ISSN 1728-5445

SERIES

STUDIES AND PERSPECTIVES 113

ECLAC SUBREGIONAL HEADQUARTERS FOR THE CARIBBEAN

Statistical literacy

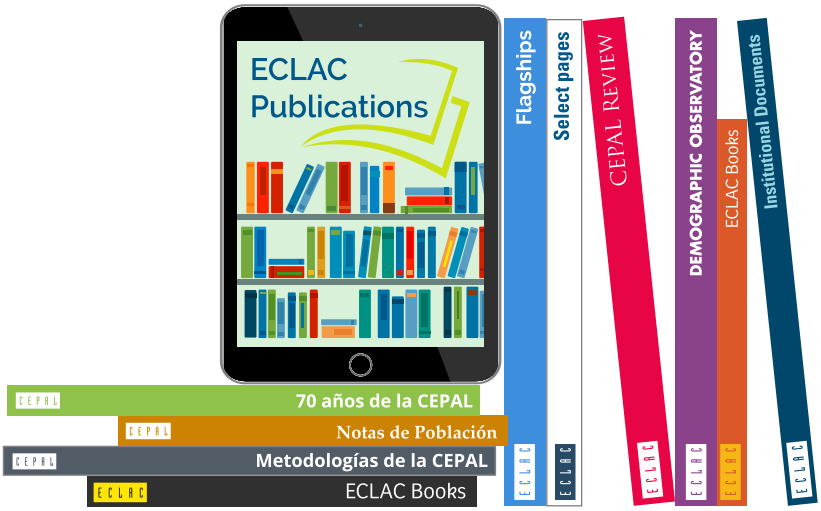
An enabler of statistical capacity development in the Caribbean

Shirelle Floyd
Iskuhi Mkrtchyan
Abdullahi Abdulkadri

UNITED NATIONS

ECLAC

Thank you for your interest in this ECLAC publication



Please register if you would like to receive information on our editorial products and activities. When you register, you may specify your particular areas of interest and you will gain access to our products in other formats.

Register

www.cepal.org/en/publications

www.instagram.com/publicacionesdelacepal

www.facebook.com/publicacionesdelacepal

www.issuu.com/publicacionescepal/stacks

www.cepal.org/es/publicaciones/apps

UNITED NATIONS

ECLAC

SERIES

STUDIES AND PERSPECTIVES 113

ECLAC SUBREGIONAL
HEADQUARTERS
FOR THE CARIBBEAN

Statistical literacy

An enabler of statistical capacity development in the Caribbean

Shirelle Floyd
Iskuhi Mkrtchyan
Abdullahi Abdulkadri

UNITED NATIONS

ECLAC

This document was prepared by Shirelle Floyd, consultant, Iskuhi Mkrtchyan, Statistics Assistant, and Abdullahi Abdulkadri, Coordinator, all of the Statistics and Social Development Unit of the Economic Commission for Latin America and the Caribbean (ECLAC) subregional headquarters for the Caribbean.

United Nations publication
ISSN: 1728-5445 (electronic version)
ISSN: 1727-9917 (print version)
LC/TS.2022/227
LC/CAR/TS.2022/7
Distribution: L

Printed at United Nations, Santiago
S.22-01099

This publication should be cited as: S. Floyd, I. Mkrtchyan and A. Abdulkadri, "Statistical literacy: an enabler of statistical capacity development in the Caribbean", *Studies and Perspectives series-ECLAC Subregional Headquarters for the Caribbean*, No. 113 (LC/TS.2022/227-LC/CAR/TS.2022/7), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC), 2023.

Contents

Tables

Figures

Abstract

This study reviews the level of statistical skills and competencies of staff of National Statistical Offices (NSOs) of the Caribbean as a critical step in enhancing the statistical capacity of National Statistical Systems (NSSs) of the subregion. It is important to take stock of the skills gaps that exist at the NSOs and the level of statistical literacy of NSO stakeholders in ministries, departments, and agencies of government. As producers and users of official statistics, NSO stakeholders' understanding of data and statistics is key to evidence-based decision making. In general, improving statistical literacy among the Caribbean population will contribute to a better understanding and use of statistical data by all users, including businesses, mass media, civil society, academia, and the ordinary citizen. Building on discussions of statistical literacy in national policies and regional frameworks such as CARICOM's Regional Strategy for the Development of Statistics (RSDS), this study explores statistical literacy and competencies at the NSOs using self-reported responses of NSO staff to a structured questionnaire that focused on technical expertise of staff and their perception of the statistical skills of their colleagues at the NSO and within the NSS. Results of the survey provide an encouraging indication that NSOs facilitate continuous education for staff to enhance their skills and are actively engaged in promoting statistical literacy among the general population. NSO staff perceive the staff of other government ministries, departments, and agencies with whom they interact on data needs and requests to have good statistical literacy. However, the studybresults are also indicative of the need to improve the statistical literacy of staff who do non-statistical work at the NSOs and suggest the prevalence of misuse and misinterpretation of data and statistics by journalists and the ordinary citizens.

Introduction

In the Caribbean, statistical literacy is not well discussed in the development of administrative structure nor considered enough in human resource capacity. It is also not adequately factored in the ways data are disseminated to users for ease of understanding. Technical competency in statistics is often limited to the statisticians and others who analyse data but is not widely found among data users or managers at the ministries, departments and agencies of government, and employees with non-statistical roles in the private sector. This leaves room for misunderstanding, misinterpretation, and miscommunication of data, with consequences for individual decision-making, and in circumstances that affect public policies and decisions.

The COVID-19 pandemic has elevated the importance of data in decision-making and resulted in a multitude of data collection activities, including surveys on the impact of the pandemic on different sectors of the economy and spheres of life. Due to physical and social distancing restrictions imposed as a result of the pandemic, individuals and organizations have mainly utilized online means to conduct these surveys. In some cases, those conducting the surveys do not possess the necessary statistical knowledge and skills in survey design and data collection. Beyond that, the abundance of COVID-19 data and statistics from a wide range of data sources, some of these questionable, has led to the rise of statistical fallacies – resulting in misrepresentation and the increased occurrence of misinformation. This growing trend has implications for decision making and public trust in data.

In a global economy that is fast becoming knowledge-based, the importance of statistics cannot be over-emphasized. This fact is aptly put by the Independent Expert Advisory Group (IEAG) on a Data Revolution for Sustainable Development when they proclaimed that "Data are the lifeblood of decision-making and the raw material for accountability. Without high-quality data providing the right information on the right things at the right time; designing, monitoring, and evaluating effective policies becomes almost impossible".[1] Therefore, it is critical to underscore that statistical literacy is not optional

[1] See *A World That Counts*, November 2014, p.2, available at https://www.undatarevolution.org/wp-content/uploads/2014/11/A-World-That-Counts.pdf.

in the quest for sustainable development. Sustainable development cannot be achieved in an environment of poor quality data— occasioned by poor knowledge of statistical concepts and methodologies— since it could lead to errors, misrepresentation and/or erroneous communication of data, which consequentially would result in poor decisions.

To ensure a proper data ecosystem for sustainable development, statistics should be understood by all. Not everyone needs to be an expert in statistics, but minimal statistical literacy will make the public and private sectors more efficient. In particular, official statistics are relied on by governments for evidence-based decision making, policy development and for building active citizenship. There is the increasing need to strengthen statistical capacity in the Caribbean at all levels of policy and decision-making. This is of critical importance, among others, in monitoring and evaluating the global Sustainable Development Goals (SDGs). To enhance statistical capacity and literacy, there needs to be enhanced coordination between data producers and users from multiple data systems. Furthermore, innovation in the production and communication of data and statistics will be required to address the intricate challenges faced in attaining sustainable development (The Sustainable Development Goals Report, 2017).

Internationally, there has been a call for an improved understanding of data and statistics by the United Nations (UN). In its report, the IEAG called for "A proposal for a special investment to increase global data literacy". The Expert Group recommended that the UN works with other organizations to develop an education programme and promote new learning approaches to improve the data literacy of infomediaries, public servants and people in general. Similarly, the Synthesis Report of the UN Secretary-General on the Post-2015 Agenda[2] called for a transformative agenda where we "base our analysis in credible data and evidence, enhancing data capacity, availability, disaggregation, literacy and sharing" (p.19). The report emphasized the IEAG's suggestion that "the world must acquire a new 'data literacy' to be equipped with the tools, methodologies, capacities, and information necessary to shine a light on the challenges of responding to the new agenda" (p.38).

The Caribbean subregion is already taking on this challenge and has committed to the improvement of statistical systems and capacities for a more statistically literate public.[3] Regional partnerships and international cooperation and collaboration have become critical in advancing statistical literacy in the region. The Caribbean Community (CARICOM) has developed a Regional Strategy for the Development of Statistics (RSDS) to be fulfilled by 2030. The RSDS contains strategies to improve statistical literacy as part of the communication and advocacy priorities. International cooperation with agencies such as the Inter-American Development Bank (IDB), the European Union, and Partnership in Statistics for Development in the 21st Century (Paris 21) has also promoted statistics and data literacy in the subregion through various training initiatives and activities as part of the implementation of the RSDS.

Furthermore, the work of the Economic Commission for Latin America and the Caribbean (ECLAC) in the Caribbean has sought to strengthen the statistical capacity and expertise of the subregion's National Statistical Systems (NSSs) in the production and use of official statistics. This work has continued to reveal the limited capacity of countries in the production and use of official statistics for planning and decision making. There is anecdotal evidence to support the notion that knowledge and understanding of statistical concepts and methodologies and their correct application in the production and interpretation of official statistics could be significantly improved among a slew of actors in the society, including the public sector staff, policymakers, the media, and ordinary citizen. As part of the data cycle,[4] statistical literacy must be enhanced at all levels to better inform policy,

[2] The Road to Dignity by 2030: ending poverty, transforming all lives and protecting the planet.
[3] The CARICOM Third High Level Advocacy Forum on Statistics (2019).
[4] See UNECE. (2012). Making Data Meaningful. Part 4: A guide to improving statistical literacy. United Nations, Geneva.

programmes, and key interventions. ECLAC recognizes that the National Statistical Office (NSO) is a key player in ensuring that statistical literacy is improved at the country level. Through the NSOs, strategies for public education and training on statistical literacy can occur. This will no doubt require collaboration and partnerships among data producers and users within and outside of the NSS. It is imperative that in advancing the statistical capacity of the NSSs of Caribbean countries, attention be paid to improving statistical literacy in the subregion in order to ensure better understanding and use of statistical data.

As a first step in informing policy recommendations for programme to enhance statistical capacity in the Caribbean, this study reviews the level and range of statistical competence in Caribbean NSOs and seeks to gauge NSO staff's perception of the level of statistical literacy of official statistics stakeholders. The findings of the study inform the recommendation that greater focus be given to statistical literacy in programmes and projects designed to promote statistical capacity in the Caribbean.

I. Background

Statistics have grown in visibility in recent times due to the abundance of information being shared about the COVID-19 pandemic. Watson and Callingham (2020, p.17) asserted that "there has not been another time in our lifetimes where there has been a plethora of data in the form of graphical representations and the associated analyses that have been presented on COVID-19". They suggest that COVID-19 data and statistics have been receiving tremendous attention in the media and have resulted in 'incredible claims' being made. Statistical fallacies have been espoused as copious amounts of data and numerous data sources and data producers have left many susceptible to misinformation and conspiracy theories (Watson and Callingham,2020). This, they say, has revealed a lack of statistical and data literacy and critical thinking among global citizens. As data and information on the pandemic are easily accessible many laypersons are more confused than informed due to competing ideals, inconsistent reporting practices, and dubious sources which have contributed to increased public distrust in data and statistical messages. Despite this, PARIS21 noted that the pandemic has created opportunities to promote a widespread data culture in our societies by developing data literacy at the level of citizens, organizations, and society (PARIS21, 2021).

In his press conference before the opening of the 76th General Assembly, the United Nations Secretary-General alluded to fake news and the need to promote statistical literacy. He said: "And I propose action to tackle disinformation and conspiracy theories and promote facts and science in public global discourse. We must make lying wrong again".[5] A similar message was echoed by the Secretary-General of CARICOM who in her message on the occasion of the Caribbean Statistics Day 2021 emphasized the importance of statistics to timely recovery from the pandemic and in achieving the Sustainable Development Goals and the 2030 Agenda.[6] Despite the health and economic crises

[5] See United Nations Secretary-General's message at https://www.un.org/en/observances/statistics-day/messages.

[6] Message By Dr. Carla Barnett, Caricom Secretary-General on The Occasion of The 13th Observance Of Caribbean Statistics Day, 15 October 2021 Retrieved from https://caricom.org/message-by-dr-carla-barnett-caricom-secretary-general-on-the-occasion-of-13th-observance-of-caribbean-statistics-day-15-october-2021/.

caused by the COVID-19 pandemic, there is an opportunity to examine statistical literacy and investigate what can be done to increase citizens' understanding of data and statistical messages and arguments (PARIS21, 2021).

Recent studies on COVID-19 have revealed that statistical literacy translates to understanding and correct interpretation of the COVID-19 risks. Statistically literate persons were found to be more likely than others to understand the risks posed by the COVID-19 virus, comply with COVID-19 protocols, and be vaccinated against the virus (Metzger and others, 2020). In their study conducted among 4000 households in the Netherlands, Metzger and others (2020) assessed the role of statistical literacy in interpreting COVID-19 related information, assessing the risk of infection, and complying with social distancing restrictions. The study tested the theory that *even with the same information available, individuals may differ in their ability to interpret it*. This was based on anecdotal evidence that pointed to the challenges faced by the population (including politicians and journalists) in interpreting and drawing conclusions from key data. The study found that statistically literate persons were more likely to social distance, more concerned about infecting others than their own infection risk, and considered the flu shot to be important, which the authors inferred may suggest a positive attitude toward vaccination. In contrast, those who had challenges understanding and interpreting data may be unlikely to take actions to mitigate the risks associated with COVID-19.

"The importance of timely, quality, open and disaggregated data and statistics have never been as clear as during the COVID-19 crisis". [7] When data collected using sound methodologies and the statistics generated from the data are used in decision-making, it promotes democracy and increases the citizens' understanding of the state of their country and other nations. This also enhances statistical literacy and promotes data-driven cultures (Biggeri, 1999).

[7] See The Sustainable Development Goals Report, 2020, p.4.

II. Statistical literacy in the Caribbean

A. The importance of statistical literacy

Statistics play an important role in the modern society. Statistics enables transparency and accountability, thus, statistical literacy is fundamental in promoting good governance and is essential for a thriving democracy. If citizens are statistically literate, then they would be better able to execute their civil responsibilities, including actively participating in monitoring the progress and performance of governments and holding them accountable for policy outcomes (PARIS21, 2020; Poljicak and others., 2014).

In an increasingly global, data-driven economy with advancements in technology, informed citizenship has become exceedingly important and a requirement for living in a full democracy (Biggeri, 1999; Poljicak et. al 2014). Statistical information and messaging is everywhere and citizens should be able to understand, interpret, critically evaluate, and make sense of official statistics such as population growth, crime rates, the spread of disease, unemployment rates, and also statistics based on probability such as insurance policies and lotteries (Paul, 2018; Helenius and Mikkela, 2011). Watson and Callingham (2020) underscored that data and statistics will continue to be a driving force, balancing critical issues faced by society into the future. The understanding of statistics is thus fundamental to living in today's society where it is increasingly important to be statistically literate both at the workplace and throughout everyday life. The understanding of statistics is as much a basic skill as reading (Poljicak et al.,2014; Paul, 2018). As echoed by Watson (1997, p.1), "Statistical thinking will one day be necessary for efficient citizenship as the ability to read and write".

With the increased use of statistics and data, statistical fallacies have also become more evident. Statistical fallacies come about because of the lack of technical knowledge and are present when there is misuse, misunderstanding, misinterpretations and incorrect reasoning about data and statistics (Faris and Yuniarti, 2019; Paul, 2018). Statistics and statistical claims can be discredited because of these fallacies even to the point that statistics, including official statistics, are perceived as lies (PARIS21, 2021). Therefore, the legitimacy and use of statistics in society can be strengthened by

improving statistical literacy and awareness of citizens, including government officials and other decision-makers (Helenius, 2010). Furthermore, promoting statistical literacy will enhance the ability of persons to understand, accurately interpret, and critically evaluate data and statistical findings for proper and effective use (Watson and Callingham, 2020).

Furthermore, increasingly vital to civic participation and social progress are competencies in statistics and data skills which are at the heart of sustainable development. Data and statistics are essential for monitoring the progress in the implementation of the Sustainable Development Goals and in the fulfilment of the 2030 Agenda. Statistical literacy has thus become important to sustainable development and the measurement of the 232 indicators which are engrained in the Global SDG Indicator Framework. As Jones and others (2021) emphasised, both statistical skills and the ability to draw insights from the data used in monitoring the SDGs require statistical literacy to understand the social issues represented by the SDGs.

Studies have shown that one of the key challenges faced by the NSS of the majority of developing countries is producing the data required for SDG monitoring and reporting (Jones et al., 2021; OECD, 2017). This challenge arises mainly because data collection and reporting are not primary functions of most line ministries. Consequentially, beyond the NSO, a large part of the NSS have minimal statistical capacity and many staff do not possess the required level of statistical and data literacies to meet the demands of the 2030 Agenda. It is thus imperative that the NSSs increase their statistical capacity to produce timely and reliable data to monitor SDG targets and indicators. In addition to improving their technical capacity, NSSs must also lead the promotion and advocacy of statistical literacy to foster greater use and interpretation of data and enhance data-driven decision making among data users and the general public.

Partnerships and international cooperation are critical to achieving the 2030 Agenda and constitute Goal 17 of the SDGs, "Partnership for the Goals", which is targeted at improving the monitoring and implementation of the SDGs through capacity building and "effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships"[8] (The United Nations 2014) had hoped that by 2020 partnerships would result in greater awareness of publicly available data, strengthened data and statistical literacy of citizens, the media, and other users of data as this was deemed important in ensuring that everyone can contribute to and evaluate data quality for personal decision-making as well as for initiatives that contribute to active citizenship. Although progress has seen slow, the statistical demands resulting from the COVID-19 pandemic had renewed national focus on the importance of data and provides a new opportunity, amidst a disaster, to advance statistical literacy.

B. Regional strategies to promote statistical literacy

There is an increasing need in the Caribbean to understand and interpret data and statistics that inform decision-making and policy development. However, National Statistical Offices in the subregion experience capacity challenges that limit their ability to produce quality statistics in a timely manner. The NSOs have recognized the challenges they face with data production, dissemination, and availability. These challenges include limited technical capacity and expertise within the NSOs, outdated legislative frameworks, lack of coordination with other data producers in the NSS, siloed operations, the increased demand to produce data for the SDG indicators and a need for enhanced international cooperation (Abdulkadri, 2017; Bleeker and Abdulkadri (2020); CARICOM, 2016). Data producers must have a high level of statistical literacy to generate high-quality data for evidence-based decisions. The NSS thus requires enhanced training and development of statistical competencies and

[8] See United Nations Global Indicator Framework for the SDGs, p.21.

statistical literacy. Statistical literacy should be enhanced by developing the capacity of all data producers and users - among government officials, civil society organizations and academic institutions; this is to enable the better understanding and wider use of data, for monitoring progress of sustainable development, advocacy, and policy development (United Nations, 2017).

Globally, it is recognized that the role of statistical organizations has evolved to more than the collection and production of statistics and statistical information. Therefore, it is pertinent that statistical organizations stay relevant by understanding the differentiated needs of data users, improving the dissemination of data, and promoting the value and informed use of statistics (UNECE, 2012; Polijack 2014; Zwick 2013). These issues have been discussed at the subregional level by CARICOM and the Organisation of Eastern Caribbean States (OECS) who have each developed a Regional Strategy for the Development of Statistics (CARICOM 2018; OECS 2017) to address several of the challenges.

The CARICOM RSDS is designed to strengthen and improve the availability of statistical data for evidence-based decision making which is of paramount importance in improving developmental outcomes particularly in small island developing States (SIDS) of the Caribbean. Prior to the CARICOM RSDS, the Action Plan for Statistics was fundamental in the development of an Implementation plan for the CARICOM RSDS (2019-2030). Within the RSDS, the following actions are listed to enhance statistical capacity in the subregion:

- Strengthen the national statistical systems in countries which will address the funding of NSOs and other producing agencies including staffing, legislation, education, and the training and development of current staff.
- Enable the upgrading of the IT infrastructure in the NSOs in relation to the production and dissemination of statistics.
- Promote careers in statistics through greater infusion of statistics in the education system to lead to the development of data scientists.
- Promote the professionalisation of statistics in CARICOM through the Caribbean Association of Professional Statisticians (CAPS).
- Support a regional approach to the development of statistics (CARICOM RSDS 2019-2030).

Furthermore, as part of the strategic objectives for advancing the five integrated priorities for building the resilience of CARICOM, the Advocacy and Communication (AC) pillar of the RSDS includes an objective to increase statistical literacy in CARICOM as well as to promote activities on the usefulness of statistics. The plan states that effective communication and advocacy initiatives will enable the Community to become more "statistics literate" "to engender an understanding of basic uses and interpretation of statistics that can assist in detecting inaccurate information" (p.29). The implementation plan outlines actions to increase statistical literacy in CARICOM which include targeting the education system and improving the dissemination of statistics. The plan also considers different data users by including targeted approaches in their messaging (CARICOM RSDS, 2018).

The strategic objectives of the Advocacy and Communication priority of the CARICOM RSDS are:

- To develop and implement/disseminate, on a sustained basis, advocacy and communication programmes, activities, and products on the use/usefulness of statistics.
- To increase statistical literacy in CARICOM.
- To enable an understanding of the value and usefulness of statistics.

- To establish and sustain a culture of engagement of employees and stakeholders in the communication of the statistical processes and products.
- To strengthen the communication and advocacy programmes and develop Centres of Excellence in communication and advocacy.
- To facilitate the development and living of a high-quality brand of statistics by all employees of the CSS.
- To establish dissemination frameworks for the accessibility of statistics by the people of CARICOM.

Similarly, the OECS RSDS 2017-2030 was developed as a tool to promote statistical development of the Eastern Caribbean and to measure development and integration of the OECS Economic Union. Several strategic objectives and priorities are outlined in the OECS RSDS to promote statistical development, including the Statistical Advocacy pillar that incorporates a priority to enhance visibility and trust in a Regional Statistical System. The plan outlines actions to improve statistical literacy, enhance trust in statistics and the NSS, enhance skills, reporting and dissemination of data at the NSO, and have a better understanding of user data and statistical needs.

The CARICOM and OECS strategies show that several actors contribute to better statistical literacy and that collaboration and coordination are required among the regional bodies, national statistical offices, ministries, departments, and agencies (MDAs), educational institutions and the private sector, in particular the media, to promote and develop statistical literacy. Several activities and initiatives have been launched by the statistical community championed by NSOs and regional statistical bodies to help users better understand and use statistics. At the national level, statistical literacy activities are not identified in any legislative or policy documents pertaining to the advocacy and communication of statistical literacy. Still, the NSOs and other statistical institutions recognize the need to educate citizens including data users in government MDAs, academic institutions, and the media, among others.

III. Statistical literacy and competences at the National Statistical Offices

ECLAC and the CARICOM Secretariat jointly administered a statistical literacy survey to the staff of Caribbean NSOs during September-December 2021. The survey broadly explored the self-perceived levels of statistical competency and expertise, and statistical literacy at the NSOs.

For the purposes of the survey, the term statistical literacy was used to describe the training, knowledge and understanding of basic statistical concepts and the ability to interpret, explain and critically evaluate statistical results and messages. The survey questionnaire was designed using the model of statistical literacy proposed by Gal (2002) as the underlying conceptual framework. The questionnaire also considered the hierarchical statistical literacy construct by Watson and Callingham (2003). These theoretical frameworks were used to assess respondents' perception of statistical literacy. Information on statistical competency was sourced through self-reporting of statistical expertise and statistics-related skills. The questionnaire examined statistical literacy in three parts:

(i) A self-assessment of skills and statistical competency – all NSO staff (those who do and do not do statistical work) were required to complete this.

(ii) The perception of statistical literacy of staff – all NSO staff (those who do and do not do statistical work) were required to complete this.

(iii) The perception of statistical literacy of data users with a focus on MDA staff – only NSO staff who interact with MDAs were required to complete this.

The survey was administered online via an email invitation to prospective participants. Follow-up emails were sent approximately two weeks after the initial invitation. Data collection was undertaken over six weeks and resulted in 56 completed questionnaires from 11 Caribbean NSOs.[9] The responses received were in varying degrees of completeness.

In presenting the analyses of the responses for this study, respondents are categorized according to their self-reporting of statistical knowledge (Beginner, Basic, Intermediate, Advanced and Expert). These categories were collapsed to three levels of statistical knowledge – Low (beginner and basic), Moderate (intermediate) and High (advanced and expert). The rating scale for the level of statistical expertise was also reclassified to three levels: Basic or less, Intermediate, and Advanced or more. The survey data were analyzed using descriptive statistics in SPSS and MS Excel. Due to the small sample size and the use of perception questions, this study should be regarded as indicative and not confirmatory of the level of statistical competency and literacy at the NSOs.

A. Profile of respondents

As table 1 shows, most of the respondents were female (78.6 per cent), over the age of 36 (75.1 per cent), had a bachelor's degree or higher (66.2 per cent), and had been working in statistics for over 5 years (73.2 per cent).

Table 1
Distribution of statistical literacy survey respondents by key demographic characteristics
(Frequency and percentages)

Variable	Label	Frequency	Percentage[a]
Sex	Male	11	19.6
	Female	44	78.6
	No answer	1	1.8
Age	18-25	2	3.6
	26-30	4	7.1
	31-35	7	12.5
	36-40	17	30.4
	41-45	10	17.9
	46-50	6	10.7
	51-55	5	8.9
	56-60	3	5.4
	61-65	1	1.8
	No answer	1	1.8
Highest level of education	Secondary school	8	14.3
	Post-Secondary Diploma or Certificate	4	7.1
	Associate's degree	7	12.5
	Bachelor's degree	17	30.4
	Postgraduate Certificate/ diploma	2	3.6
	Master's degree	16	28.6
	Doctorate	2	3.6
Years working in statistics	<5 years	9	16.1
	5-10 years	12	21.4
	11-15 years	6	10.7
	>15 years	23	41.1
	No answer	6	10.7

Source: ECLAC based on data from statistical literacy survey.
[a] Percentages may not necessarily add up to 100% due to rounding error.

[9] Study participants were from the NSOs of Aruba, Barbados, Belize, Bermuda, Dominica, Guyana, Jamaica, Montserrat, Saint Kitts and Nevis, Saint Lucia, and Suriname. Only NSO staff with experience in using statistics at work responded to the survey.

Concerning experience using statistics at work, 10 respondents (17.9 per cent) indicated that they were the "go-to-person" for statistics at theit NSO, 36 respondents (64.3 per cent) used statistics daily and 10 (17.9 per cent) rarely used statistics at work. Most of the respondents (95 per cent) indicated that they had a statistics-related degree or training, which included qualifications in Statistics, Mathematics, Economics, Sociology, Geography, Accounting, Business, and other social sciences.

B. Statistical competency

1. Overall statistical knowledge and experience

Based on self reporting of their statistical knowledge, 26.8 per cent of respondents were classified as having low statistical knowledge, 33.9 per cent had moderate statistical knowledge and 39.2 per cent had high statistical knowledge. Those with high statistical knowledge were more likely to have a master's degree or higher while those with moderate statistical knowledge were more likely to have a bachelor's degree. Considering their experience at the NSO, staff with high knowledge were more likely to be the "go-to-person" for the conduct of statistical analysis and interpretation (40.9 per cent) compared to 6.7 per cent with low knowledge. None of those with moderate knowledge indicated that they were the "go-to-person". However, those with moderate knowledge were more likely to regularly conduct statistical analysis (89.5 per cent) compared to 53.3 per cent with low knowledge and 50 per cent with high knowledge who perform this task. Lastly, those with low knowledge were most likely to rarely use statistics at work (40 per cent) compared to 10.5 per cent of those with moderate knowledge and 9.1 per cent of those with high knowledge who rarely do (see table 2).

Table 2
Usage of statistics at work by NSO staff according to level of statistical knowledge
(Frequency and percentages)

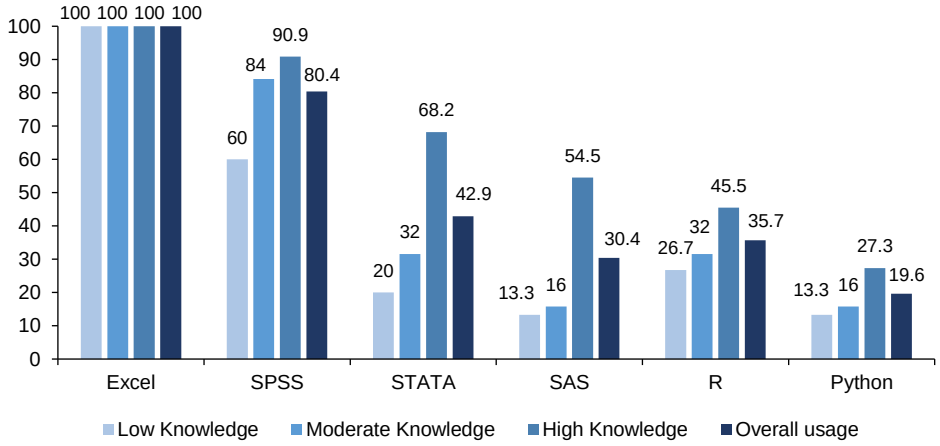
	Low Knowledge		Moderate Knowledge		High Knowledge	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Rarely, I only use statistics when it is presented to me.	6	40.0	2	10.5	2	9.1
Daily, I regularly conduct statistical analysis and calculate indicators and I am often asked for tables and graphs.	8	53.3	17	89.5	11	50.0
Always, I am the "go-to person" for the conduct of statistical analysis and interpretation.	1	6.7	0	0.0	9	40.9

Source: ECLAC based on data from statistical literacy survey.

2. Experience using technology and statistical analysis software

Respondents self-reported their level of computer literacy and their experience in using statistical analysis software. The results show that 45 respondents (80.4 per cent) were very comfortable using a computer while 11 respondents (19.6 per cent) indicated that they could perform basic operations using a computer. All respondents had experience using at least one statistical analysis software, particularly Microsoft Excel for which 100 per cent indicated that they were users. The second most used software was SPSS with 45 respondents (80.4 per cent) indicating its use. Less than half of the respondents used STATA (42.9 per cent), R (35.7 per cent), SAS (30.4 per cent), and Python (19.6 per cent). When considering the level of statistical knowledge of staff as previously defined (high, moderate, and low knowledge), figure 1 shows that staff with higher levels of statistical knowledge used more statistical analysis software than others.

Figure 1
Experience of NSO staff in the use of statistical analysis software
(Percentages)

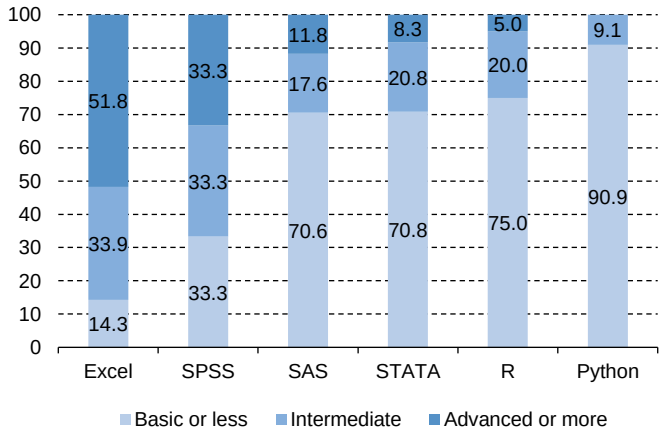


Source: ECLAC based on data from statistical literacy survey.

(a) Level of expertise using statistical analysis software

Looking further at the experience of staff in the use of statistical analysis software, a varied level of expertise was revealed. For instance, figure 2 shows that although all respondents used Excel, just over half (51.8 per cent) reported advanced or greater proficiency in its use compared to 33.9 per cent and 14.3 per cent who reported intermediate and basic proficiency, respectively. For SPSS, the data show that a third of the respondents had advanced, intermediate and basic proficiency, respectively. Most respondents had a basic level of expertise in the use of the statistical analysis software with the least usage. For example, advanced proficiency was reported by 8.3 per cent, 11.8 per cent and 5 per cent of respondents for STATA, SAS and R, respectively. No one reported advanced proficiency in the use of Python.

Figure 2
Level of expertise of NSO staff in the use of statistical analysis software
(Percentages[a])



Source: ECLAC based on data from statistical literacy survey.
[a] Percentages may not necessarily add up to 100% due to rounding error.

(b) Level of expertise using statistical analysis software by level of statistical knowledge

The relationship between statistical knowledge and the level of expertise in the use of statistical analysis software was also examined. Notably, table 3 shows that NSO staff with high statistical knowledge had a greater level of expertise in the use of statistical analysis software than those with moderate and low knowledge. Among those who use Excel, 86.4 per cent of those with high statistical knowledge had an advanced level of expertise compared to 42.1 per cent of staff with moderate knowledge and 13.3 per cent of those with low knowledge. This pattern is similar for the other software where, for example, among SPSS users, 60 per cent of those staff with high Knowledge reported an advanced level of expertise compared with 18.8 per cent of staff with moderate knowledge. Those with low knowledge did not report an advanced level of expertise in SPSS. For the less popular statistical analysis software, all user types were more likely to have basic or less statistical expertise regardless of the level of statistical knowledge. It is evident that despite Python users being more likely to have high statistical knowledge, they were just as likely as other users to have basic or less expertise in the use of the software.

Table 3
Level of expertise of NSO staff in the use of statistical analysis software by level of statistical knowledge
(Percentages[a])

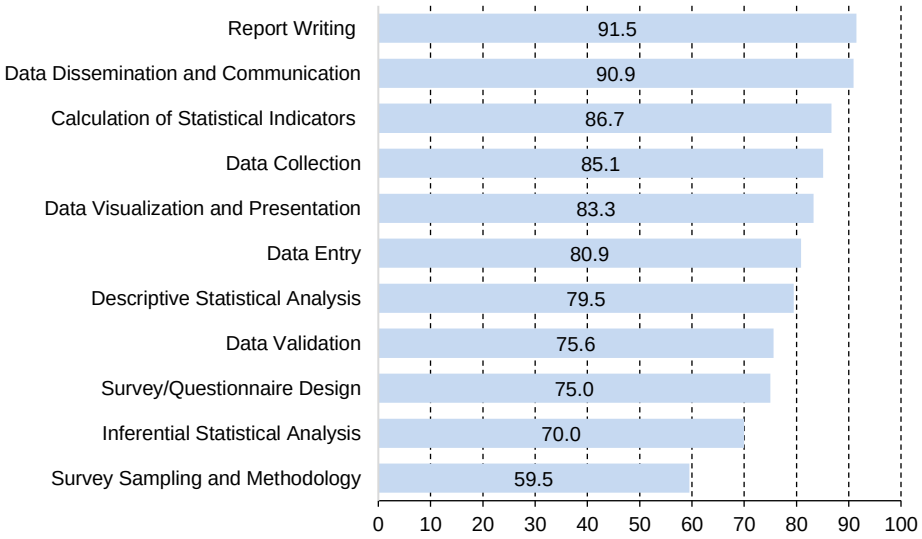
Statistical analysis software	Level of expertise	Level of statistical knowledge			
		Low knowledge	Moderate knowledge	High knowledge	Total
MS Excel	Basic or less	26.7	15.8	4.5	14.3
	Intermediate	60.0	42.1	9.1	33.9
	Advanced or more	13.3	42.1	86.4	51.8
	N	15	19	22	56
SPSS	Basic or less	77.8	37.5	10.0	33.3
	Intermediate	22.2	43.8	30.0	33.3
	Advanced or more	0.0	18.8	60.0	33.3
	N	9	16	20	45
SAS	Basic or less	66.7	66.7	73.3	70.8
	Intermediate	33.3	16.7	20.0	20.8
	Advanced or more	0.0	16.7	6.7	8.3
	N	2	3	12	17
STATA	Basic or less	100.0	66.7	66.7	70.6
	Intermediate	0.0	33.3	16.7	17.6
	Advanced or more	0.0	0.0	16.7	11.8
	N	3	6	15	24
R	Basic or less	100.0	100.0	50.0	75.0
	Intermediate	0.0	0.0	40.0	20.0
	Advanced or more	0.0	0.0	10.0	5.0
	N	4	6	10	20
Python	Basic or less	50.0	100.0	100.0	90.9
	Intermediate	50.0	0.0	0.0	9.1
	Advanced or more	0.0	0.0	0.0	0.0
	N	2	3	6	11

Source: ECLAC based on data from statistical literacy survey.
[a] Percentages may not necessarily add up to 100% due to rounding error.

3. Statistical activities performed at the National Statistical Office (NSO)

The level of staff's expertise in 11 main statistical activities[10] done at the NSOs is summarized in figure 3. Report writing (91.5 per cent) and data dissemination and communication (90.9 per cent) were the most reported activities performed by NSO staff. Sizeable proportion of staff also performed calculation of statistical indicators (86.7 per cent), data collection (85.1 per cent), data visualization and presentation (83.3 per cent), data entry (80.9 per cent) and descriptive statistical analysis (79.5 per cent), respectively. The remaining activities including data validation (75.6 per cent), survey/questionnaire design (75 per cent), inferential statistical analysis (70 per cent) and survey sampling and methodology (59.5 per cent) were performed by fewer staff.

Figure 3
Distribution of statistical activities performed by NSO staff
(Percentages)



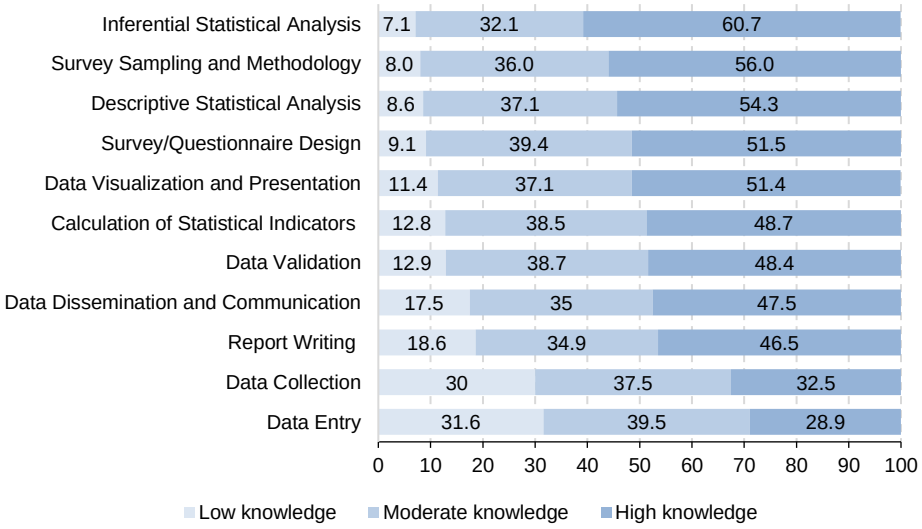
Source: ECLAC based on data from statistical literacy survey.

(a) Performance of statistical activities at the NSO by statistical knowledge

The performance of statistical activities at the NSOs varied by level of statistical knowledge of NSO staff where those with higher statistical knowledge performed a greater proportion of the activities than those with lower levels of statistical knowledge (see figure 4). Approximately half of the respondents who performed reporting, analysis and methodological tasks had high statistical knowledge. These include, inferential statistical analysis (60.7 per cent), survey sampling and methodology (56 per cent), descriptive statistical analysis (54.3 per cent), survey questionnaire design (51.5 per cent), and data visualization and presentation (51.4 per cent). Most staff who performed each statistical activity indicated that they had moderate to high level of statistical knowledge. For data entry and data collection, 3 in 10 had low statistical knowledge (31.6 per cent and 30 per cent, respectively).

[10] These include Survey Sampling and Methodology, Data Entry, Calculation of Statistical Indicators, Survey/Questionnaire Design, Data Collection, Data Validation, Descriptive Statistical Analysis, Inferential Statistical Analysis, Data Visualization and Presentation, Report Writing and Data Dissemination and Communication.

Figure 4
Performance of statistical activities at the NSO by level of statistical knowledge of staff
(Percentages[a])



Source: ECLAC (2022).
[a] Percentages may not necessarily add up to 100% due to rounding error.

(b) Level of expertise in performing statistical activities at the NSO

Overall, the respondents rated their specific level of expertise in each of the statistical activities performed at the NSO. They were more likely to report advanced or higher levels of expertise in nine out of the 11 statistical activities performed at the NSO (see table 4). They reported the highest level of competency in data validation in which 67.7 per cent reported that they had advanced or higher expertise. Approximately half of the respondents reported that they had advanced or higher expertise in data collection (55 per cent), descriptive statistical analysis (51.4 per cent) and data dissemination and communication (50 per cent). The other activities that were performed at an advanced level of expertise include: calculation of statistical indicators (46.2 per cent), data visualization and presentation (45.7 per cent), survey/questionnaire design (45.5 per cent), report writing (44.2 per cent) and data entry (42.1 per cent). The majority of those performing inferential statistical analysis (46.4 per cent) and survey sampling and methodology (40 per cent) reported having intermediate and basic levels of expertise in those activities, respectively.

The relationship between statistical knowledge and the level of expertise in the performance of statistical activities was also examined. Continuing the trend, table 4 shows that NSO staff with high statistical knowledge had a greater level of expertise in performing statistical activities at the NSO than those with moderate and low knowledge.

Table 4
Distribution of survey participants according to level of expertise in performing statistical activities and level of statistical knowledge
(Percentages[a])

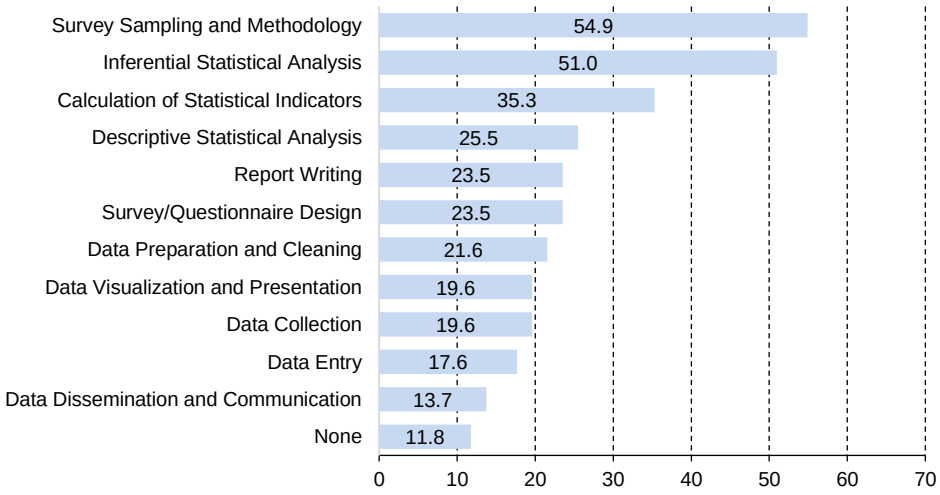
Statistical activities	Level of expertise	Level of statistical knowledge			
		Low Knowledge	Moderate Knowledge	High Knowledge	Total
Survey Sampling and Methodology	Basic or less	100.0	33.3	35.7	40.0
	Intermediate	0.0	55.6	28.6	36.0
	Advanced or more	0.0	11.1	35.7	24.0
	N	2	9	14	25
Data Entry	Basic or less	50.0	26.7	9.1	28.9
	Intermediate	33.3	26.7	27.3	28.9
	Advanced or more	16.7	46.7	63.6	42.1
	N	12	15	11	38
Calculation of Statistical Indicators	Basic or less	80.0	6.7	5.3	15.4
	Intermediate	20.0	66.7	21.1	38.5
	Advanced or more	0.0	26.7	73.7	46.2
	N	5	15	19	39
Survey/Questionnaire Design	Basic or less	100.0	23.1	17.6	27.3
	Intermediate	0.0	38.5	23.5	27.3
	Advanced or more	0.0	38.5	58.8	45.5
	N	3	13	17	33
Data Collection	Basic or less	50.0	6.7	7.7	20.0
	Intermediate	33.3	33.3	7.7	25.0
	Advanced or more	16.7	60.0	84.6	55.0
	N	12	15	13	40
Data Validation	Basic or less	75.0	16.7	0.0	16.1
	Intermediate	0.0	33.3	6.7	16.1
	Advanced or more	25.0	50.0	93.3	67.7
	N	4	12	15	31
Descriptive Statistical Analysis	Basic or less	100.0	7.7	10.5	17.1
	Intermediate	0.0	69.2	10.5	31.4
	Advanced or more	0.0	23.1	78.9	51.4
	N	3	13	19	35
Inferential Statistical Analysis	Basic or less	100.0	22.2	17.6	25.0
	Intermediate	0.0	77.8	35.3	46.4
	Advanced or more	0.0	0.0	47.1	28.6
	N	2	9	17	28
Data Visualization and Presentation	Basic or less	50.0	15.4	11.1	17.1
	Intermediate	25.0	61.5	22.2	37.1
	Advanced or more	25.0	23.1	66.7	45.7
	N	4	13	18	35
Report Writing	Basic or less	75.0	26.7	5.0	25.6
	Intermediate	12.5	53.3	20.0	30.2
	Advanced or more	12.5	20.0	75.0	44.2
	N	8	15	20	43
Data Dissemination and Communication	Basic or less	71.4	28.6	5.3	25.0
	Intermediate	14.3	35.7	21.1	25.0
	Advanced or more	14.3	35.7	73.7	50.0
	N	7	14	19	40

Source: ECLAC based on data from statistical literacy survey.
[a] Percentages may not necessarily add up to 100% due to rounding error.

4. Challenges in performing statistical activities at the National Statistical Office (NSO)

The most reported challenges that staff face when performing statistical activities at the NSO are in the areas of survey sampling and methodology (54.9 per cent) and inferential statistical analysis (51 per cent) (see figure 5). Only 11.8 per cent of the respondents indicated that they did not experience any challenges. This trend is consistent irrespective of the level of statistical knowledge of staff (see table 5).

Figure 5
Staff experiencing challenges in performing statistical activities at the NSO
(Percentages)



Source: ECLAC based on data from statistical literacy survey.

Table 5
Staff experiencing challenges in performing statistical activities at the NSO by level of expertise
(Percentages)

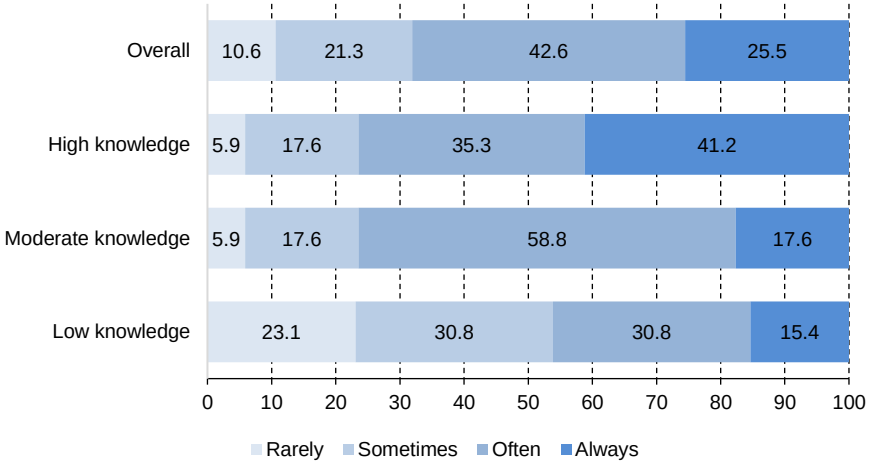
Statistical activities	Level of statistical knowledge			
	Low knowledge	Moderate Knowledge	High Knowledge	N
Survey Sampling and Methodology	54.5	63.2	47.6	28.0
Data Entry	27.3	26.3	4.8	9.0
Calculation of Statistical Indicators	72.7	42.1	9.5	18.0
Survey/Questionnaire Design	45.5	21.1	14.3	12.0
Data Collection	27.3	21.1	14.3	10.0
Data Preparation and Cleaning	36.4	26.3	9.5	11.0
Descriptive Statistical Analysis	45.5	21.1	19.0	13.0
Inferential Statistical Analysis	54.5	42.1	57.1	26.0
Data Visualization and Presentation	27.3	10.5	23.8	10.0
Report Writing	18.2	10.5	38.1	12.0
Data Dissemination and Communication	18.2	10.5	14.3	7.0
None	0.0	10.5	19.0	6.0

Source: ECLAC based on data from statistical literacy survey.

C. The dissemination and communication of data to data users

Data users frequently request for data from NSOs and staff with varying seniority and expertise respond to these requests. Among the staff that respond to data requests, the majority classified as those with high statistical knowledge reported that they "always" interact with other data users (41.2 per cent). In comparison, the majority of those with moderate knowledge reported that they "often" interact with data users (58.8 per cent). Among those with low knowledge, equal proportions indicated that they somewhat or often interact with other data users (30.8 per cent each) (see figure 6).

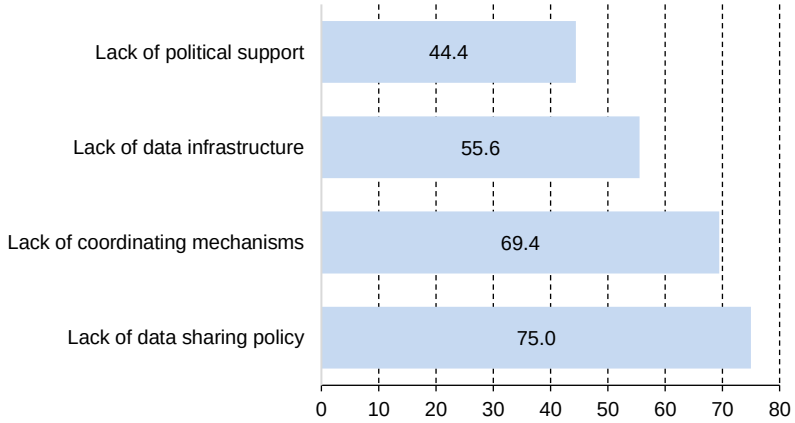
Figure 6
Frequency with which NSO staff interact with data users according to level of statistical knowledge
(Percentages[a])



Source: ECLAC based on data from statistical literacy survey.
[a] Percentages may not necessarily add up to 100% due to rounding error.

In any typical year, almost two-fifths (39.1 per cent) of staff interactions with data users relating to data requests were deemed to be with the public sector (government offices—21.8 per cent; MDAs—17.3 per cent). Interactions with international organizations (17.8 per cent), academics/students (14.4 per cent), and businesses (14 per cent) were also notable, while engagements with ordinary citizens (8.3 per cent) and the media or journalists (6.5 per cent) werenot very common. Most respondents (75 per cent) indicated that they were aware of defined framework or mechanism used by staff for communicating data and statistics to data users. About 0.5 per cent of respondents did not know of any such framework while 17.5 per cent were unsure. Notwithstanding, respondent indicated major challenges in communicating statistics/data to MDAs, many of whom cited lack of data sharing policy (75 per cent), lack of coordinating mechanisms (69.4 per cent), lack of data infrastructure (55.6 per cent), and lack of political support (44.4 per cent) as challenges in this regard (see figure 7).

Figure 7
Challenges cited by NSO Staff in communicating data and statistics to data users
(Percentages)



Source: ECLAC based on data from statistical literacy survey.

D. Perception of statistical literacy of MDA staff and other NSO staff

Given the frequency of interaction with government officials and staff of MDAs, respondents were asked series of questions on their opinion of MDA staff pertaining to statistical literacy or familiarization with statistics. Table 6 shows that on a scale of 1 (strongly disagree) to 7 (strongly agree), the average score on all but one question was above 4. The responses reflect a fairly good perception of MDA staff by their NSO colleagues in relation to the former's level of statistical literacy.

Table 6
Average rating by survey respondents on statements regarding opinions of MDA staff
(Means and standard deviations)

How much do you agree or disagree with the following statements about the staff at Ministries, Departments and Agencies (MDAs)?	Rating		N
	Mean	Standard Deviation	
Most staff at MDAs understand requests coming from you/your office	4.93	1.46	28
Most staff at MDAs are clear about their requests for data	4.86	1.43	28
Most staff at MDAs sufficiently respond to data requests from you/your office	4.79	1.32	28
Most staff at MDAs understand basic statistical concepts and terms	4.76	1.3	25
Most staff at MDAs can accurately read tables, graphs and charts	4.71	0.98	28
Most staff at MDAs have a good understanding of the statistical information they request	4.59	1.21	29
Most staff at MDAs draw accurate conclusions from data	4.31	1.12	26
Most staff at MDAs understand how data is collected	4.25	1.21	28
Administrative data provided by staff at MDAs are mostly free of errors	4.21	1.72	24
Most staff at MDAs can accurately interpret data	4.19	1.06	26
Most staff at MDAs use statistical vocabulary when making requests for data	3.97	1.4	29

Source: ECLAC based on data from statistical literacy survey.

With respect to staff of the NSO who do non-statistical work, the rating was lower. As table 7 shows, the minimum mean rating (3.22) was on the statement: *Most of my colleagues who do non-statistical work understand how statistical conclusions or inferences are reached*. The highest mean rating (4.38) was on the statement: *Most of my colleagues who do non-statistical work can read and understand tables, charts and graphs*.

Given the need for continuous education and the importance of on-the-job training, respondents were asked if their NSO provides regular statistical training, seminars, and workshops, etc., to both technical and non-technical staff. There was general agreement among respondents (Mean= 4.60, SD=1.72) that the NSO provides such opportunities.

Table 7
Average rating by survey respondents on perception of the statistical literacy of staff who do non-statistical work
(Means and standard deviations)

Most of my colleagues who do non-statistical work…	Rating		N
	Mean	Standard Deviation	
...can read and understand tables, charts, and graphs	4.38	1.84	34
...have a good understanding of basic statistical concepts and their correct interpretations	4.27	1.74	33
...can explain trends from a data display in tables, charts, and graphs	4.15	1.89	34
...can summarize data using frequencies and percentages	4.03	1.85	33
...can draw appropriate conclusions from data in tables, charts, and graphs	4.00	1.87	32
...often misuse or misrepresent statistical data	3.93	2.04	28
...understand how to report on frequencies, percentages, means and median	3.88	1.87	33
...can place the statistical messages in context	3.85	1.8	33
...understand data collection and sampling procedures and processes	3.76	1.99	34
...critically assess/challenge research and statistics for trustworthiness	3.76	1.88	29
...can interpret data well	3.71	1.85	34
...are skilled in data visualization and storytelling	3.67	1.90	33
... have a good understanding of statistical concepts and their correct interpretations	3.44	1.78	32
...understand how statistical conclusions or inferences are reached	3.22	1.72	32

Source: ECLAC based on data from statistical literacy survey.

When asked about their opinion of the statistical literacy of all data users (e.g., MDAs, businesses, government officials, journalists, and ordinary citizens, etc.), respondents appear to share the concern of misuse and misrepresentation of data among different sectors of the population. The ordinary citizen and journalists and those in the mass media are the two main groups that respondents agreed misuse or misinterpret data, with average rating of 5.56 and 5.16, respectively. Respondents agreed less strongly about the misuse of data and statistics by staff of MDA and government officials, but the average rating still falls in the agreed range (see table 8).

Considering the high concordance of survey respondents that misuse or misrepresentation of data and statistics is an issue, it is important that NSOs take a proactive role in promoting statistical literacy more generally. On that note, the respondents generally agreed that their NSO continuously works to promote statistical literacy in the community (Mean=4.83; SD=1.85).

Table 8
Average rating by survey respondents on perception of the statistical literacy of groups of data users
(Means and standard deviations)

Statements	Rating		
	Mean	Standard Deviation	N
There is often misuse or misinterpretation of data and statistics by ordinary citizens	5.56	1.55	39
There is often misuse or misinterpretations of statistics by journalists and other mass media	5.16	1.60	38
There is often misuse or misinterpretations of statistics by the business sector	4.95	1.60	37
There is often misuse or misinterpretation of data and statistics by government officials	4.86	1.67	37
There is often misuse or misinterpretation of data and statistics by MDA (Ministries, Departments, Agencies) staff	4.46	1.7	39

Source: ECLAC based on data from statistical literacy survey.

IV. Conclusions

"Data in the 21st Century is like Oil in the 18th Century: an immensely, untapped valuable asset. Like oil, for those who see Data's fundamental value and learn to extract and use it there will be huge rewards".[11] This statement reflects the general message of the Data Revolution for Sustainable Development and is enough a motivation to enhance the statistical literacy of the populace and statistical capacity of the NSS. In the Caribbean context, CARICOM identifies statistical literacy as a key element of the Advocacy and Communication priority of its Regional Strategy for the Development of Statistics. As National Statistical Offices, and in general National Statistical Systems, implement programmes and activities that promote statistical literacy in furtherance of the RSDS, the knowledge of the level of statistical literacy, starting with the NSO, will go a long way in helping to design these activities.

As a first step towards informing these programmes and activities, this study has focused on understanding the levels of statistical expertise in Caribbean NSOs. This was done by analysing data on statistical skills that were self-reported by NSO staff, including their perception of the statistical literacy of other stakeholders within their cycle of interaction on official statistics. The results indicate a perception that staff of government ministries, departments, and agencies that interact with NSOs on data needs and requests have good statistical literacy. Nonetheless, the study suggests a prevalence of misuse and misinterpretation of data and statistics by the ordinary citizens and journalists in the Caribbean. These two groups, who are the most important in curbing misinformation and shaping public opinions, should, therefore, constitute key targets of any statistical literacy programme.

[11] See https://www.wired.com/insights/2014/07/data-new-oil-digital-economy/.

The fact that NSOs facilitate continuous education for staff to enhance their skills and are engaged in promoting statistical literacy among the general population is an encouragnig indication. However, the findings of this study are indicative of the need to improve the statistical literacy of staff who do non-statistical work at the NSOs. At the broader policy level, the lack of data sharing agreements and absence of formalized coordinating mechanisms in the NSS constitute challenges for statisticians in communicating data and statistics to data users and constitute another area of focus for NSS administrators.

Bibliography

Abdulkadri, A. (2017), "Addressing capacity gaps in the production of the SDG indicators in the Caribbean," *Policy Brief*, LC/CAR/2017/20.

Biggeri, L. (1999), "The dissemination of statistical literacy among citizens and public administration directors." The 52nd of International Statistical Institute, 1999.

Bleeker, A. and Abdulkadri, A (2020), "A review of Caribbean national statistical legislation in relation to the United Nations Fundamental Principles of Official Statistics", *Studies and Perspectives series-ECLAC Subregional Headquarters for the Caribbean*, No. 86 (LC/TS.2020/1-LC/CAR/TS.2019/9), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).

Caribbean Community (CARICOM) (2018). "Regional Strategy for the Development of Statistics". Retrieved from https://caricom.org/documents/16305/rsds2018.pdf.

Faris, M. and Yuniarti. "Investing Statistical Knowledge -A Road to Sustainable Statistical Literacy". Seminar proceedings, *Asia–Pacific Economic Statistics Week* 2019, 17 – 21 June.

Gal, Iddo. (2002), "Adults' statistical literacy: Meanings, components, responsibilities." *International statistical review* 70, no. 1 (2002): 1-25.

Helenius, R. (2010). Improving statistical literacy by national and international cooperation. In Proceedings of the Eighth International Conference on the Teaching of Statistics. IASE, ISI.

Helenius, R., & Mikkelä, H. (2011). "Statistical literacy and awareness as strategic success factors of a national statistical office–the case of Statistics Finland". *Statistical Journal of the IAOS*, *27*(3, 4), 137-144.

Jones, P., Carter, J., Renken, J., & Tobón, M. A. (2021). Strengthening the Skills Pipeline for Statistical Capacity Development to Meet the Demands of Sustainable Development: Implementing a Data Fellowship Model in Colombia. Retrieved from https://www.research.manchester.ac.uk/portal/en/publications/strengthening-the-skills-pipeline-for-statistical-capacity-development-to-meet-the-demands-of-sustainable-development-implementing-a-data-fellowship-model-in-colombia(95d77266-c654-4311-881f-320150ad86e8).html.

Metzger, Daniel, Mikael Paaso, and Vesa Pursiainen (2020), "The Role of Statistical Literacy in Risk Perceptions and Behavior During the COVID-19 Pandemic." Available at *SSRN 3715926*.

OECD (2017), "The role of national statistical systems in the data revolution", in Development Co-operation Report 2017: Data for Development, OECD Publishing, Paris, https://doi.org/10.1787/dcr-2017-8-en.

Organization of Eastern Caribbean States (OECS) (2017). "Regional Strategy for the Development of Statistics 2017-2030". In Revolutionising our Statistics, Developing our Societies". Retrieved from, https://www.oecs.org/en/our-work/knowledge/library/statistics/oecs-rsds-2017.

PARIS21. (2020). "Guidelines for Developing Statistical Capacity-A Roadmap for Capacity Development 4.0". Retrieved from: https://paris21.org/sites/default/files/inline-files/UNV003_Guidelines%20for%20Capacity%20Development%20PRINT_0.pdf.

PARIS21. (2021). Advancing data literacy in the post-pandemic world. Retrieved from https://paris21.org/sites/default/files/inline-files/DataLiteracy_Primer_0.pdf.

PARIS21. (2021). "Update on the indicator for statistical literacy". Retrieved from https://paris21.org/statistical-literacy-2021.

Paul, Elieza (2018), 'Africa's Participation in International Statistical Literacy Project, 16th Conference of IAOS. OECD Headquarters, Paris, France, 19-21 September 2018, viewed 10 October 2021, https://www.oecd.org/iaos2018/programme/IAOS-OECD2018_Item_3-E-3-Paul.pdf>.

Poljičak Sušec, Martina and others (2014), "Statistical literacy as an aspect of media literacy." *Medijska istraživanja: znanstveno-stručni časopis za novinarstvo i medije* 20, no. 2 (2014): 131-155.

UN IEAG (2014). "A World That Counts: Mobilising the Data Revolution for Sustainable Development", Independent Expert Advisory Group on a Data Revolution for Sustainable Development, United Nations, New York, www.undatarevolution.org/wp-content/uploads/2014/11/A-World-That-Counts.pdf.

UN Secretary General (2014), "The road to dignity by 2030: ending poverty, transforming all lives and protecting the planet". *Synthesis report of the Secretary-General on the post-2015 sustainable development agenda*. New York: United Nations.

United Nations Economic Commission for Europe (UNECE) (2012). "Making Data Meaningful. Part 4: A guide to improving statistical literacy". Retrieved from https://unece.org/DAM/stats/publications/2013/Making_Data_Meaningful_4.pdf.

United Nations. (2020). "Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development. Retrieved from: https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework%20after%202020%20review_Eng.pdf.

United Nations (2020), "The Sustainable Development Goals Report, 2020". Retrieved from: https://unstats.un.org/sdgs/report/2020/The-Sustainable-Development-Goals-Report-2020.pdf

Watson, J. (1997). Assessing statistical thinking using the media. In I. Gal & J. B. Garfield (Eds.), The assessment challenge in statistics education (pp. 107–121). Amsterdam: IOS Press and The International Statistical Institute.

Watson, J., & Callingham, R. (2003). Statistical Literacy: A Complex Hierarchical Construct. *Statistics Education Research Journal*, 2(2), 3-46.

Watson, Jane, and Rosemary Callingham (2020), "COVID-19 and the need for statistical literacy." *Australian Mathematics Education Journal* 2, no. 2 (2020): 16-21.

UNITED NATIONS

Series

ECLAC **Studies and Perspectives-The Caribbean**

Issues published

A complete list as well as pdf files are available at
www.eclac.org/publicaciones

113. Statistical literacy: an enabler of statistical capacity development in the Caribbean, Shirelle Floyd, Iskuhi Mkrtchyan, and Abdullahi Abdulkadri (LC/TS.2022/227; LC/CAR/TS.2022/7), 2023.
112. Digital inclusion in Caribbean digital transformation frameworks and initiatives: a review, Dale Alexander, Lika Døhl Diouf and Kwesi Prescod (LC/TS.2022/226; LC/CAR/TS.2022/6), 2023.
111. The ageing Caribbean: 20 years of the Madrid Plan of Action, Nekehia Quashie and Francis Jones (LC/TS.2022/225; LC/CAR/TS.2022/5), 2023.
110. Science, technology and innovation for sustainable development: lessons from the Caribbean's energy transition, Laverne Walker and Jônatas de Paula (LC/TS.2022/217; LC/CAR/TS.2022/4), 2022.
109. Addressing gender disparities in education and employment: a necessary step for achieving sustainable development in the Caribbean, Abdullahi Abdulkadri, Samantha John-Aloye, Iskuhi Mkrtchyan, Candice Gonzales, Shari Johnson and Shirelle Floyd (LC/TS.2022/114; LC/CAR/TS.2022/3), 2022.
108. Preliminary overview of the economies of the Caribbean 2020–2021, Dillon Alleyne, Michael Hendrickson, Sheldon McLean, Machel Pantin, Nyasha Skerrette and Keron Victor (LC/TS.2022/49; LC/CAR/TS.2022/2), 2022.
107. A review of the status of institutional mechanisms for sustainable development planning in the Caribbean, Catarina Camarinhas and Ivica Trumbic (LC/TS.2022/16; LC/CAR/TS.2022/1), 2022.
106. Economic Survey of the Caribbean 2021, Dillon Alleyne, Michael Hendrickson, Sheldon McLean, Machel Pantin and Nyasha Skerrette (LC/TS.2021/222; LC/CAR/TS.2021/8), 2022.
105. Selected online learning experiences in the Caribbean during COVID-19, Amelia Bleeker and Ryan Crowder (LC/TS.2021/212; LC/CAR/TS.2021/7), 2022.
104. Education during the COVID-19 pandemic: access, inclusion and psychosocial support, Malaka Parker and Pablo Alfaro (LC/TS.2021/211; LC/CAR/TS.2021/6), 2022.

STUDIES AND PERSPECTIVES

Issues published:

113 Statistical literacy
An enabler of statistical capacity development in the Caribbean
Shirelle Floyd, Iskuhi Mkrtchyan and Abdullahi Abdulkadri

112 Digital inclusion in Caribbean digital transformation frameworks and initiatives
A review
Dale Alexander, Lika Døhl Diouf and Kwesi Prescod

111 The ageing Caribbean
20 years of the Madrid Plan of Action
Nekehia Quashie and Francis Jones

110 Science, technology and innovation for sustainable development
Lessons from the Caribbean's energy transition
Laverne Walker and Jônatas de Paula

ECLAC
Economic Commission for Latin America and the Caribbean (ECLAC)
Comisión Económica para América Latina y el Caribe (CEPAL)
www.eclac.org

LC/TS.2022/227