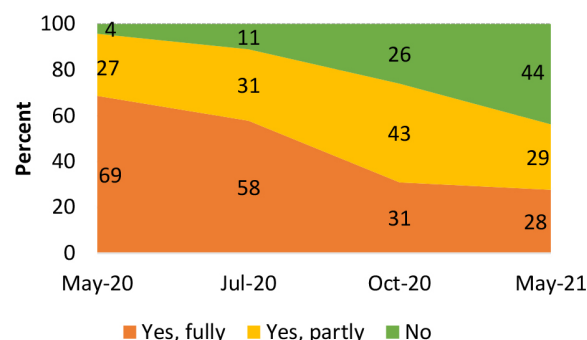


Fig. 1. Stopped face-to-face data collection (% of NSOs). Source: UNSD and World Bank [20–23].

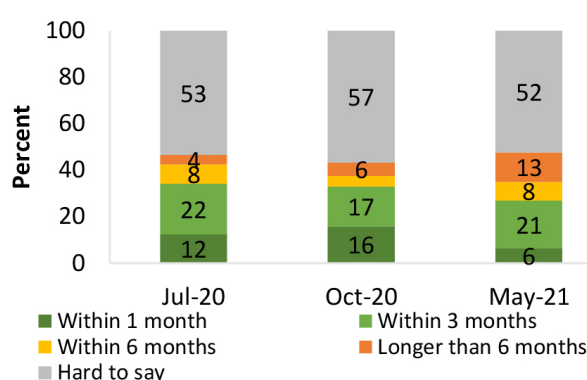


Fig. 2. When do you expect to be able to resume face to face interviews in full? (% of NSOs). Source: UNSD and World Bank [20–23].

still considerable uncertainty about when face-to-face data collection could be resumed in full (Fig. 2).

The survey also provides evidence on the differentiated impact of the COVID-19 pandemic across types of NSOs operations. Surveys and censuses have been the most affected operations, while the maintenance of statistical registers has been the least affected. 81 percent of NSOs in low and lower-middle income countries report that surveys have been delayed or negatively affected, compared to 61 percent of NSOs in high income countries, pointing to a more marked divide in countries’ ability to cope. Almost half of the NSOs in low and lower-middle income countries report that the maintenance of statistical registers has been negatively impacted (Fig. 3).

3.3. Office closures and remote work

As elsewhere in the workplace, many NSOs were faced with closing down their offices and requiring staff to work from home. In 2020, 65 percent of the

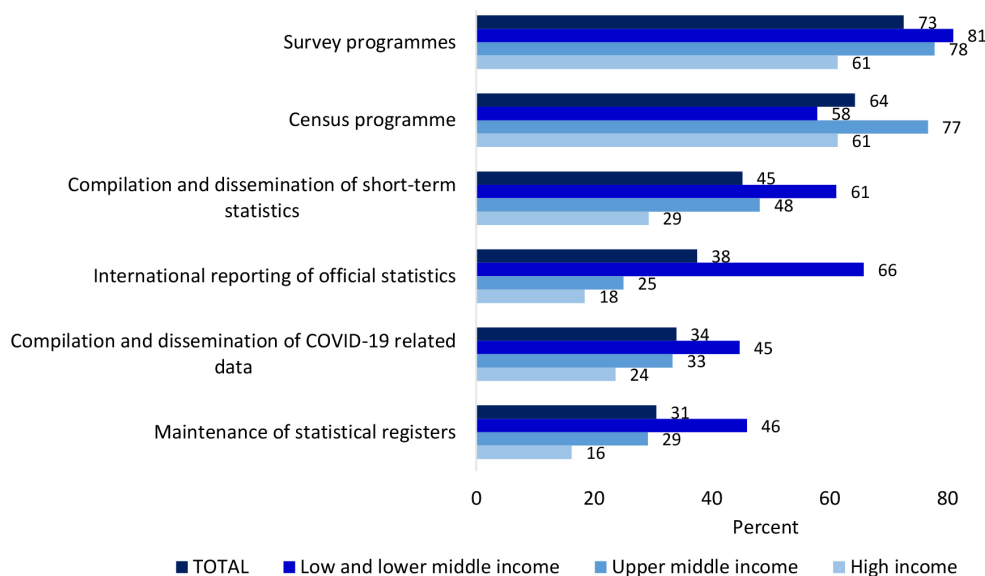


Fig. 3. At any point since the beginning of the pandemic, has any of your operations listed below been delayed or otherwise negatively affected as a result of the pandemic? (% of NSOs included in Round 4). Source: UNSD and World Bank [23].

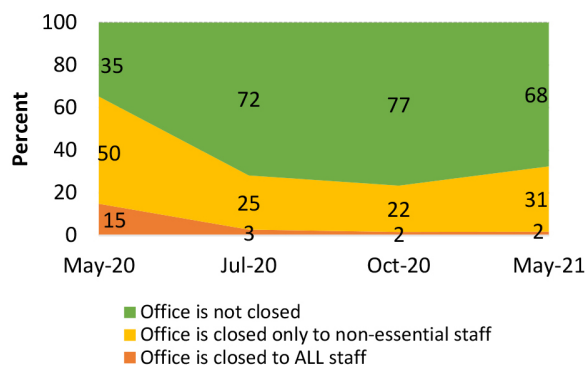


Fig. 4. As a consequence of the COVID-19 pandemic is your main office closed? (% of NSOs). Source: UNSD and World Bank [20–23].

NSOs included in Round 1 of the Survey reported that their offices were closed to non-essential or to all staff (Fig. 4) (United Nations and World Bank, 2020a). In addition, 90 percent of the NSOs instructed some or all their staff to work from home. From July 2020 until May 2021, the share of NSOs that had instructed at least some of their staff to work from home had remained stable at approximately two thirds (Fig. 5).

In May 2020, the disruptions to work arrangements and data collection severely limited the ability of 69 percent of NSOs to produce essential statistics (Fig. 6a). Low and lower-middle income countries, and countries in Sub-Saharan Africa were particularly affected. 63 percent of NSOs in high-income countries reported that the pandemic had affected their ability to produce statis-

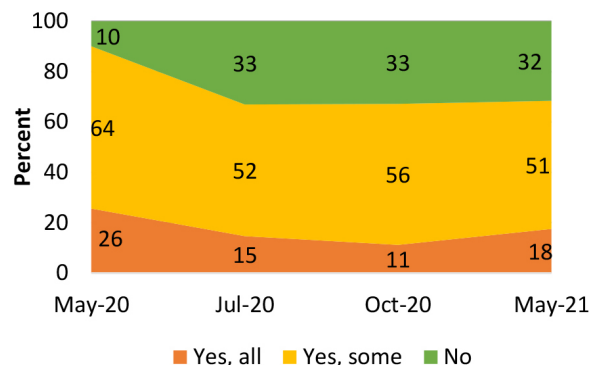


Fig. 5. Is staff instructed to work from home? (% of NSOs). Source: UNSD and World Bank [20–23].

tics, compared to 88 percent of the NSOs in low- and lower-middle-income countries. As of May 2021, 68 percent of the NSOs in low- and lower-middle-income countries reported that their ability to produce statistics was still halted (Fig. 6b).

3.4. Modernization efforts

The pandemic accelerated a process of modernization that was already in the making. For example, the use of phone surveys had been on the rise in the last two decades, but it received an exceptional acceleration when the lockdown measures were implemented in the countries [24]. In May 2020, more than half of the NSOs reported that they were using at least one alterna-

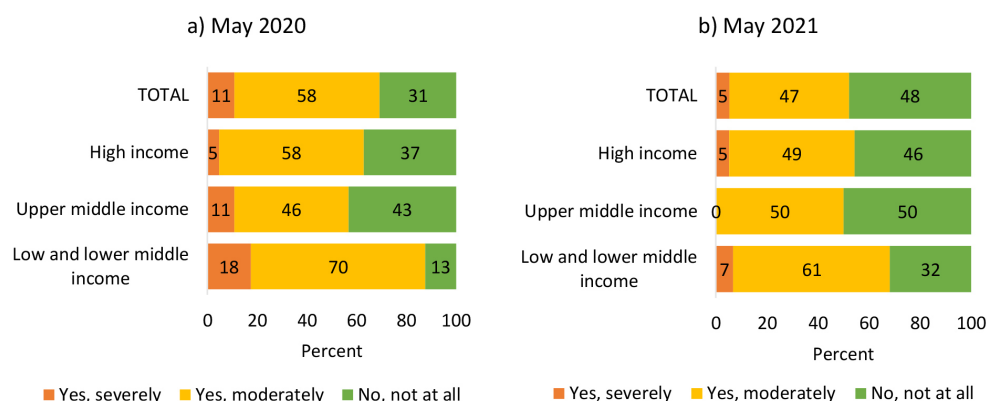


Fig. 6. Is the COVID-19 pandemic negatively affecting your current ability to produce essential monthly and quarterly statistics? (% of NSOs). Source: UNSD and World Bank [20–23].

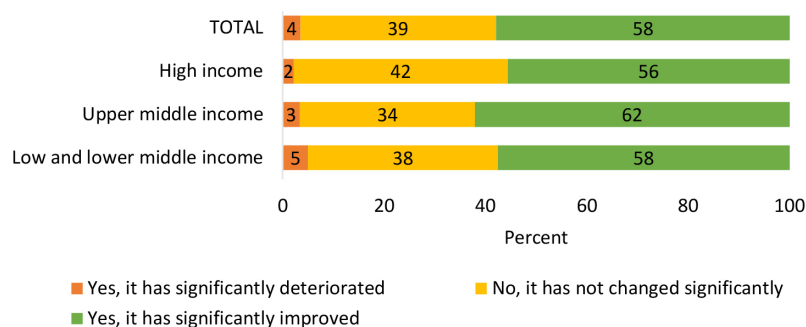


Fig. 7. Has the overall Information and Communication Technology (ICT) readiness of your office changed in the last 6 months? (% of NSOs). Source: UNSD and World Bank [23].

tive data source or approach to monitor the pandemic. More specifically, 58 percent of NSOs were relying on phone surveys, 53 percent on administrative data, and 34 percent are relying on web surveys. These three alternative sources are commonly used across all income levels. The use of administrative data was reported as most common in high-income countries, while low and lower-middle-income countries were much less likely to use web surveys, most likely due to a lack of online infrastructure.

In addition, in the May 2021 round 58 percent of the NSOs reported that the overall Information and Communication Technology (ICT) readiness of their office had significantly improved in the previous 6 months. Similar shares were reported in all the country groups (Fig. 7). However, there is evidence that inequalities in ICT readiness are still pronounced between high-income and low- and lower-middle income countries when analyzing the actions that were taken to enhance the ICT readiness in the offices. A larger share of NSOs in high-income countries provided new equipment to staff (88%) compared to 57% in offices in low- and

lower-middle-income countries. While 76 percent of NSOs in high-income countries deployed new remote access tools such as VPN, virtual desktop, or mobile device, only 35 percent of the NSOs in low- and lower-middle income countries did so (Fig. 8).

3.5. The differentiated impacts of the COVID-19 pandemic on NSOs operations

In a context where different NSOs had a heterogeneous toolbox to conduct their statistical operations, the pandemic seems to have impacted strongly to NSOs in low and lower-middle income countries that were lagging in terms of funding, technical capacity, and statistical performance before the pandemic. As discussed, the disruptions to work arrangements affected more low and lower-middle income countries with 88 percent of their NSOs that reported that the pandemic has negatively affected their ability to produce essential statistics as of May 2020.

Furthermore, 81 percent of NSOs in low and lower-middle income countries reported that surveys have

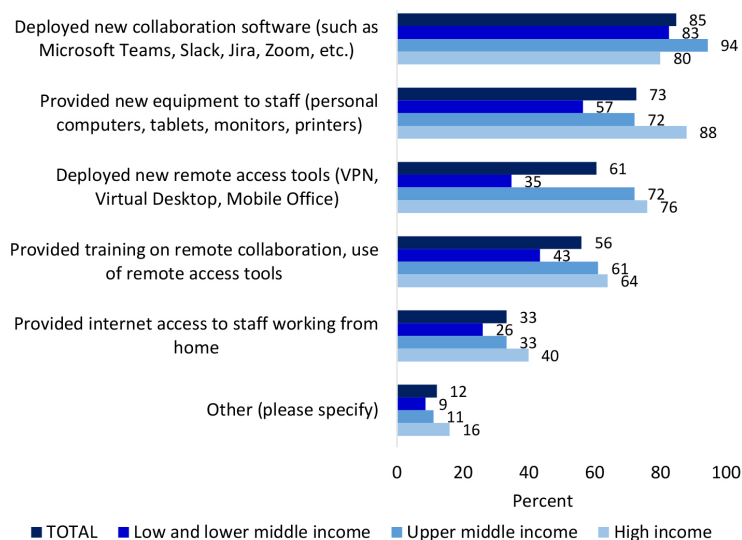


Fig. 8. What actions were taken to enhance the ICT readiness in your office? (% of NSOs). Source: UNSD and World Bank [23].

been delayed or negatively affected in May 2020, compared to 61 percent of NSOs in high income countries, pointing to a more marked divide in countries' ability to cope. There is evidence that inequalities in ICT readiness are still pronounced between high-income and low- and lower-middle income countries when analyzing the actions that were taken to enhance the ICT readiness in the offices.

The bottom line of the descriptive analysis is that statistical operations have been hardest hit in low- and lower middle-income countries. NSOs experiencing funding cuts and lacking the technological resources to adapt to remote work lagged in recovering from the shock, while NSOs able to improve their ICT infrastructure recovered more easily. Approximately seven out of ten NSOs in sub-Saharan Africa, Northern Africa and Western Asia, and Latin America and the Caribbean had experienced a decrease in funding from the government. While 59 percent of NSOs in sub-Saharan Africa reported decreased funding from donors and other sources.

4. Drivers of differentiated impacts of the COVID-19 pandemic on NSOs operations

4.1. Methodology

Beyond the summary of findings from the Global COVID-19 Survey of NSOs discussed in the previous section, we seek to explore the determinants of the differentiated impacts of the pandemic on NSO operations

using a multivariate regression model. This part of the analysis includes two different datasets. The first one is the fourth round of the survey in May 2021. The second one is a panel dataset of NSOs included in round 1 (May 2020) and in round 4. Appendix 2 describes more in detail the data used and its distribution. It also provides evidence that there is no evidence of systematic attrition when considering the panel dataset.

We are interested in understanding the factors that determine which NSOs are more likely to be recovering from the negative effects of the pandemic, as well as the nature of the persistent challenges faced by the worst hit. To that end, we use a set of linear probability models of the form presented in Eq. (1). In the model, y_{ir} represents the probability that the NSO in country i and region (or income group) r reports a negative impact from the pandemic (e.g., on its ability to produce essential monthly/quarterly statistics or to meet international reporting requirements); \mathbf{X}_{ir} is a vector of explanatory variables, δ_r represents income fixed effects, and ε_{ir} is an error term.

$$y_{ir} = \beta_0 + \beta_x \mathbf{X}_{ir} + \delta_r + \varepsilon_{ir} \quad (1)$$

The vector \mathbf{X}_{ir} includes three types of explanatory variables. The first group includes binary variables related to NSOs operations: whether the NSOs have ever stopped field data collection involving face-to-face interviews; whether some staff are instructed to work from home; whether the ICT readiness has improved in the last months; and whether staff working from home have adequate computers to perform their work. The second type includes binary variables related to costs

Table 2

Dependent variable: The COVID-19 pandemic has negatively affected NSO's current ability to produce essential monthly/quarterly statistics as of May 2021

VARIABLES	(1)	(2)	(3)	(4)
NSO has ever stopped field data collection involving f2f interviews as a consequence of the COVID-19 pandemic – R4	0.198** (0.0991)		0.156 (0.103)	0.111 (0.118)
Some or all staff is instructed to work from home because of COVID-19 pandemic – R4	0.0793 (0.0975)		0.0882 (0.105)	0.115 (0.120)
NSO's overall ICT readiness has improved in the last 6 months – R4	–0.0730 (0.0916)		–0.0654 (0.0962)	–0.0949 (0.108)
Staff working from home does not have adequate computers to perform their work – R4	0.363*** (0.0947)		0.255** (0.114)	0.254** (0.127)
Since the beginning of the COVID-19 pandemic, the costs of data collection have increased – R4		–0.000583 (0.0933)	–0.0150 (0.103)	0.00745 (0.115)
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on government funding – R4		0.249** (0.111)	0.213* (0.112)	0.148 (0.123)
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on donors/ other sources funding – R4		0.146 (0.119)	0.0993 (0.122)	0.0771 (0.137)
Statistical Performance Index 2019 – Overall value for pillar of Data Infrastructure (0–1)				0.0502 (0.222)
Oxford Stringency Index – average value in April 2020 – R1				0.000801 (0.00365)
Upper-middle income vs High income	0.0509 (0.112)	0.00230 (0.121)	0.00472 (0.116)	0.00964 (0.139)
Low and lower-middle income vs High income	0.329*** (0.105)	0.156 (0.126)	0.206 (0.128)	0.265 (0.173)
Constant	0.192 (0.142)	0.342*** (0.0856)	0.176 (0.150)	0.111 (0.356)
Observations	114	108	108	98
R-squared	0.200	0.169	0.227	0.217

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Notes: This table shows the results of estimating a linear probability model to understand the characteristics of NSOs that after one year into the pandemic reported that their ability to produce essential statistics is still halted. We checked for multicollinearity by estimating the variance inflation factor (VIF) for the vector of variables included in the regressions. None of the variables (in any regression) reported a VIF higher than 4: The general rule of thumb is that VIFs exceeding 4 warrants further investigation [28,29].

and funding: whether the costs of data collection have increased since the beginning of the pandemic; whether the government funding has decreased; and whether funding from donors/other sources has decreased. The third group of explanatory variables incorporates NSOs characteristics such as the Statistical Performance Index (SPI) of 2019, and the Oxford Stringency Index as of April 2020. The SPI is a score of the performance of national statistical systems which combines indicators grouped in five pillars: Data Use, Data Services, Data Products, Data Sources, and Data Infrastructure, and takes a minimum value of 0 and a maximum of 100 [25]. The Oxford Stringency Index includes 23 indicators and covers nine metrics: school closures, workplace closures; cancellation of public events; restrictions on public gatherings; closures of public transport; stay-at-home requirements; public information campaigns; restrictions on internal movements; and international travel controls [26]. Like the SPI, the index takes a value of 0 to 100, with 100 indicating a stricter policy regime, and does not evaluate whether the measures are appropriate or effective.

4.2. Results

We estimated a linear probability model to understand the characteristics of NSOs that after one year into the pandemic reported that their ability to produce essential statistics is still halted (See Table 2). More than half of the NSOs in May 2021 reported that their data production ability was still compromised (54%). Table 2 presents different specifications. Column 1 includes variables related to NSOs operations. In column 2, we inspect variables related to costs and funding. Column 3 includes in the model all the variables on both Columns 1 and 2. Finally, Column 4 adds to the analysis the value of the pillar of Data Infrastructure reported in the Statistical Performance Index of 2019 and the Oxford's stringency index as of April 2020.

We find that NSOs whose staff do not have adequate computers to perform their work from home were much more likely to be negatively affected in their ability to produce essential statistics as of May 2021. This result is in line with the qualitative responses included in the survey. The NSOs reported several difficulties

Table 3

Dependent variable: The COVID-19 pandemic has negatively affected NSO's current ability to meet international reporting requirements

VARIABLES	(1)	(2)	(3)	(4)
NSO has ever stopped field data collection involving f2f interviews as a consequence of the COVID-19 pandemic – R4	0.222** (0.105)		0.188* (0.109)	0.151 (0.120)
Some or all staff is instructed to work from home because of COVID-19 pandemic – R4	0.0109 (0.0964)		0.0706 (0.101)	0.150 (0.112)
NSO's overall ICT readiness has improved in the last 6 months – R4	–0.0570 (0.0935)		–0.0888 (0.0952)	–0.0757 (0.105)
Staff working from home does not have adequate computers to perform their work – R4	0.262** (0.106)		0.123 (0.125)	0.116 (0.147)
Since the beginning of the COVID-19 pandemic, the costs of data collection have increased – R4		0.188** (0.0923)	0.191* (0.103)	0.160 (0.112)
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on government funding – R4		0.0555 (0.103)	0.0319 (0.106)	0.0142 (0.121)
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on donors/ other sources funding – R4		0.276** (0.120)	0.241** (0.120)	0.233* (0.135)
Statistical Performance Index 2019 – Overall value for pillar of Data Infrastructure (0–1)				–0.0896 (0.219)
Oxford Stringency Index – average value in April 2020 – R1				0.00153 (0.00363)
Upper-middle income vs High income	0.208* (0.113)	0.166 (0.118)	0.182 (0.115)	0.116 (0.137)
Low and lower-middle income vs High income	0.417*** (0.104)	0.254** (0.123)	0.308** (0.130)	0.290* (0.168)
Constant	0.143 (0.140)	0.225*** (0.0772)	0.0685 (0.142)	–0.0104 (0.323)
Observations	113	108	108	98
R-squared	0.200	0.233	0.270	0.265

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Notes: This table shows the results of estimating a linear probability model to understand the characteristics of NSOs that after one year into the pandemic reported that their ability to produce essential statistics is still halted. We checked for multicollinearity by estimating the variance inflation factor (VIF) for the vector of variables included in the regressions. None of the variables (in any regression) reported a VIF higher than 4: The general rule of thumb is that VIFs exceeding 4 warrants further investigation [28,29].

derived by the COVID-19 shock, but they also varied according to countries' income level. Low and lower-middle income countries had to cope with their staff's lack of resources to work and access to services, mainly internet and public transport. 55 percent of the NSOs from low- and lower-middle-income countries reported that staff working from home did not have adequate computers to perform their work, compared to only 16 percent of NSOs from high-income countries. Regarding internet access, 35 percent of NSOs from low- and lower-middle-income reported that their staff working from home did not have adequate internet access at home to work remotely, compared to only 3 percent of NSOs from high-income countries. Respondents from low and lower-middle income countries reported that one of the main constraints was "the unavailability of internet services for essential staff working at home", meaning that they mostly had to interrupt job activities while social distancing. Moreover, mobility restrictions including disruptions to public transportation also negatively impacted them, and some respondents highlighted that "the difficulty [to work] for staff who use taxis and buses".

Table 2 also shows that NSOs that experienced a decrease in their funding are also more likely to still be affected in May 2021. Almost half on the NSOs reported in May 2021 that their funding from the government has decreased since the beginning of COVID-19 pandemic. Approximately seven out of 10 NSOs in sub-Saharan Africa, Northern Africa and Western Asia, and Latin America and the Caribbean had experienced a decrease in funding from the government.

Table 3 presents a similar analysis as Table 2 but focusing on NSOs that reported that their ability to meet international reporting requirements is still halted as of May 2021. The results show that NSOs that have experienced a decrease in funding from donors/other sources are more likely to still be affected in their ability to meet international reporting requirements. It is important to note that funding from donors and other sources has been more stable than government funding, but changes in funding from donors and other sources have been more uneven across regions. Globally, 29 percent of NSOs reported decreased funding from donors and other sources, compared to 59 percent of NSOs in sub-Saharan Africa. According to one respondent from

a NSOs in sub-Saharan Africa: “surveys are donors-driven and therefore without assistance from the donor’s community the office will not conduct any survey”. In these countries, there are major activities pending due to lack of resources such as labor force surveys, enterprises surveys, among others.

5. Conclusions

In this paper we used data from a Global Survey of NSOs to portray the differences and commonalities in the trajectories of statistical offices across regions and income levels as they were hit by and emerged from the shock of the COVID-19 pandemic. Disparities in initial conditions among NSOs were worsened by the pandemic, as less resourced institutions found it harder to engineer a response. NSOs from low- and lower middle-income countries have been affected the deepest and are taking longer to emerge from the crisis. Yet, even within this group there are differences in impact, responses, and trajectories out of the crisis which have to do with variables that can be influenced by policies and actions by national and international agents, such as funding allocations and investment in the ITC infrastructure.

We find that access to adequate computers for staff working from home was crucial to NSOs recovery of their ability to produce essential monthly/quarterly statistics. Remote work, training, data collection, and data storage are vital for NSOs to operate during the pandemic but many, particularly in low and middle-income countries, are constrained by inadequate ICT equipment and infrastructure. This calls for more decisive investments in digital technology. Investing in the capacity of personnel is also likely to play an important role in helping NSOs cope with exogenous shock, but this was not an area covered by the survey and hence our analysis did not offer specific conclusions on the matter.

A further, crucial insight that emerged from the analysis is that more and better financial and technical support to NSOs is key to mitigate the impacts of the pandemic on statistical operations. We find that NSOs that experience a decrease on government or donor funding were more likely to still be affected after a year into the pandemic and most of the NSOs that that experienced funding shortfalls are in low- and lower-middle income countries where the tools to deal with the crisis were more limited. Enhancing the stability, quality, and predictability of NSOs operations should be an immediate priority for action by governments and the international development community.

Mobilizing such actions would likely be facilitated by an effort to better communicate the fundamental role that NSOs have had during the pandemic, the advantages and limitations that Big Data has vis-à-vis sample based traditional surveys [27], and the unsuspected ability that statistical offices have demonstrated to be able to reach to the crisis and play a substantive role in informing actions.

Going forward, the Global Survey of NSOs can continue to play a role in producing a shared understanding of the evolution, trends, disparities and convergence and modernization processes of statistical institutions world-wide. The objective would be for this survey to become a shared tool for the global statistical community to take the pulse of critical areas for the community of NSOs, with results possibly reported annually to the UN Statistical Commission to inform a formal discussion among member states. The survey periodicity could become annual to alleviate the burden on the respondents, and the questionnaire a combination of a core set of questions and indicators that could be monitored on a long-term basis and rotating, and ad hoc modules that could cater to specific needs or allow adjusting the focus to the evolving demands for information. That could include modules aimed at responding to specific regional concerns, hence enhancing the coordination, and reducing the duplication among global and regional survey efforts. The design and implementation of the survey in this new form will gain additional relevance with a greater participation and involvement of national and regional statistical organizations.

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Appendix 1: Additional tables

Table A1

Dependent variable: The NSO's current ability to produce essential monthly/quarterly statistics was affected in R1 but is no longer affected in R4

VARIABLES	(1)	(2)	(3)	(4)
NSO has ever stopped field data collection involving f2f interviews as a consequence of the COVID-19 pandemic – R4	–0.228 (0.166)		–0.210 (0.171)	–0.369* (0.206)
Some or all staff is instructed to work from home because of COVID-19 pandemic – R4	0.00681 (0.165)		–0.0657 (0.185)	0.0344 (0.214)
NSO's overall ICT readiness has improved in the last 6 months – R4	0.158 (0.136)		0.120 (0.152)	0.0933 (0.172)
Staff working from home does not have adequate computers to perform their work – R4	–0.290** (0.124)		–0.222 (0.146)	–0.191 (0.163)
Since the beginning of the COVID-19 pandemic, the costs of data collection have increased – R4		–0.185 (0.178)	–0.130 (0.202)	–0.130 (0.194)
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on government funding – R4		–0.107 (0.199)	–0.0895 (0.205)	0.00180 (0.224)
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on donors/ other sources funding – R4		–0.00492 (0.162)	0.00821 (0.158)	–0.0170 (0.157)
Statistical Performance Index 2019 – Overall value for pillar of Data Infrastructure (0–1)				0.215 (0.521)
Oxford Stringency Index – average value in April 2020 – R1				0.0177** (0.00728)
Upper-middle income vs High income	0.00476 (0.165)	–0.0351 (0.179)	0.0258 (0.186)	–0.224 (0.281)
Low and lower-middle income vs High income	–0.154 (0.159)	–0.0838 (0.169)	–0.101 (0.178)	–0.0894 (0.318)
Constant	0.545** (0.250)	0.512*** (0.127)	0.661** (0.284)	–0.838 (0.740)
Observations	54	52	52	46
R-squared	0.150	0.092	0.159	0.261

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Notes: We checked for multicollinearity by estimating the variance inflation factor (VIF) for the vector of variables included in the regressions. None of the variables (in any regression) reported a VIF higher than 4: The general rule of thumb is that VIFs exceeding 4 warrants further investigation [28,29].

Table A2

Dependent variable: The NSO's current ability to meet international reporting requirements was affected in R1 but is no longer affected in R4

VARIABLES	(1)	(2)	(3)	(4)
NSO has ever stopped field data collection involving f2f interviews as a consequence of the COVID-19 pandemic – R4	–0.185 (0.182)		–0.276 (0.207)	–0.320 (0.296)
Some or all staff is instructed to work from home because of COVID-19 pandemic – R4	0.179 (0.164)		0.0421 (0.200)	0.00986 (0.286)
NSO's overall ICT readiness has improved in the last 6 months – R4	0.128 (0.135)		0.0783 (0.146)	0.0166 (0.177)
Staff working from home does not have adequate computers to perform their work – R4	–0.314** (0.130)		–0.247 (0.155)	–0.257 (0.192)
Since the beginning of the COVID-19 pandemic, the costs of data collection have increased – R4		–0.307* (0.170)	–0.246 (0.199)	–0.222 (0.209)
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on government funding – R4		0.105 (0.186)	0.111 (0.193)	0.111 (0.231)
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on donors/ other sources funding – R4		–0.252 (0.202)	–0.223 (0.203)	–0.238 (0.230)
Statistical Performance Index 2019 – Overall value for pillar of Data Infrastructure (0–1)				–0.0236 (0.629)
Oxford Stringency Index – average value in April 2020 – R1				0.00600 (0.0111)
Upper-middle income vs High income	–0.259 (0.158)	–0.280 (0.166)	–0.209 (0.169)	–0.327 (0.319)
Low and lower-middle income vs High income	–0.140 (0.177)	–0.0904 (0.192)	–0.0940 (0.205)	–0.173 (0.398)
Constant	0.556** (0.267)	0.663*** (0.127)	0.810** (0.337)	0.503 (1.175)
Observations	52	48	48	42
R-squared	0.204	0.176	0.244	0.236

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Notes: We checked for multicollinearity by estimating the variance inflation factor (VIF) for the vector of variables included in the regressions. None of the variables (in any regression) reported a VIF higher than 4: The general rule of thumb is that VIFs exceeding 4 warrants further investigation [28,29].

Table A3
 Dependent variable: The NSO's current ability to produce essential monthly/quarterly statistics was never affected

VARIABLES	(1)	(2)	(3)	(4)
NSO has ever stopped field data collection involving f2f interviews as a consequence of the COVID-19 pandemic – R4	–0.174 (0.106)		–0.170 (0.110)	–0.0834 (0.132)
Some or all staff is instructed to work from home because of COVID-19 pandemic – R4	–0.0479 (0.105)		–0.0430 (0.120)	–0.0876 (0.132)
NSO's overall ICT readiness has improved in the last 6 months – R4	–0.0394 (0.0971)		–0.0743 (0.102)	–0.108 (0.108)
Staff working from home does not have adequate computers to perform their work – R4	–0.356*** (0.0762)		–0.354*** (0.0919)	–0.384*** (0.115)
Since the beginning of the COVID-19 pandemic, the costs of data collection have increased – R4		0.0724 (0.124)	0.103 (0.123)	0.124 (0.127)
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on government funding – R4		–0.128 (0.124)	–0.126 (0.113)	–0.178 (0.114)
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on donors/other sources funding – R4		–0.0939 (0.159)	–0.0200 (0.156)	0.00188 (0.165)
Statistical Performance Index 2019 – Overall value for pillar of Data Infrastructure (0–1)				–0.0262 (0.404)
Oxford Stringency Index – average value in April 2020 – R1				–0.00350 (0.00469)
Upper-middle income vs High income	0.175 (0.124)	0.160 (0.128)	0.215* (0.128)	0.331* (0.174)
Low and lower-middle income vs High income	–0.0534 (0.109)	0.00114 (0.126)	0.0201 (0.117)	0.0634 (0.232)
Constant	0.470*** (0.154)	0.240*** (0.0846)	0.453** (0.172)	0.742 (0.566)
Observations	79	74	74	68
R-squared	0.171	0.064	0.179	0.242

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Notes: We checked for multicollinearity by estimating the variance inflation factor (VIF) for the vector of variables included in the regressions. None of the variables (in any regression) reported a VIF higher than 4: The general rule of thumb is that VIFs exceeding 4 warrants further investigation [28,29].

Table A4
 Dependent variable: The NSO's current ability to meet international reporting requirements was never affected

VARIABLES	(1)	(2)	(3)	(4)
NSO has ever stopped field data collection involving f2f interviews as a consequence of the COVID-19 pandemic – R4	–0.255** (0.111)		–0.261** (0.113)	–0.183 (0.126)
Some or all staff is instructed to work from home because of COVID-19 pandemic – R4	–0.153 (0.107)		–0.208* (0.123)	–0.254* (0.136)
NSO's overall ICT readiness has improved in the last 6 months – R4	–0.0444 (0.0965)		–0.0529 (0.102)	–0.0620 (0.111)
Staff working from home does not have adequate computers to perform their work – R4	–0.228** (0.0879)		–0.173 (0.104)	–0.218* (0.112)
Since the beginning of the COVID-19 pandemic, the costs of data collection have increased – R4		–0.0565 (0.129)	–0.0959 (0.135)	–0.0356 (0.138)
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on government funding – R4		–0.0992 (0.141)	–0.0982 (0.139)	–0.119 (0.154)
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on donors/other sources funding – R4		–0.183** (0.0882)	–0.156* (0.0798)	–0.140 (0.0909)
Statistical Performance Index 2019 – Overall value for pillar of Data Infrastructure (0–1)				0.157 (0.379)
Oxford Stringency Index – average value in April 2020 – R1				–0.00111 (0.00426)
Upper-middle income vs High income	–0.00113 (0.122)	–0.000626 (0.135)	0.0373 (0.130)	0.194 (0.168)
Low and lower-middle income vs High income	–0.254** (0.106)	–0.115 (0.123)	–0.156 (0.114)	–0.0490 (0.212)
Constant	0.686*** (0.163)	0.393*** (0.0924)	0.797*** (0.180)	0.701 (0.511)
Observations	79	75	75	68
R-squared	0.179	0.103	0.227	0.262

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Notes: We checked for multicollinearity by estimating the variance inflation factor (VIF) for the vector of variables included in the regressions. None of the variables (in any regression) reported a VIF higher than 4: The general rule of thumb is that VIFs exceeding 4 warrants further investigation [28,29].

Table A5
 Dependent variable: The NSO's ability to produce essential monthly/quarterly statistics has not been recovered

VARIABLES	Stage 1 Ability to produce essential statistics ever affected	Stage 2 Still not recovered
NSO has ever stopped field data collection involving f2f interviews as a consequence of the COVID-19 pandemic – R4	0.137 (0.144)	
Some or all staff is instructed to work from home because of COVID-19 pandemic – R4	0.0265 (0.160)	
NSO's overall ICT readiness has improved in the last 6 months – R4	–0.216* (0.128)	
Staff working from home does not have adequate computers to perform their work – R4	0.133 (0.168)	
Since the beginning of the COVID-19 pandemic, the costs of data collection have increased – R4	0.151 (0.156)	
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on government funding – R4	0.0484 (0.153)	
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on donors/other sources funding – R4	0.00320 (0.195)	
Statistical Performance Index 2019 – Overall value for pillar of Data Infrastructure (0–1)	–0.420 (0.854)	
Oxford Stringency Index – average value in April 2020 – R1	0.0184 (0.0142)	
Upper-middle income vs High income	–0.849* (0.485)	
Low and lower-middle income vs High income	0.0504 (0.578)	
Constant	–1.271 (1.352)	0.580*** (0.207)
Observations	69	69
LR chi2	13.93	13.93

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Notes: We checked for multicollinearity by estimating the variance inflation factor (VIF) for the vector of variables included in the regressions. None of the variables (in any regression) reported a VIF higher than 4: The general rule of thumb is that VIFs exceeding 4 warrants further investigation [28,29].

Table A6
 Dependent variable: The NSO's ability to meet international reporting requirements has not been recovered

VARIABLES	Stage 1 Ability to produce essential statistics ever affected	Stage 2 Still not recovered
NSO has ever stopped field data collection involving f2f interviews as a consequence of the COVID-19 pandemic – R4	0.209 (0.157)	
Some or all staff is instructed to work from home because of COVID-19 pandemic – R4	0.0423 (0.175)	
NSO's overall ICT readiness has improved in the last 6 months – R4	–0.176 (0.137)	
Staff working from home does not have adequate computers to perform their work – R4	0.136 (0.173)	
Since the beginning of the COVID-19 pandemic, the costs of data collection have increased – R4	0.166 (0.177)	
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on government funding – R4	–0.0139 (0.175)	
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on donors/other sources funding – R4	0.178 (0.184)	
Statistical Performance Index 2019 – Overall value for pillar of Data Infrastructure (0–1)	–1.207 (0.886)	
Oxford Stringency Index – average value in April 2020 – R1	0.0127 (0.0141)	
Upper-middle income vs High income	–0.595 (0.482)	
Low and lower-middle income vs High income	0.273 (0.600)	
Constant	–0.435 (1.389)	0.404* (0.240)
Observations	69	69
LR chi2	15.69	15.69

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Notes: We checked for multicollinearity by estimating the variance inflation factor (VIF) for the vector of variables included in the regressions. None of the variables (in any regression) reported a VIF higher than 4: The general rule of thumb is that VIFs exceeding 4 warrants further investigation [28,29].

Appendix 2: Data used for regression analysis and descriptive statistics

We use the COVID-19 survey of NSOs to explore the determinants of the differential impacts of the pandemic on NSO operations. The analysis includes two different datasets. The first one is the cross-sectional round 4 of the survey that was conducted in May 2021. The second dataset is a panel that includes the NSOs included in round 1 (May 2020) and in round 4 (May 2021).

Round 4 captured information of 118 NSOs, its distribution by income level and regions can be found in Table A3.1. The panel dataset (Round 1 and 4) incorporates information of 83 NSOs. The panel loses the NSOs that were not captured in both rounds. However, by including both rounds in the analysis, we are able to explore if NSOs operations recovered or not. One relevant question that may be raised is if the observations lost when creating the panel affect the distribution of the sample. In order to test if this is the case Table XX presents balance tests under the null hypothesis that the samples are not different. We do not find evidence to reject the null hypothesis. Therefore, there is no systematic attrition, and the results will not be driven by sample composition.

Table A7
Distribution of NSOs

	Number of NSOs		% of NSOs	
	R4	R4 and R1	R4	R4 and R1
Income group				
High income	46	35	39%	42%
Middle income	31	24	26%	29%
Low and lower middle income	41	24	35%	29%
Regions				
Europe and Northern America	33	28	28%	34%
Latin America and the Caribbean	19	12	16%	14%
Northern Africa and Western Asia	16	10	14%	12%
Oceania	5	3	4%	4%
Eastern and South-Eastern Asia	14	11	12%	13%
Central and Southern Asia	7	2	6%	2%
Sub-Saharan Africa	24	17	20%	20%
Total	118	83	100%	100%

Source: UNSD and World Bank [20–23].

Table A8
T-test of distributions. Null hypothesis: Distributions are not different

	Difference (panel-R4)	Std. Err.	t
Income group			
High income	0.0319	0.0706	0.4513
Middle income	0.0264	0.0641	0.4122
Low and lower middle income	-0.0583	0.0672	-0.8673
Regions			
Europe and Northern America	0.0577	0.0661	0.8732
Latin America and the Caribbean	-0.0164	0.0520	-0.3162
Northern Africa and Western Asia	-0.0151	0.0483	-0.3128
Oceania	-0.0062	0.0281	-0.2213
Eastern and South-Eastern Asia	0.0139	0.0475	0.2923
Central and Southern Asia	-0.0352	0.0297	-1.1872
Sub-Saharan Africa	0.0014	0.0580	0.0246

Source: Own elaboration based on UNSD and World Bank [20,23].

Table A9
Descriptive statistics – Tables 2 and 3

	N	Mean	Std. Dev.	Min	Max
The COVID-19 pandemic has negatively affected NSO's current ability to produce essential monthly/quarterly statistics as of May 2021	114	0.5439	0.5003	0	1
The COVID-19 pandemic has negatively affected NSO's current ability to meet international reporting requirements	113	0.5221	0.5017	0	1
NSO has ever stopped field data collection involving f2f interviews as a consequence of the COVID-19 pandemic – R4	114	0.6754	0.4703	0	1
Some or all staff is instructed to work from home because of COVID-19 pandemic – R4	114	0.6842	0.4669	0	1
NSO's overall ICT readiness has improved in the last 6 months – R4	114	0.5790	0.4959	0	1
Staff working from home does not have adequate computers to perform their work – R4	114	0.2193	0.4156	0	1
Since the beginning of the COVID-19 pandemic, the costs of data collection have increased – R4	110	0.4091	0.4939	0	1
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on government funding – R4	114	0.4825	0.5019	0	1
Since the beginning of the COVID-19 pandemic, NSO has experienced a decrease on donors/other sources funding – R4	112	0.2142	0.4122	0	1
Statistical Performance Index 2019 – Overall value for pillar of Data Infrastructure (0–1)	116	0.5957	0.2862	0	1
Oxford Stringency Index – average value in April 2020 – R1	108	78.6352	15.0774	13.89	100

Source: UNSD and World Bank [20–23].