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Envisioning a Future Data Ecosystem in Federal Nepal

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Envisioning a Future Data Ecosystem in Federal Nepal

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The Nepal Development Update is produced twice a year to report on key economic developments over the preceding months, placing them in a longer-term and global perspective, and to examine (in the Special Focus section) topics of particular policy significance. The Update is intended for a wide audience including policy makers, business leaders, the community of analysts and professionals engaged in economic debate, and the general public.

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Abbreviations

AGIMO	Australian Government Information Management Office
BFI	Banks and Financial Institutions
CAD	current account deficit
CAR	capital adequacy ratio
CBS	Central Bureau of Statistics
CCD	Credit to Core Capital Plus Deposit
CDO	Chief Data Officer
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CGD	citizen-generated data
CPR	central population register
CRD	call detail records
CTO	Chief Technology Officer
DoC	Department of Customs
DoFE	Department of Foreign Employment
EC	Economic Census
FCGO	Financial Comptroller General Office
FDI	foreign direct investment
G2B	Government-to-Business
G2C	Government-to-Citizens
G2G	Government to Government
GDP	gross domestic product
GFS	Government Finance Statistics
GIS	Geographic Information System
GNI	Gross National Income
GoN	Government of Nepal
GPS	Global Positioning System
HLCIT	High-Level Commission for Information and Technology
IDEA	Institute for Democracy and Electoral Assistance
IRC	interest rate corridor
IRD	Inland Revenue Department
JICA	Japan International Cooperation Agency
MoF	Ministry of Finance
MTEF	Medium-Term Expenditure Framework
MTI	Macroeconomics Trade and Investment
MW	megawatt
NASA	The National Aeronautics and Space Administration
NDO	National Data Office
NDP	National Data Profile
NDU	Nepal Development Update
NEPSE	Nepal Stock Exchange
NGOs	nongovernmental organizations
NIC	National Information Commission

NIH	National Institutes of Health
NITRD	National Information Technology Research and Development
NNRFC	National Natural Resources and Fiscal Commission
NPC	National Planning Commission
NRB	Nepal Rastra Bank
NSDS	National Strategy for the Development of Statistics
NSO	National statistical offices
NSS	National Statistical System
NTIS	Nepal Trade Integration Strategy
OCR	Office of Company Registrar
OGD	Open Government Data
PAN	permanent account number
PERC	public expenditure review commission
SDGs	Sustainable Development Goals
SLF	Standing Liquidity Facility
SSSPCR	Strengthening Systems for Social Protection and Civil Registration
VAT	value-added tax
y/y	year-on-year

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Executive Summary

Recent Economic Developments

Economic growth in Nepal remained robust, reaching 7.1 percent in FY2019. This is in contrast with past growth that averaged 4.1 percent a year between FY2007 and FY2016. The service sector accounted for 57 percent of the growth, and the agriculture sector contributed an additional 24 percent. Higher remittance inflows and a surge in tourist arrivals translated into higher growth in retail trade, real estate, transport, and hotel and restaurant services. Good monsoons and increased commercialization coupled with improved availability of fertilizers, seeds, and irrigation facilities contributed to higher paddy, maize, and wheat production. Higher remittances also supported increased private consumption, while private investment expanded because of regular electricity supply and greater political and policy stability. However, public investment contracted as post-earthquake housing reconstruction slowed and national pride projects like Melamchi water supply and Upper Tamakoshi hydroelectric were further delayed. Net exports continued to underperform.

A good agricultural harvest helped keep inflation subdued at 4.6 percent in FY2019.

Food price inflation remained low at 3.1 percent, while non-food price inflation rose to 5.9 percent, driven by housing and utility prices. Inflation was also contained by the Nepalese rupee peg to the Indian rupee (at the rate of 1.6 to 1). Prices movements in Nepal follow those in India with a lag. However, in the last two months of FY2019, inflation spiked to above 6 percent (y/y), triggered mainly by government testing of vegetables and fruits imported from India for pesticides. This reduced food imports and domestic supply. Private sector credit drove growth in the money supply of 15.8 percent (y/y). Nepal Rastra Bank (NRB) adopted measures to limit overdraft facilities and hire purchases, which slowed private credit growth to 19.3 percent. Growth in deposits also slowed to 17.7 percent, mainly from a reduction of the ceiling on the share of institutional deposits (out of total deposits) held by banks. The continued higher level of credit relative to deposits growth limited the availability of loanable funds and kept interest rates elevated.

The financial sector remains stable, but a rising trend in non-performing loans point to some emerging vulnerabilities. Non-performing loans (NPLs) remain low but increased by 25 percent in 7 of the 25 private commercial banks, as elevated lending rates pushed some borrowers into default. All banks and financial institutions (BFIs) are well capitalized and meet the capital adequacy ratio requirement of 11 percent. However, capital adequacy ratios have declined over the past year, with development banks recording the largest decline. The NRB has been encouraging mergers and acquisitions to further strengthen the financial system and curb unhealthy competition.

With a lower growth in imports, the current account deficit narrowed marginally in FY2019 but remains large. Import growth decelerated to 5.2 percent (y/y). Slower growth was evident across all categories of imports, except consumer goods. Imports of capital goods and industrial supplies declined, as one-off capital imports to support federalism and housing reconstruction tapered off. Quantitative restrictions on sugar imports (to protect domestic producers) coupled with restrictions on vegetables and fruit imports from India reduced imports of food and beverages. In contrast, exports grew by 10.7 percent (y/y) on the back of increased demand for non-crude palm and soybean oil from India. This was helped by tariff exemptions on Nepalese exports to India (under the South Asian Free Trade Area Agreement), while other countries face tariffs of 54 percent on palm oil and 45 percent on soybean oil. Despite the lower import growth, the trade deficit far exceeded remittance inflows because of the high dependence on imports. As a result, the current account deficit (7.7 percent of GDP in FY2019) remained high. Foreign exchange reserves were used to partly finance the external deficit, leading to a decline in international reserves of the central bank for the first time since FY2010 to US$8 billion (6.8 months of imports) from a peak of US$9.5 billion in July 2018.

Robust revenue growth coupled with persistent underspending of the budget reduced the fiscal deficit from 6.7 percent of GDP in FY2018 to 1.9 percent in FY2019. Revenues grew by 17.7 percent (y/y), driven by income tax, value-added tax (VAT), and excise tax collections, all of which grew by more than 15 percent. Trade-related taxes were, however, lower than budgeted because of lower import growth. The robust performance of revenues was supported by: (a) a 20 percent surcharge on individual earnings of more than NPR 2 million; (b) higher excise duties on alcohol and tobacco and luxury vehicles; (c) a wider tax base for the VAT (for liquor, cigarettes, sanitary products, electronics, and construction materials in metropolitan and sub-metropolitan areas); and (d) introduction of a health risk tax on the production and import of cigarettes. On the expenditure side, total government spending dropped 2.7 percent (y/y). Capital spending declined for the first time since FY2006 as earthquake reconstruction efforts plateaued, national pride projects got further delayed and subnational governments were unable to spend. Recurrent expenditures grew marginally, by 0.9 percent, the lowest increase in the past 15 years, despite higher fiscal transfers to local and provincial governments. Underspending of the budget persists mainly from limited

technical capacity of existing staff and delays in the hiring of new staff at the subnational levels. To address some of the challenges linked to public expenditures, the government has started implementing certain recommendations put forth by the public expenditure review commission. The lower fiscal deficit and large government balances have constrained public debt to around 30 percent of GDP.

Fiscal federalism reforms are progressing with the increased transfer of resources to subnational governments and ongoing reforms to strengthen the fiscal transfer system. Fiscal transfers to local governments increased to 9 percent of GDP in FY2019. An additional 3 percent of GDP was also transferred with the initiation of revenue sharing. Work is underway to refine and further align the fiscal transfer framework with the Constitutional provisions that stipulate a fiscal gap approach. This work also entails further clarification of functions and service delivery norms that will define subnational expenditure needs. The basic elements of a functioning intergovernmental finance system are in place for budgeting and financial reporting. Over the medium-term, the system will need to be upscaled to support program monitoring for results and to inform subnational decision making. So far, the federalism successes have been possible because of implementation of key legislation such as the recent enactment of the Fiscal Procedures and Financial Responsibility Bill that governs public financial management across all tiers of government. Progress has also been possible due to the high-level political commitment.

Outlook

GDP growth is projected to average 6.5 percent over the medium term. A steady inflow of remittances coupled with high tourist arrivals is expected to drive growth in services. Among the key measures and investments that will help buoy tourist arrivals are (a) the Visit Nepal 2020 program; (b) completion of the second international airport; (c) construction of several big hotels; and (d) the increase in air connectivity through the implementation of new/revised air service agreements with different countries including Australia, Cambodia, China, the United Arab Emirates, and Vietnam. However, the recent delays in the monsoons coupled with climate-related natural disasters, the outbreak of armyworms that damaged crops, and fake paddy seeds used for growing crops are expected to reduce growth in agricultural production. Construction activities, new investments in the cement and hydropower sectors, and improved capacity utilization in the manufacturing sector will support industrial growth. Efforts to build subnational capacity and the implementation of performance-based contracts are also likely to improve government spending.

Private investment, in contrast, will be supported by the implementation of the 2019 national work plan to minimize the trade deficit. The establishment of the Nepal Infrastructure Bank, which will help finance large and critical infrastructure projects; and the operationalization of a one-stop service center for investors. More recently, the government has set up the Investment Reform Delivery Unit under the Prime Minister's office to advance doing business reforms.

The trade deficit is expected to trend downward over the medium term. This is because import growth will likely slow further as the spending on federalism-related infrastructure and post-earthquake reconstruction decline while the government implements a work plan for encouraging import-substituting industries. Electricity exports are expected to improve in the next few years, but broader export growth will depend on structural reforms (to boost competitiveness) yielding results. Remittances as a share of GDP are projected to stabilize at around 25 percent over the medium term. The external gap will be financed primarily by long-term borrowing and some drawdown in reserves. International reserves are projected to cover close to five months of imports by FY2021. There are negligible portfolio investments in the country and foreign direct investment is likely to remain low

over the medium term.

The fiscal deficit is projected to average around 3 percent of GDP, with a likely pickup in spending. Revenue performance is projected to remain robust as the government proceeds with reforms to improve tax mobilization. These include (a) improvements in tax administration through the operationalization of systems for vehicle and consignment tracking, biometric registration, and electronic tax payments; (b) strengthening VAT collection by providing an incentive for partial VAT refunds when payments are made electronically or through bank cards, (c) simplification of the tax structure by adopting a Single Tax Code to support greater compliance; and (d) the creation of a private-investment-friendly environment for productive industries and businesses. Efforts are also underway to strengthen own-source revenue of subnational governments. As provincial and local governments become fully functional, spending is likely to increase, and the fiscal deficit is projected to reach 3.3 percent of GDP by FY2021. The implementation of the Public Expenditure Review Commission recommendations is expected to support greater spending efficiencies. In addition, Development Partners, including the World Bank, are working to improve various facets of Public Financial Management and Public Investment Management. The fiscal deficit will be financed by a mix of domestic and international borrowing, and the availability of concessional financing is likely to continue.

Risks and Challenges

Persistently high trade deficits raise risks to the external sector. This could potentially be exacerbated if geopolitical tensions escalate in migrant receiving countries, thereby impacting remittance inflows. Lower remittances could also adversely impact the liquidity of the financial system. This risk is mitigated, in part, by measures to support exports and reduce imports.

Climate-related natural disasters resulting from erratic monsoons could adversely impact agricultural production and existing infrastructure and reverse the gains in poverty reduction. Recent delays in the monsoons and the outbreak of armyworms that damaged crops in parts of the country are likely to lower agricultural growth in FY2020. The government has been implementing reforms to strengthen the institutional framework for improved management of climate-related disasters, which will help mitigate some of these risks. Also, new construction is slated to be more resilient to climatic shocks, while there is increased emphasis on renewables through investments in hydropower projects.

In addition, capacity and staffing challenges persist, particularly at the subnational levels, and this could continue to affect budget execution and service delivery. Measures will be needed to strengthen planning and budgeting at the subnational levels, including implementation of subnational Medium-Term Expenditure Frameworks. Moreover, it will be important to adopt a legal framework for hiring staff at the subnational level, and a capacity building program for all staff.

Underpinning the above challenges is the need for more and better data that will support evidence-based reforms and risk mitigation efforts. This is the focus of the special topic section of this Nepal Development Update on data, which outlines the key data gaps as well as the legal and institutional framework for data and statistics in federal Nepal. It highlights the important role of data in supporting development and fostering transparency and accountability. The section aims to assist the government in envisioning a future data ecosystem that harnesses new technologies and new data sources to meet the growing demand for knowledge and evidence to steer Nepal's development progress.

Special Focus – Envisioning a Future Data Ecosystem in Federal Nepal

Nepal's historic transition to federalism has created a surge in demand for more and better data. One of the primary purposes of

decentralization is to improve public service delivery. Data and evidence-based analysis beyond heuristics and anecdotes play critical roles in achieving and measuring results. Aspirations are apparent, as declared by the Rt. Hon'ble President of Nepal during her address to the joint session of both Houses of the Federal Parliament in 2018, that the country's "development in the days to come will be based on intensive analysis of information and data, research and evidence." About 60 percent of the newly elected local leaders are new to politics[1], and a renewed sense of accountability is emerging as they strive to deliver the promises to their constituencies.

Data can play a critical role for successful implementation of federalism and accelerating development progress. Governments' core activities – including policy development, program implementation, and performance monitoring – all require data. The need for data is amplified as federalism brings the decision-making power to provinces and local governments. As the United Nations put it, "Data are the lifeblood of decision-making,"[2] and it is difficult to successfully implement federalism without high-quality data.

Globally, the internet and other digital technologies have led to an unprecedented increase in data production during the last two decades. At the turn of the 21st century, there were approximately 5 billion gigabytes of information available. By 2012, the same volume of information was created every two days. By 2016, 90 percent of data in existence were produced in the preceding year. The preceding 12 months produced nine times as much data as the world has produced previously.

The global data revolution is propelled by three mutually reinforcing factors. These include the ability to collect and store data digitally, the ability to share data instantaneously through the Internet, and the ability to analyze large volumes of data owing to the vast improvements in computer processing power.

Nepal's data ecosystem needs to build around three analogous dimensions that spurred the global data revolution: data production, data sharing, and data use, all of which must be built on a strong data governance structure. So far, the focus in Nepal has been on data production. Without improving data sharing and data use, however, additional data production will not contribute much to the growth and dynamism of the ecosystem, represented by the volume of the cube in Figure 1. The value of new data can be maximized only if the data can be widely shared and used by many.

Data evolve in an ecosystem, an environment in which a wide range of actors produce, use, and exchange data and data analytics across sectors and national boundaries. In many ways, this concept supersedes a national statistical system, traditionally spearheaded by a National Statistics Office that serves as the custodian of official statistics and is the main data producer for the government. It consists of more than government actors, such as the private sector, civil society, media, academia, and development partners.

Nepal's data ecosystem is facing a fundamental and inevitable paradigm shift. National Statistics Offices around the world are facing the need to graduate from data producers, relying on traditional surveys and censuses, to data integrators that exercise leadership and coordinate key actors to foster an effective and sustainable data ecosystem. Inaction will leave Nepal behind in the global data revolution and jeopardize the government's lofty goals for building a prosperous Nepal. Timely and visionary leadership, however, will enable Nepal to unlock the value of the data ecosystem to propel the economy and society forward.

1 World Bank 2018a.
2 United Nations 2014.

The Central Bureau of Statistics (CBS) is at the core of Nepal's data ecosystem. Established under the Statistical Act 1958, the CBS has long been regarded as the sole custodian of official statistics for the Government of Nepal. For example, the recently completed National Economic Census 2018 is a historical landmark, as it is the first such census in Nepal. The CBS is preparing for the next round of the Population and Housing Census in 2021. This census is a golden opportunity to bring a fresh set of benchmark data for all three tiers of government.

More than 60 years after the original Statistics Act, the CBS is no longer the sole government authority collecting data. Many line ministries and specialized agencies maintain administrative databases generated from the operation of public agencies such as registration, transaction, recordkeeping, and service delivery. All provincial governments and local governments will join the ranks of data producers and users in Nepal's data ecosystem. The unbundling report of the Constitution lists almost 50 responsibilities directly or indirectly related with data across the three tiers of government, including but not limited to data collection and management, coordination, capacity development, quality assurance, and protection of statistics. A strong coordination mechanism is urgently needed in order to clarify responsibilities and avoid duplications.

An emerging group of private firms and nonprofit organizations are contributing to a nascent yet emerging data community in Nepal. Citizen-generated data and private sector data also proved to be important data sources to generate near real-time measurement of the displaced population in the immediate aftermath of the 2015 Gorkha earthquakes. In the aftermath of the devastating earthquakes in 2015, Flowminder, a Swedish nonprofit company, used Ncell's aggregate and anonymized call detailed record (CDR) data to create a map of population movements. Near real-time and locally disaggregated measurement of population movements after natural disasters provided critical information about displaced populations, who are often vulnerable and in need of support.

Development partners play a significant supporting role in Nepal's data ecosystem. There are at least 14 multilateral and bilateral agencies providing support to more than 25 public agencies in Nepal in the area of data and statistics. They conduct a significant number of surveys on their own. Some development partners have already started supporting provincial and local governments, and this trend will likely increase in the future.

At the same time, the dearth of data is already surfacing as a challenge for many prominent federal initiatives. Fiscal equalization policies achieved through intergovernmental fiscal transfers rely on a heavily data-driven scheme, but so far it still relies on some data collected pre-federalism. The National Data Profile (NDP), an open data platform to disseminate data from all relevant sectors across all three tiers of government, faces similar challenges, and it could only draw on its 2011 Population and Housing Census data at the time of writing. Localization of Sustainable Development Goals also needs more and better data, and the National Planning Commission (NPC) already produced 120 provincial-level indicators, but not at the local level.

Data needs of local governments are even more diverse, as are the local development challenges and priorities. Metropolitan cities like Kathmandu and Lalitpur would need data for urban planning, much like other metropolitan cities in other countries. Many rural municipalities likely need basic demographic and socioeconomic indicators to set baselines. The way data are communicated must be carefully customized to local contexts because the capacity to understand data is extremely diverse. The need to grow capacity to use data is echoed across the spectrum of the data ecosystem.

Nepal needs a data ecosystem that can fill the demand for reliable data from users within and

outside of government. Most of the focus thus far was on data production. Without improving data sharing and data use, however, additional data production will not contribute much to the growth of the ecosystem. Realizing this vision will be a long journey. Strategic planning and investments under strong leadership are of utmost importance. Given the cross-cutting nature of data, much deeper coordination will be needed across government agencies, the private sector, civil society, media, academia, and development partners. The recommendations in this update are organized around two broad themes: (1) making the most of existing data, which focuses on short-term priorities; and (2) creating an enabling environment to nurture the data ecosystem, which mainly consists of long-term reforms.

Making the most of existing data would entail creating a more balanced data ecosystem across data production, sharing, and use. Since Nepal already has a lot of data, efforts around future data production should prioritize:

• *Continued and successful implementation of existing core statistical activities.* The National Economic Census 2018 was a major accomplishment for Nepal. The 2021 Population and Housing Census offers an important opportunity for Nepal to establish statistical benchmarks for the central, provincial, and local governments. The core statistical activities will need to be reinforced to remain authoritative data sources and to serve the purposes of subnational jurisdictions to avoid parallel data collections.

• *Developing a long-term data production schedule for national censuses and surveys.* Such a schedule would help avoid bunching of large-scale data production activities as observed in recent years. The government should use it to plan ahead of time and to strategically align donor support to ensure that these core activities cater to the data needs of the country over the long run. Given the intensive support by development partners in this area, development partners' coordination is critical. It will help provincial and local governments to plan to satisfy specific data needs not addressed by the federal government.

Short-term reforms that can drastically improve data accessibility include:

• *Publishing data appendixes in statistical abstracts and reports in a machine-readable format.* This will immediately boost data usability and reduces the chances of data misuse as users will no longer have to manually "scrape" data from PDF files or manually restructure data for analysis. To the extent possible, methodological notes and programs to replicate the results should also be made available. Transparency around how statistics are generated is essential for building and maintaining trust.

• *Developing a consistent data dissemination policy.* Anonymized microdata from sample surveys should be consistently made available online and free-of-charge. The revenue from sales of microdata is likely marginal compared to the value of the data sets to society. The practice of charging for data limits use. It is crucial, however, that the privacy of respondents and confidentiality are ensured. Trust is the main currency of national statistical agencies and must be protected.

Improved data sharing must be accompanied by efforts to boost demand for data use by government agencies, private firms, academic institutions, and the general public including:

• *Building basic data literacy for local governments across the country.* The need for capacity building for data collection, sharing, and use is echoed across all three tiers of the government and across the spectrum of the data ecosystem. Priority should be given to local governments as they are responsible for the delivery of key public services, but their capacity varies significantly. Efforts to narrow this capacity gap are needed to ensure that no local governments are left behind.

• *Promoting innovations in data use that explore new sources of data* such as geospatial data, remote sensing data, private sector data, and citizen-generated

Table ES. 1. Envisioning a future data ecosystem in federal Nepal

Reform themes	Key recommendations	
Make the most of the existing data	**Data Production**	Leadership and long-term vision
	• Continue to focus on core statistical products (censuses and national surveys)	
	• Introduce geo-tagging in all relevant surveys, censuses and administrative registers	
	• Develop a long-term calendar of censuses and priority surveys, reflecting user feedback	
	• Establish a data producer-user network to reflect user feedback in data production	
	Data Sharing	
	• Develop a comprehensive data dissemination policy and open government strategy	
	• Promote data sharing in machine-readable formats	
	• Invest more and further develop National Data Profile as a model for improved data sharing and exchange	
	Data Use	
	• Cultivate demand for data use by government agencies, private firms, academic institutions, and the general public	
	• Promote innovations in data use that explore new sources of data such as geospatial data, citizen-generated data, and private sector data	
Create an enabling environment	**Data Governance**	
	• Establish a new data governance structure conducive for federal Nepal that clarifies leadership and coordination roles across the three tiers of government	
	• Update the Statistics Act and follow through on recommendations in the National Strategy for the Development of Statistics	
	Data Sharing	
	• Develop a long-term vision for enhanced data integration	
	• Develop an enabling legal and institutional framework conducive to active data exchanges across public agencies	
	• Develop a set of common, foundational registers on people, places, and business	
	Data Use	
	• Invest more in staffing and capacity development for data and statistics	

data. New data sources must be sought out as not all data demands will be satisfied by traditional data sources such as surveys and censuses.[3] To maximize the value of data produced by the private sector, governments should partner with one or two data providers to develop pathways for private data to flow for public good. Factors that support an effective partnership include ensuring privacy and security, minimizing transaction costs, and mitigating reputational risks.

Creating an enabling environment to nurture the data ecosystem would require reforms to strengthen governance; establish a strategy, systems, and a related legal framework for data integration; and increase staffing and capacity. A robust data governance structure would enable data sharing across government institutions and facilitate enhanced data integration that can connect data on people, businesses, and places, and produce timely and locally disaggregated data.

Strengthening the **data governance framework** is a critical prerequisite for a functional data ecosystem. This would entail the following reforms:

• *Establishing a new data governance structure conducive for federal Nepal that clarifies functions and roles and facilitates increased coordination across the three tiers of government.* Intergovernmental coordination becomes increasingly important to support Nepal's data ecosystem. The data governance should be institutionalized in such a way that data coming from different sources would "complement" rather than "compete" with each other and abide the "cooperation," "co-existing," and "coordination" principle enshrined in the Constitution of Nepal. We discuss three alternative models with examples from other countries.

• *Following through on the recommendations of the National Strategy for the Development of Statistics (NSDS) as a strategic platform for improving the national statistical system.* It is imperative for the government to establish an implementation mechanism based on an agreed roadmap. The eventual adoption of a new Statistics Act is critical for the establishment of a sound national statistical system that makes up the core of the overall data ecosystem under the new federalism.

Enhanced **data sharing and integration** of administrative databases is imperative for a cohesive federated data ecosystem. This is an opportunity for Nepal to leapfrog as many middle-income countries struggle to fully harness the benefits of data integration. In Nepal, the governance framework could be strengthened to support improved data sharing and integration by developing:

• *A long-term vision for enhanced data integration, built on strong leadership and coordination beyond the traditional statistical system.* It needs an enabling legal framework and a supporting institutional arrangement conducive to active data exchange across public agencies, as well as a solid technical foundation to set standards, definitions, and data quality frameworks. Provisions for data privacy must be developed and encoded in legislation as required.

• *Common and foundational registers of people, places, and businesses,* with unique identifiers for linking data on people, businesses, and places. Nepal needs a set of common, foundational, national databases on people, places, and business to form the backbone of the new data ecosystem, with links to sectoral management information systems such as education and health. Together these three registers could form the nexus for an integrated register-based data system with the potential to vastly increase the efficiency of government operations. Countries such as Denmark, Norway, and Singapore make full use of integrated administrative databases to conduct their population census at a fraction of the cost for traditional censuses. The strong push for digitization of the Civil Registry and implementation of a National ID should be

3 Recent applications of geospatial data and citizen-generated data in Nepal are discussed in the main text.

expanded to other base registers, like the Company Register and the Cadaster.

Finally, it will be important to invest more in **staffing and capacity development** for improved **data use** and growth of the data ecosystem. Meeting the growing data demands such as fiscal federalism and National Data Profile needs significant financial and human resource support to cover the bottom line. National statistical agencies have limited opportunities for generating revenue, and given the public good of their product, sufficient public funding via national and subnational budgets is needed.

The transition to federalism is a testament to Nepal's desire to accelerate its development progress to achieve a series of ambitious goals. Nepal aspires to be a prosperous middle-income country by 2030 and committed to achieving a range of aspirational development goals, including the Sustainable Development Goals (SDGs). Goals cannot be achieved without monitoring progress, and progress cannot be monitored without high-quality data. To translate aspirations into actions, there is an emerging thirst for more data and knowledge to design effective policies to accelerate development progress by all three tiers of the governments.

Nepal's data ecosystem needs long-term strategic directions to modernize itself and improve data sharing and data use. Nepal already has a lot of data to start its own data revolution, but they exist in silos. In a way, Nepal's data ecosystem today is like society at the dawn of the digital transformation in which many have a computer, but no internet. The volume of information exchange would be severely limited in such a constrained environment. The culture of data use will not grow unless there is an active exchange of data that encourages data-driven innovations. A positive feedback loop must be created, whereby improved data sharing leads to enhanced data use, which in turn can reveal data gaps and quality issues to improve data production.

Even in the age of artificial intelligence, it will remain a distinctive advantage of humans to ask the right questions. Data itself have no value, no matter how big they may be. Data must be used to measure things we care about and to generate knowledge that inspires change. Data must drive actions on results that count. This requires visionary leadership to push through necessary reforms to create an enabling legal and institutional environment for the data ecosystem to thrive and contribute to Nepal's development.

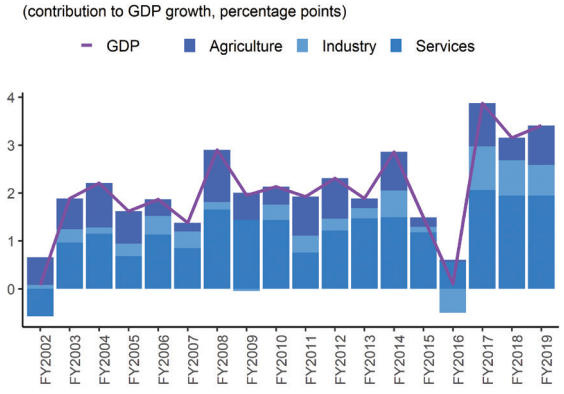
A. Recent Economic Developments

Real Sector

Nepal grew by more than 6 percent in FY 2019, a break from past tepid growth rates. Real gross domestic product (GDP) grew by 7.1 percent compared with 4.1 percent during FY2007–FY2016. Growth in the past year was mainly driven by the service and agriculture sectors, the latter supported by good monsoons. On the demand side, a surge in private sector investment and increased consumption, fueled by remittances, drove output expansion.

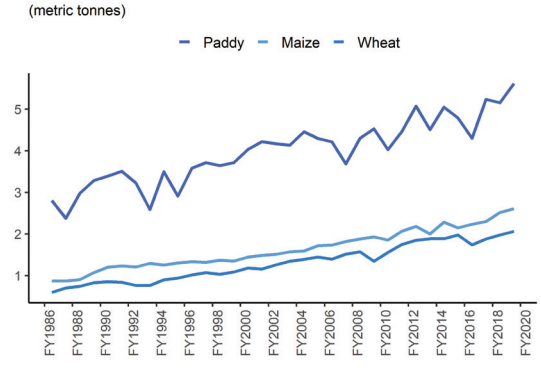
On the supply side, growth was driven by services (a 3.9-percentage-point contribution to GDP growth) and the agriculture sector (a 1.6-percentage-point contribution) (Figure 1). The services sector grew by 7.5 percent (y/y) in FY2019, boosted by higher remittance inflows and an uptick in tourist arrivals. Remittances supported the expansion of retail trade (10.9 percent, y/y) and real estate (6.1 percent y/y), whereas higher tourist arrivals boosted the transport (5.9 percent y/y), and hotel and restaurant (8.3 percent, y/y) subsectors. The agriculture sector expanded by 5 percent (y/y), well above its 30-year average of 3.1 percent. Good monsoons together with increased commercialization of agriculture, the availability of fertilizers and seeds, and irrigation facilities helped raise paddy production to the historic high of 5.6 million tons (Figure 2). In addition, maize and wheat production grew by 3.5 percent and 4.5 percent, respectively. These three crops together constitute more than 30 percent of agricultural GDP.

Figure 1. Growth reached 7.1 percent in FY2019 driven by services and agriculture...



Sources: CBS and World Bank staff calculations.

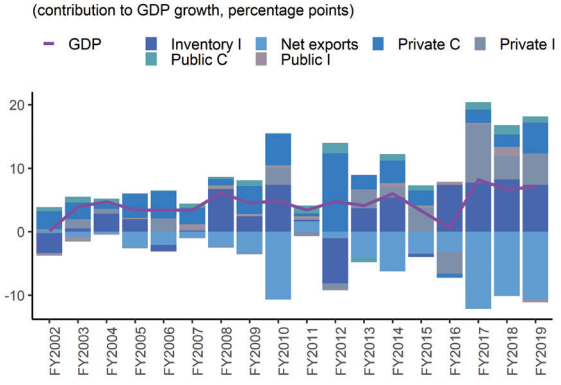
Figure 2. ...as production of paddy, maize, and wheat crops reached historic highs



Sources: MoAD and World Bank staff calculations

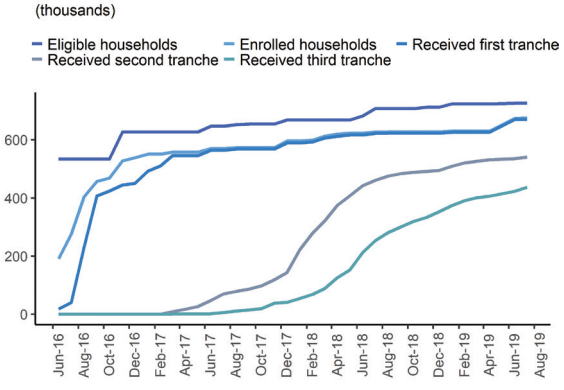
On the demand side, private investment and consumption were the main drivers of growth (Figure 3). Both contributed 4.9 percentage points each to overall GDP growth in FY2019. Private consumption grew on the back of higher remittances (discussed below), while private investment expanded because of the regular supply of electricity[4] and greater political and policy stability. Public investment, however, contracted, reducing growth by 0.5 percentage points, as post-earthquake housing reconstruction slowed[5] (Figure 4) and national pride projects like Melamchi water supply and Upper Tamakoshi hydroelectric were further delayed.

Figure 3. Private investment picked up in FY2019 whereas public investment contracted...



Sources: CBS and World Bank staff calculations.

Figure 4. ...as post-earthquake housing reconstruction continued to taper off



Sources: MoUD and World Bank staff calculations

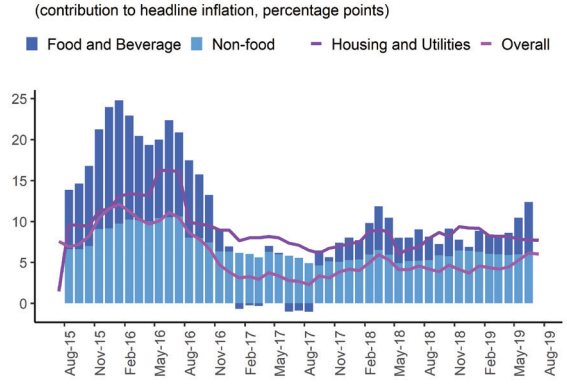
4 The 22 megawatt (MW) from the Bagmati Hydropower project and the 60 MW from the Upper Trishuli 3A were added in FY2019.

5 There has been growing concern that post-earthquake housing reconstruction is contributing to the increase in household debt as households increasingly borrow from informal sources (family, relatives, neighbors, and cooperatives) at high interest rates to construct their houses. Increased household borrowing from informal sources is due to insufficient government housing grants (NPR 300,000) and the inability of households to borrow from formal sources (banks and financial institutions) (see United Nations [2018] for details). In addition, there is a significant variation in the cost of housing reconstruction across earthquake-affected districts. That is why even after four years, only around 27.8 percent of earthquake survivors in the Kathmandu Valley have completed reconstruction works compared with 63.3 percent for the other 11 earthquake-affected districts.

Inflation

Inflation remained subdued in FY2019, driven by good agricultural production and the Indian Rupee. Average inflation was 4.5 percent in FY2019, lower than the revised monetary policy target of 5.5 percent. The price of non-food items grew by 5.8 percent, driven mainly by housing and utilities (Figure 5), whereas food prices rose only by 3 percent, supported by the good agricultural harvest. The Nepalese rupee is pegged to the Indian rupee at the rate of 1.6 to 1 (India is the largest trading partner) and thus, inflation in Nepal follows the price movements in India, but with a lag (Figure 6). In the last two months of FY2019, inflation spiked to above 6 percent (y/y), mainly driven by higher food prices. This was triggered

Figure 5. Inflation remained subdued due to low food prices...



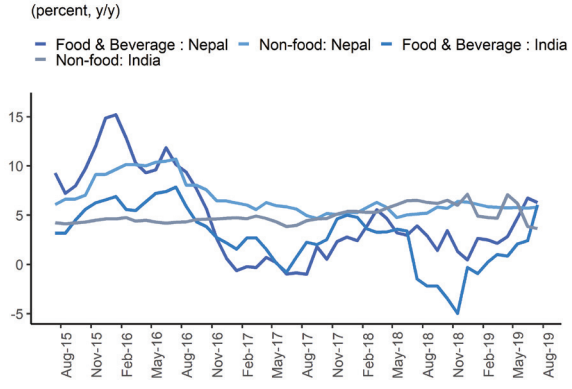
Sources: NRB and World Bank staff calculations

by the government's decision to conduct pesticide tests on vegetables and fruits imported from India which resulted in lower uptake of imported food and an increase in domestic prices.

Monetary Policy and the Financial Sector

Monetary policy remained accommodative in FY2019, with the policy repo rate (14 days) set at the same level as FY2018. The NRB has been using the interest rate corridor (IRC) since FY2017 to help control the short-term interest rate (weighted average interbank rate) and keep

Figure 6. ...and the price trends in India

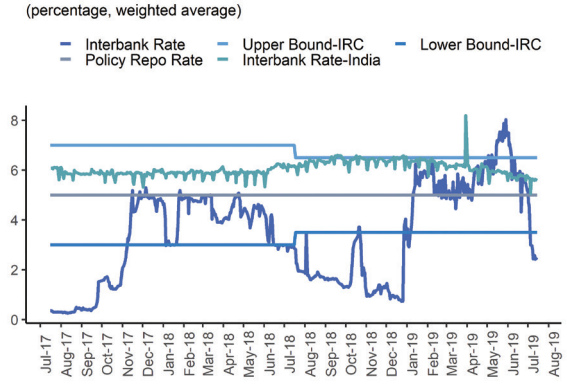


Sources: NRB, Ministry of Statistics and Program Implementation of India, and World Bank staff calculations

it in the target range. In FY2019, the lower limit and the upper limit of the target range were set to the two-week deposit collection rate (3.5 percent) and the standing liquidity facility (SLF[6]) rate (6.5 percent), respectively. This range was narrower than FY2018 by 1 percentage point. The interbank rate remained below the lower limit of the IRC in the first half of FY2019 but was largely range bound in the second half (Figure 7). The deviation in the first half stemmed from the NRB's decision not to mop up excess liquidity in order to lower the lending rate. Following the central bank's directive on December 26, 2018, to allow interbank loans to be treated as deposits when calculating the credit-to-core capital and domestic deposits (CCD) ratio, the interbank rate surged. This directive, together with the use of 14-day repurchase agreements (equivalent to NPR 5.7 billion in the second half of FY2019), helped keep the interbank rate within the IRC in the second half of FY2019. However, the interbank rate slumped toward the end of the fiscal year, and remained below the lower limit, because of increased liquidity resulting from underspending

6 Under the SLF, the central bank provides collateralized loans up to 90 percent of the face value of collateral to meet a short-term liquidity requirement (up to five days) of BFIs.

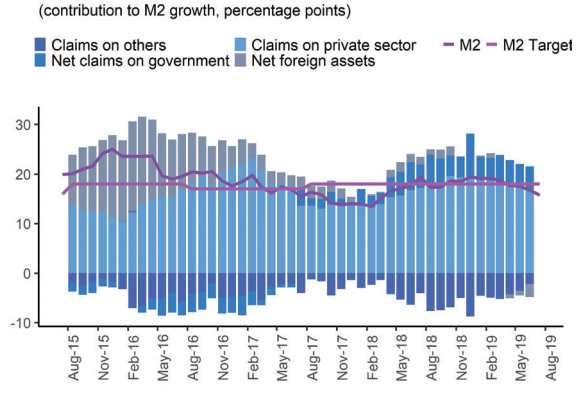
Figure 7. The interbank rate remained within the IRC in the second half of FY2019



Sources: NRB and World Bank staff calculations.

of the budget. This has created a large interest rate gap with India, putting pressure on the exchange rate peg.

Figure 8. Money supply grew but was below the monetary policy target

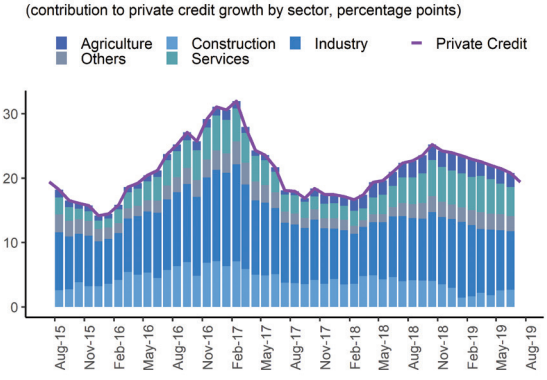


Sources: NRB and World Bank staff calculations.

Money supply (M2) growth was below the FY2019 monetary policy target (Figure 8). M2 grew by 15.8 percent (y/y) in July 2019 and remained below the FY2019 target of 18 percent. The private sector was the key driver of M2 growth, contributing 15.1 percentage points. Net claims on the government contributed another 3.6 percentage points as government deposits declined. However, net foreign assets made a negative contribution of 2.2 percentage points to M2 growth.

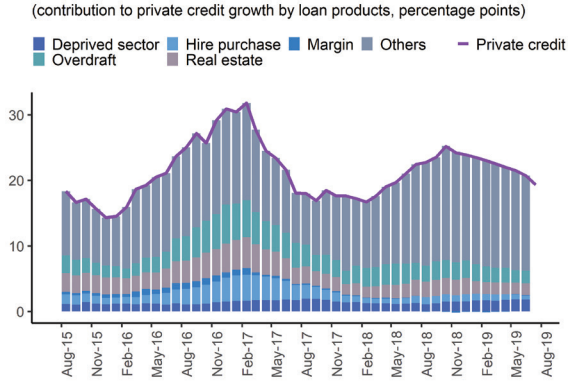
Private sector credit growth, while lower than last year, remained robust. Credit grew by 19.3 percent in FY2019, lower than the monetary policy target of 20 percent and the FY2018 growth of 22.4 percent. The deceleration was primarily because of the slowdown in growth of real estate loans and the macroprudential measures introduced by the NRB (Figures 9 and 10). The NRB adopted measures related to overdrafts and hire purchases to contain credit growth.

Figure 9. Credit growth has declined recently...



Sources: NRB and World Bank staff calculations.

Figure 10. ...partly explained by a reduction in overdrafts and hire purchases...



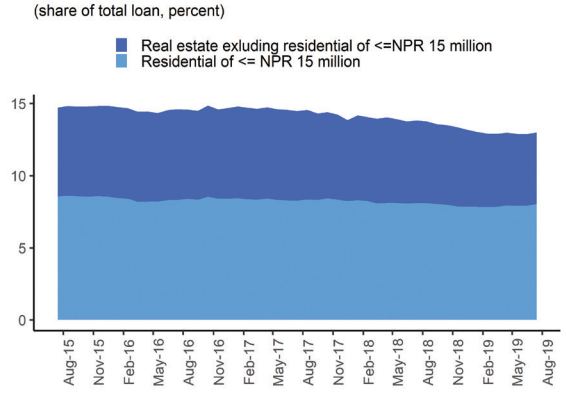
Sources: NRB and World Bank staff calculations.

For overdrafts, the maximum limit for personal overdraft loans was reduced to NPR 5 million in July 2018 from the previous level of NPR 7.5 million, whereas for hire purchases, the loan-to-value threshold was reduced from 65 percent

to 50 percent in November 2019. As a result of these measures, overdrafts and hire purchases declined, reducing overall credit growth. Despite the slowdown in credit growth, commercial banks, development banks, and finance companies met their priority sector lending targets and channeled 30.3 percent, 24.7 percent, and 17.6 percent, respectively, of their total credit to agriculture, energy, and tourism.

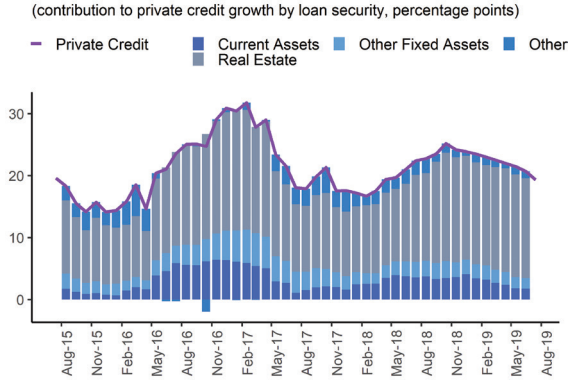
The direct exposure of BFIs to the real estate sector has declined (Figure 11). In July 2019, the share of real estate loans (including residential loans) to total credit decreased to 13 percent, significantly below the regulatory limit of 25 percent. This decrease came from a fall in the share of residential real estate (of value less than NPR 15 million) and commercial real estate loans by 13.2 percent (y/y) as lending rates remained high. However, the share of residential real estate loans of value up to and including NPR 15 million, was unchanged at 8 percent. It should be noted that the reported direct exposure may not reflect the true exposure as some personal overdraft loans are also being channeled to the real estate sector.

Figure 11. ...and the share of real estate credit to total credit also declined[7]



Sources: NRB and World Bank staff calculations.

Figure 12. Real estate continues to be the preferred form of collateral for BFIs

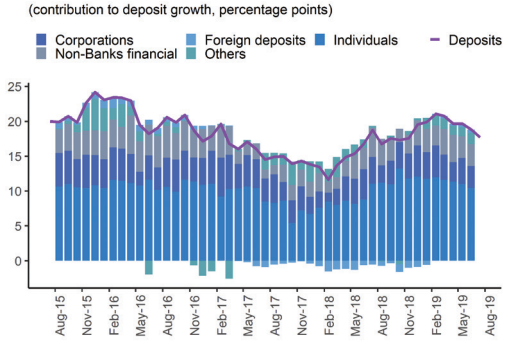


Sources: NRB and World Bank staff calculations.

However, real estate continues to be the BFI's preferred collateral for lending. In FY2018, real estate backed loans explained 62.7 percent of total credit growth, up from 60.3 percent in FY2017. In the absence of any further policy measures in FY2019, the contribution of real estate backed loans to total loan growth swelled to 79.4 percent (Figure 12).

Deposits growth also slowed in FY2019 (Figure 13). Deposits grew by 17.7 percent in FY2019, slightly lower than the 18.8 percent growth in FY2018. The slowdown in deposit growth was driven primarily by institutional depositors

Figure 13. Deposit growth has declined



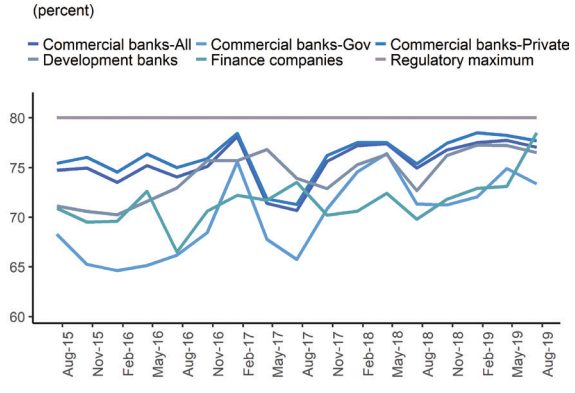
Sources: NRB and World Bank staff calculations.

7 The threshold for residential home loans was NPR 10 million prior to October 2017. Currently, loan amounts of less than NPR 15 million fall under personal home loans. Anything above that is lumped together with commercial real estate.

(like insurance companies, Employees' Provident Fund) because of the reduction in the NRB-mandated ceiling for institutional deposits to 15 percent of total deposits (from 20 percent earlier) in July 2018. There was also some slowdown in individual deposits because of the deceleration in remittance growth. In a positive step forward, in November 2018, the NRB increased the coverage amount of deposit insurance by NPR 100,000 to NPR 300,000 per depositor per bank.

The measures introduced by the NRB to increase the availability of loanable funds has not had much impact. Higher credit growth relative to deposit growth put pressure on the availability of loanable funds. The Local Currency Credit to Core Capital and Local Currency Deposit (CCD) ratio of BFIs – a measure of the availability of loanable funds – increased in July 2019 and continues to hover around the regulatory limit of 80 percent, reflecting a shortage of loanable funds (Figure 14). Among BFIs, the increase in the CCD ratio was the highest for finance companies and the lowest for state-owned commercial banks. The NRB introduced several measures to increase the availability of loanable funds, which included

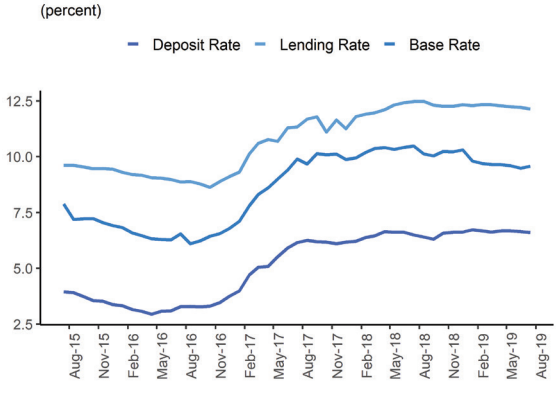
Figure 14. The CCD ratio remains close to the regulatory limit...



Sources: NRB and World Bank staff calculations.

(a) allowing commercial banks to borrow from Indian BFIs, in Indian rupees, from August 2018. This is in addition to the existing provision enabling convertible currency borrowing from foreign BFIs. The limit for both INR and foreign currency borrowing was initially set at 25 percent of core capital. In February 2019, this limit was raised to 100 percent. Development banks and finance companies were also allowed to borrow from Indian BFIs, but they can use these funds to invest only in the productive sectors such as tourism, agriculture, microfinance, and physical infrastructure, but not in real estate; (b) allowing BFIs to add loans obtained through the interbank window to deposits when calculating the CCD ratio (December 2018); (c) allowing BFIs to deduct concessional credit[8] from total credit when computing the CCD ratio (December 2018); and (d) encouraging commercial banks to issue debentures. Despite these measures, the CCD ratio remained high. As a result of the shortage of loanable funds, the long-term interest rates remain elevated (Figure 15) at 12.2 percent.

Figure 15. ...as a result, interest rates remain elevated



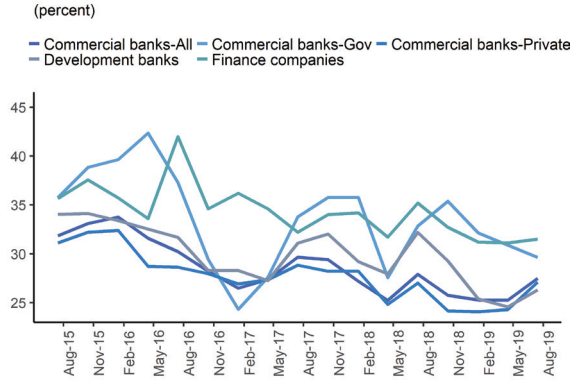
Sources: NRB and World Bank staff calculations.

The liquidity position remains adequate but there was a declining trend in FY2019

8 The concessional loans are provided to the following loan categories as per the FY2019 budget: loans to youth with higher education to start their own business; project loans for returnee migrants; project loans for women; business loans to the Dalit community; education loans to economically deprived, marginalized, and targeted communities for pursuing higher studies and for technical and vocational education; loans for the construction of private housing of earthquake victims; and commercial agriculture and livestock loans.

(Figure 16). Net liquidity – measured as net liquid assets to total deposits – for all BFIs remained above the regulatory requirement of 20 percent during FY2019.

Figure 16. Net liquidity remained above the regulatory requirement of 20 percent for BFIs

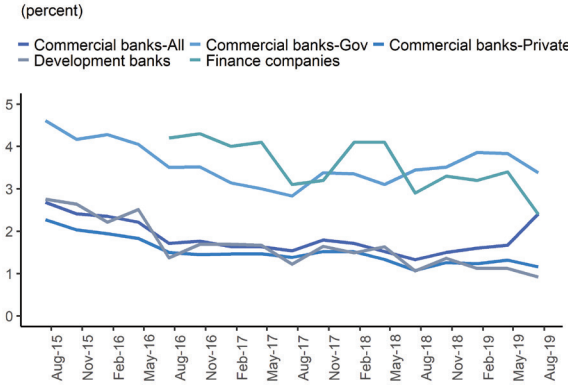


Sources: NRB and World Bank staff calculations.

However, BFIs did witness a decline in liquidity during the year. The liquidity position was supported by the reduction in the cash reserve ratio and the statutory liquidity ratio and by the open market operations of the NRB. The NRB reduced the cash reserve ratio to 4 percent for commercial banks and development banks from 6 and 5 percent, respectively, and the statutory liquidity ratio to 10 percent, 8 percent, and 7 percent for commercial banks, development banks, and finance companies from 12, 9, and 8 percent, respectively (July 2018). In addition, the NRB injected liquidity worth NPR 316.8 billion, consisting of regular repo of NPR 162.5 billion and a Standing Liquidity Facility of NPR 154.3 billion. The reverse repo and deposit auctions were much smaller. Although, these actions on the part of the NRB increased the liquidity and hence investible funds, they did little to change the CCD ratio and hence the loanable funds.

While overall non-performing loans remain below 5 percent, some vulnerabilities are emerging among private commercial banks. Non-performing loans (NPLs) – defined as the ratio of loans which are overdue by 90 days or more to total loans for all categories of BFIs – were in the low single digits in July 2019 (Figure 17).

Figure 17. NPLs remained low



Sources: NRB and World Bank staff calculations.

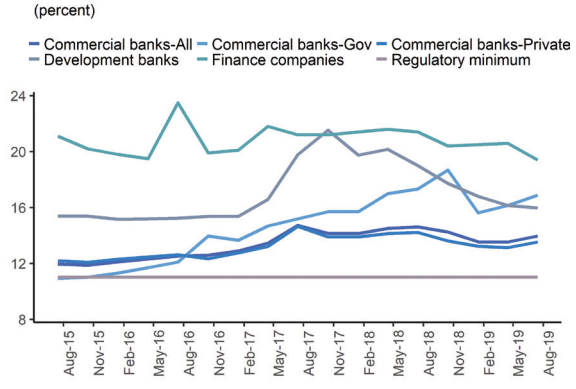
However, NPLs increased by 8.1 percent (y/y) for private commercial banks, as against a reduction in NPLs in other financial institutions. Seven of the 25 private commercial banks saw an increase in NPLs of more than 25 percent (y/y), with four of these registering a growth of more than 150 percent (y/y) as elevated lending rates pushed some borrowers into default.[9]

Nevertheless, all BFIs are well capitalized and meet the capital adequacy ratio (CAR) requirement of 11 percent. In July 2019, the CAR of state-owned and private commercial banks stood at 16.9 percent and 13.5 percent, respectively (Figure 18) while the CAR of development banks and finance companies were also above the regulatory requirement. Although BFIs maintained strong capital positions, capital ratios declined in July 2019, with development banks recording the largest decline. Stress test results from NRB show that the CAR of 24 out of 28 commercial banks fell below the regulatory

9 Since the NRB does not report NPL ratios by sectors, it was not possible to identify the key drivers of the deterioration in these seven banks.

minimum in July 2018, when subjected to a combined credit shock consisting of the following: i) 15 percent of performing loans downgraded to substandard; ii) 15 percent of substandard loans downgraded to doubtful; iii) 25 percent of doubtful loans downgraded to loss; and iv) 5 percent of performing loans downgraded to loss. The results of the stress test indicate that although the banking system is well capitalized, there is a need to monitor emerging vulnerabilities.

Figure 18. BFIs remain well capitalized

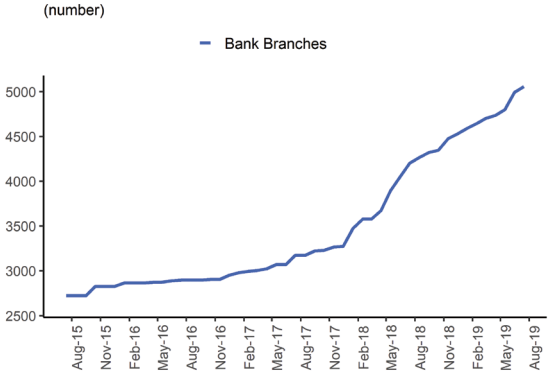


Sources: NRB and World Bank staff calculations

NRB has been encouraging mergers and acquisitions to further strengthen the financial system and curb unhealthy competition. As a result, in the last three years, the number of commercial banks decreased to 28 from 30, development banks to 29 from 76, and finance companies to 23 from 48. However, there were no mergers among commercial banks in FY2019. Contrary to NRB expectations, commercial banks were able to meet the enhanced capital requirements by raising capital through the issuance of bonus shares, rights shares, public offerings, and through mergers with non-bank financial institutions (development banks and finance companies). At the request of the NRB, most commercial banks submitted either the names of the banks they sought to merge with or a commitment letter for merger by July 2019. It is unclear whether such mergers will discourage unhealthy competition and a detailed analysis of the same needs to be undertaken.

Financial inclusion improved further in FY2019 (Figure 19). As of July 2019, the number of bank branches grew by 20.3 percent (y/y), enabling nearly 732 of the 753 local governments to have a bank branch in their locality. This was up from 631 local governments in July 2018. In FY2019 the government and the NRB introduced additional measures to expand financial inclusion, including: i) simplification of the paperwork required for opening new bank accounts (April 2019); and ii) stipulation of mandatory bank accounts for all employees of government, non-government organizations, and the private sector for salaries and financial pay incentives (July 2018).

Figure 19. The number of branches of BFIs rose by double digits in FY2019



Sources: NRB and World Bank staff calculations

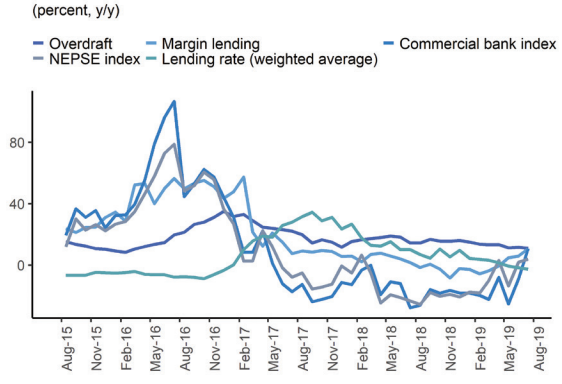
This program was first rolled out to government employees (October 2018) and was followed by employees in the service sector including international NGOs (January 2019). The remaining employees will be required to comply with this requirement from January 2020 onwards.

Stock Market

The stock market recovered partly toward the end of FY2019 in response to measures undertaken by the NRB and the government (Figure 20). The benchmark index, the Nepal Stock Exchange Index (NEPSE), declined 21.9 percent from April 2018 to May 2019, driven by (a) elevated lending rates; (b) higher interest rates on fixed deposits, which are less risky than the

stock market; (c) a reduction in the margin lending ceiling by the NRB to 25 percent of core capital in July 2018 from 40 percent, previously; (d) a decrease in the personal overdraft limit from NPR 7.5 million to NPR 5 million in July 2018; and (e) the government's mandatory requirement for secondary market traders with daily transactions above NPR 500,000 to have a permanent account number (PAN). To shore up the stock market, in December 2018, the NRB introduced a series of measures that included (a) a reversal in the decline

Figure 20. The Nepal Stock Exchange is gradually recovering



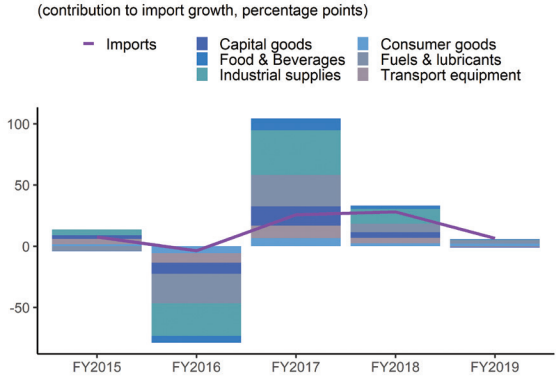
Sources: NRB, NEPSE, and World Bank staff calculations

in the margin lending ceiling to bring it back to 40 percent of core capital; (b) an increase in the loan-to-value ratio to 65 percent from 50 percent (value being the minimum of either the 180-day average price or the prevailing market price of the stock); (c) a reduction in the risk assigned to margin lending to 100 percent from 150 percent, previously; and (d) the introduction of margin loans through stockbrokers. In addition, the Nepal Stock Exchange provided a license in June 2019 to eight stockbrokers for providing a margin trading facility to the 31 listed companies eligible for margin trading. In addition, the budget speech of FY2020 also announced a capital gains tax reduction for individual investors from 7.5 percent to 5 percent (effective from FY2020). With the introduction of these measures, there was some revival in the stock exchange, with the NEPSE index up by 3.8 percent (y/y) in July 2019.

External Sector

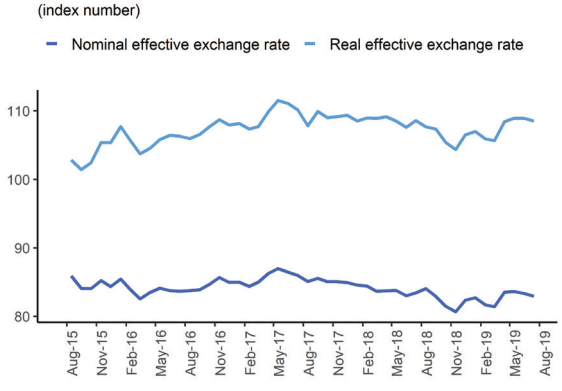
Import growth plummeted, driven largely by lower demand for capital goods and industrial supplies. In FY2019, import growth decelerated to 5.2 percent (y/y), down from 27.6 percent (y/y) in FY2018 (Figure 21). The fall in import growth was broad based and observed across all categories of products, with the exception of consumer goods. The largest declines were witnessed in capital goods and industrial supplies as one-off capital imports (such as bulldozers) to support housing reconstruction and federalism continued to taper off.

Figure 21. Import growth plummeted...



Sources: DoC and World Bank staff calculations

Figure 22. ...and the real exchange rate depreciated in FY2019...



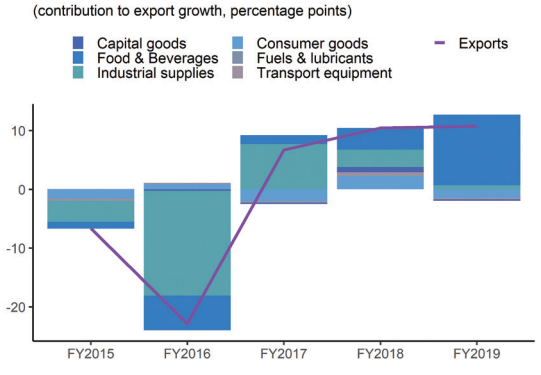
Source: IMF and World Bank staff calculations

In addition, the demand for cement clinkers declined as domestic production of clinkers

increased. The import growth of food and beverages also declined because of the government's decision to impose quantitative restrictions on sugar imports (between April 2018 and July 2019) to protect domestic producers. In addition, the depreciation of the real effective exchange rate (Figure 22) also disincentivized imports.

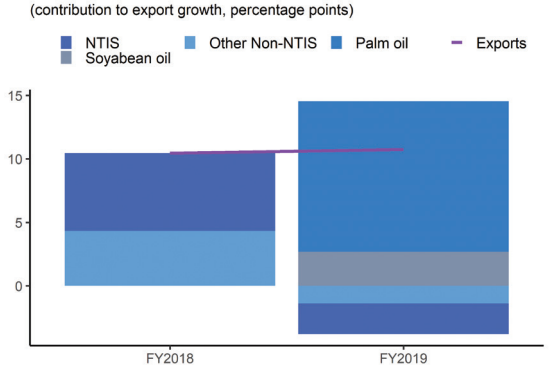
The growth in exports was sustained at FY2018 levels, supported by higher exports of crude palm and soybean oil (Figures 23 and 24). In FY2019, exports grew by 10.7 percent (y/y) on the back of increased demand for food and

Figure 23. ...while exports grew at FY2018 levels



Sources: DoC and World Bank staff calculations.

Figure 24. ...driven by exports of palm and soybean oils



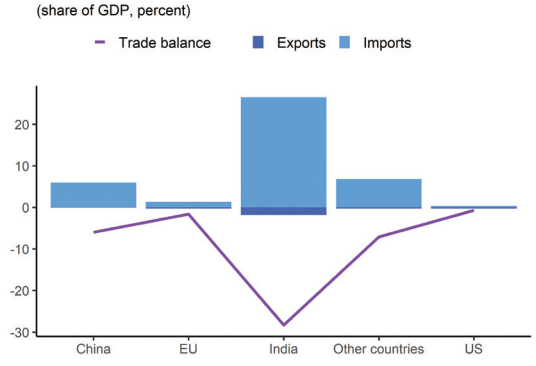
Sources: DoC and World Bank staff calculations.

beverages, especially, non-crude palm and soybean oil. Exports of non-crude palm and soybean oil began in FY2019, primarily to India, and were helped by the import tariff differential Nepal enjoys compared with other countries exporting these products to India. Exports to India from Nepal are exempted from tariffs under the South Asian Free Trade Area Agreement. However, tariffs of 54 percent on palm oil and 45 percent on soybean oil are levied by India when importing these products from other countries. Nepal capitalized on this arbitrage opportunity and significantly increased exports of these two products. However, it might not be a sustainable option in the long run. The export performance of products under the Nepal Trade Integration Strategy (NTIS) 2016 – all fabrics, textile, yarn, and rope, cardamom, carpet, footwear, ginger, leather, medicinal and aromatic plants, pashmina, and tea – was, however, dismal in FY2019, contracting by 4.8 percent (y/y) compared with the expansion of 17.9 percent (y/y) in FY2018. Consequently, the NTIS export value to GDP reached 1.1 percent, markedly lower than the target of 4 percent to be achieved by 2020. The key reasons for the weak performance included the lack of raw materials, skilled manpower, and infrastructure (processing centers, lab testing, storage facilities).

With a deceleration in imports, the trade deficit as a share of GDP declined. The decline in import growth coupled with a low exports-imports ratio resulted in the reduction of the trade deficit to 37.1 percent of GDP in FY2019 compared with 37.4 percent in FY2018.

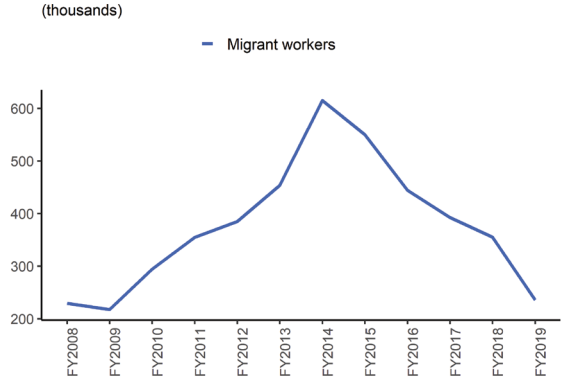
Nepal's trade remained concentrated in a few countries, highlighting vulnerabilities. In FY2019, although Nepal imported goods from 150 countries and exported goods to 45 countries, nearly 65 percent of the trade was with India. India and China together accounted for more than 80 percent of merchandise imports, while India and the United States accounted for more than 80 percent of merchandise exports. This concentration together with the high import-to-export ratio (at 12.3) makes Nepal highly susceptible to developments in India. Nepal also has a goods trade deficit with all major trading partners (Figure 25), indicating low export competitiveness.

Figure 25. Nepal had a trade deficit with all major trading partners



Sources: DoC and World Bank staff calculations.

Figure 26. Migrant worker outflow has contracted for five consecutive years



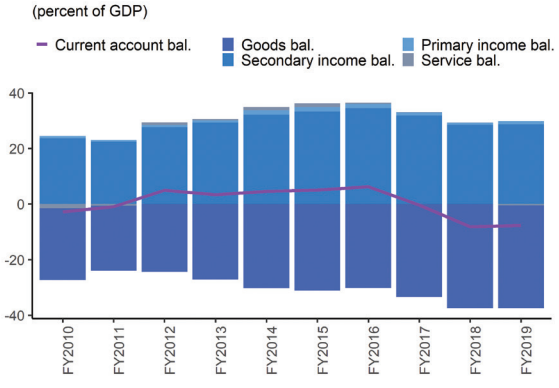
Sources: DoFE and World Bank staff calculations.

Migrant worker outflow has contracted five years in a row and reached a 10-year low in FY2019 (Figure 26). In FY2019, 235,510 Nepalese migrant workers went abroad, significantly down from 354,958 in FY2018. This is not only the fifth year in a row that the country saw a contraction in migrant outflows, but also the biggest contraction since FY2015. The decline in FY2019 was largely in response to a ban by the Nepalese government on outmigration to Malaysia because of overcharging of visa processing and health and security screening fees by outsourcing agencies. The ban was lifted in September 2019 after both countries agreed to implement the bilateral labor agreement of October 2018.

Remittance inflows remained robust, but their growth rate has slowed. Remittance inflows at US$7.8 billion in FY2019, grew by 7.8 percent, lower than the 10.2 percent recorded in FY2018. The sustained inflow of remittances was attributable to several factors. The depreciation of the Nepalese rupee against the U.S. dollar encouraged migrant workers to remit a greater share of their savings to benefit from the favorable exchange rate. This, coupled with an increased use of formal channels for remittances, contributed to higher officially recorded remittance inflows. In addition, Nepalese migrants are increasingly remitting money from Japan and the Republic of Korea, where wage rates are much higher. The main destinations for migrants are countries in the Gulf (Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates), from which Nepal receives almost 70 percent of total remittances.

With a lower growth in imports, the current account deficit narrowed marginally in FY2019 but remains large (Figure 27). Despite a lower trade deficit to GDP in FY2019, it still exceeded remittance inflows by a wide margin.

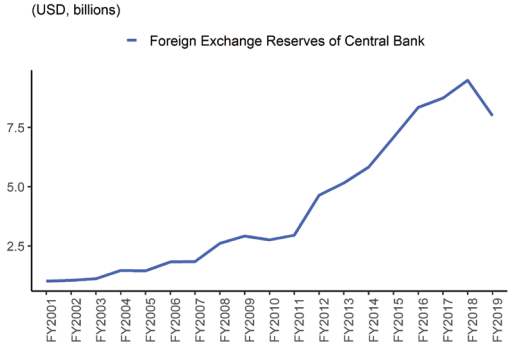
Figure 27. The current account deficit narrowed marginally in FY2019



Sources: NRB and World Bank staff calculations.

The trade deficit stood at a high of US$11.4 billion, significantly more than the remittance inflows of US$7.8 billion. Consequently, the current account deficit remained high at 7.7 percent of GDP in FY2019, but slightly lower than the FY2018 level of 8.2 percent.

Figure 28. The central bank's foreign exchange reserves contracted for the first time in nine years



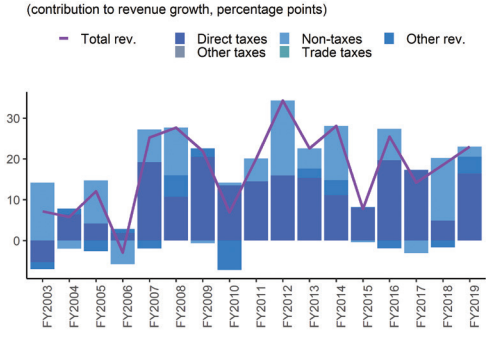
Sources: NRB and World Bank staff calculations.

Given that foreign direct investment (FDI), external borrowings, and other financing sources remained low, foreign exchange reserves were used to finance a part of the external deficit in FY2019. As a result, in July 2019, international reserves fell for the first time since FY2010 to US$8 billion (6.8 months of imports) from a peak of US$9.5 billion in July 2018 (Figure 28).

Fiscal Sector

Revenue growth was robust but below target (Figure 29). In FY2019, revenues grew by 17.7 percent (y/y), marginally below the budgeted growth rate of 18.3 percent. The increase was driven by the income tax, the VAT, and the excise tax, all of which grew by more than 15 percent. However, trade tax collections were lower than budgeted because of the deceleration in import growth (only 85 percent of the trade-related tax revenue target was achieved).

Figure 29. Revenue growth was robust but below the target...

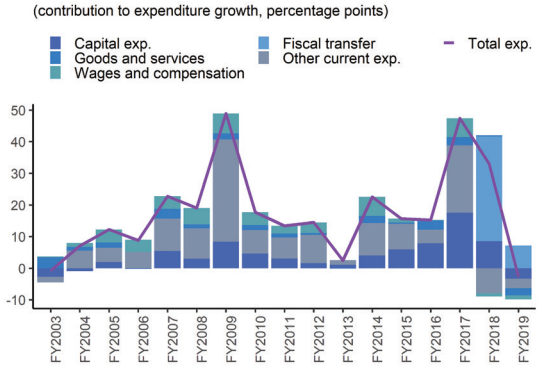


Sources: MoF and World Bank staff calculations.

The government implemented various tax enhancement measures in FY2019, which included (a) imposition of a 20 percent surcharge on individual earnings of more than NPR 2 million; (b) reduction in the threshold for capital gains property tax exemption; (c) an increase in the excise duty on alcohol and tobacco and luxury vehicles; (d) widening of the tax base for the VAT (the VAT is required for firms involved in liquor, cigarettes, sanitary products, electronics and construction materials in metropolitan and sub-metropolitan areas); and (e) introduction of a health risk tax on the production and import of cigarettes. These measures supported the buoyant collection of tax revenues.

However, federal expenditures contracted in FY2019, for the first time since FY2003 (Figure 30). In FY2019, government spending dropped by 2.7 percent (y/y) compared to growth of 33 percent (y/y) in FY2018. There was a decline in both recurrent (wages and compensation and goods and services) and capital expenditures, by 20.1 percent and 12 percent, respectively.

Figure 30. ...while expenditures contracted for the first time since FY2003

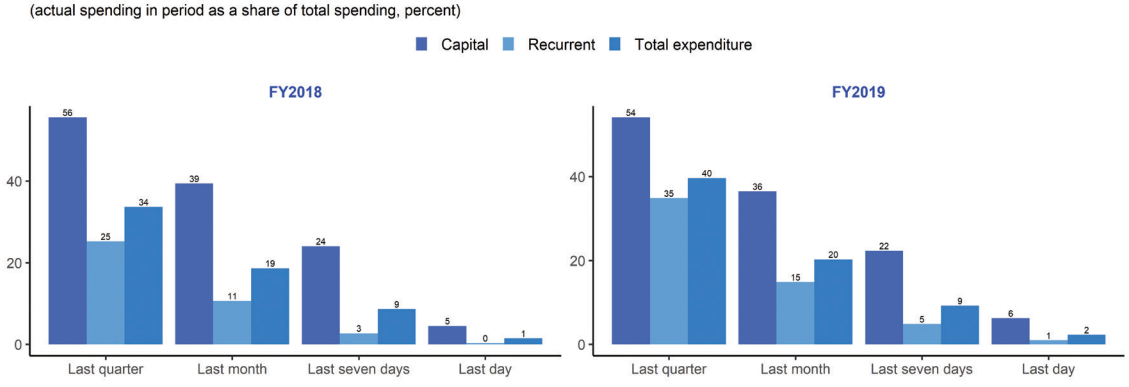


Sources: MoF and World Bank staff calculations.

Capital spending declined for the first time since FY2006 as earthquake reconstruction efforts tapered off, national pride projects were further delayed, and subnational governments were unable to spend because of capacity and staffing constraints. Recurrent expenditures grew marginally, by 0.9 percent, the lowest increase in the past 15 years, despite the increase in fiscal

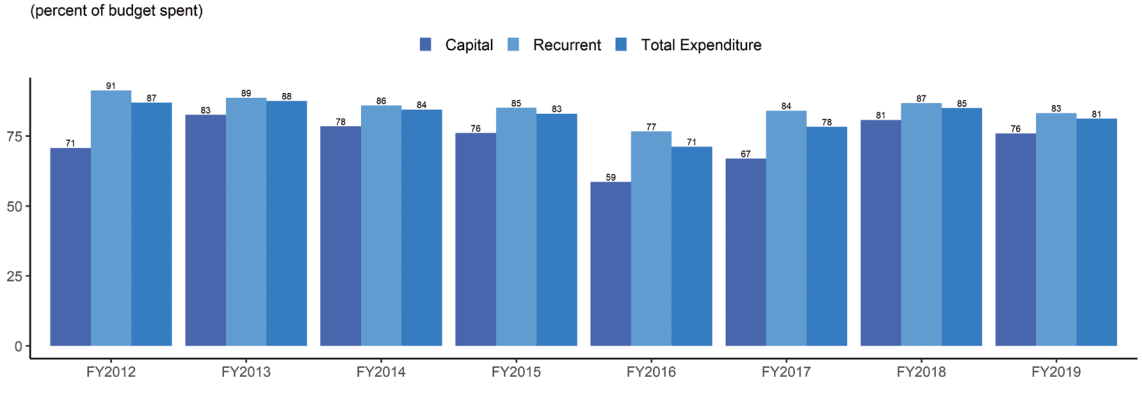
transfers to local and provincial governments. In August 2019, the government formed a public expenditure review commission (PERC) that recommended reforms to the existing public expenditure and expenditure management system for effective and results-oriented spending.

Figure 31. The bunching of capital spending continued in FY2019…



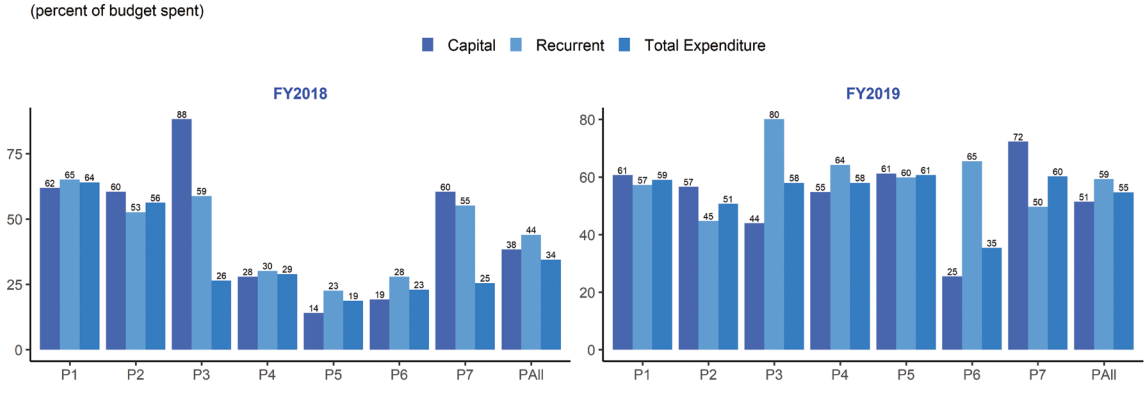
Sources: NRB and World Bank staff calculations.

Figure 32. ...as did underspending of the capital budget



Sources: NRB and World Bank staff calculations.

Figure 33. Underspending of the capital budget was also rampant in the provinces



Sources: NRB and World Bank staff calculations.

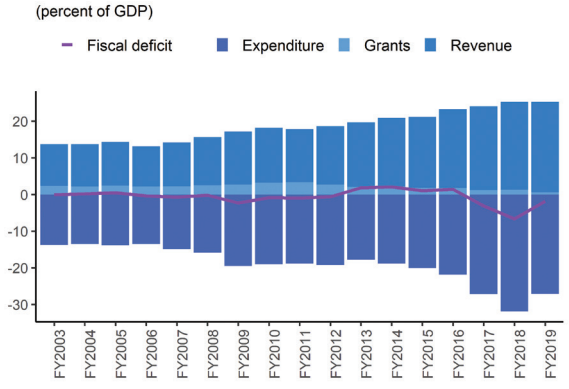
The government started implementing some of the recommendations of the PERC during FY2020.[10]

The bunching of capital spending in the last quarter and underspending of the capital budget continued in FY2019 (Figures 31 and 32). Drawbacks in the procurement process and the tendency to delay initiating contracts to the latter part of the fiscal year have led to a bunching of capital spending and underspending of the budget. With 54 percent of the capital budget spent in Q4 of FY2019, there was a marginal improvement compared with Q4 of FY2018, when it was 56 percent. However, the problem of underspending the capital budget remained, with only 76 percent of the capital budget spent in FY2019, down from 81 percent in the previous year. These problems have persisted over the years.

The underspending of the budget in the provinces was even larger (Figure 33). In FY2019, only 51 percent of the capital budget, 59 percent of the recurrent budget, and 55 percent of the total budget of provincial governments was spent (Figure 33). This was primarily because of the lack of technical capacity of existing staff and delays in the hiring of new staff at the subnational level. The latter was caused by delays in the enactment of Federal, Provincial, and Local Civil Service Acts, and in the establishment of provincial civil service commissions.

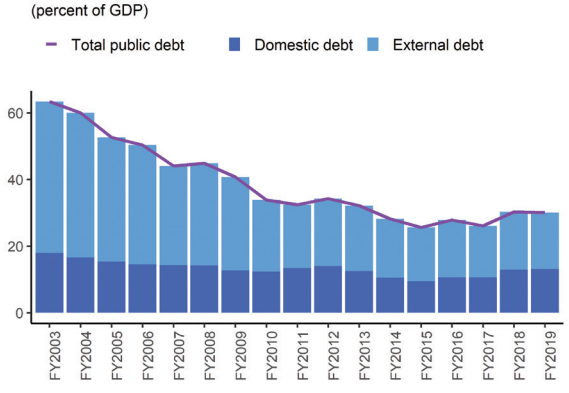
Robust revenue growth coupled with underspending of the budget led to a decline in the fiscal deficit (Figure 34). The fiscal deficit decreased from 6.7 percent of GDP in FY2018 to 1.9 percent in FY2019. Consequently, public debt in FY2019 (30.1 percent of GDP) remained close to the FY2018 level (of 30.2 percent of GDP) (Figure 35).

Figure 34. The fiscal deficit declined significantly in FY2019...



Sources: NRB and World Bank staff calculations.

Figure 35. ...and as a result, public debt remained close to the FY2018 level



Sources: NRB and World Bank staff calculations.

10 The PERC report has not been made public.

B. Outlook, Risks, and Challenges

Outlook

GDP growth is projected to average 6.5 percent over the medium term. On the supply side, growth will be driven by services, underpinned by steady remittance inflows and high tourist arrivals. The latter will be supported by the Visit Nepal 2020 program, the completion of the second international airport, the construction of big hotels, and the increase in air connectivity through the implementation of new/revised air services agreements with countries including Australia, Cambodia, China, the United Arab of Emirates, and Vietnam. However, lower agricultural growth is expected in FY2020, given recent delays in the monsoons coupled with climate-related natural disasters; the outbreak of armyworms, which damaged crops in many parts of the country; and fake paddy seeds that failed to germinate. Industrial growth will be supported by construction activities, new investments in the cement and hydropower sectors, and improved capacity utilization in the manufacturing sector, as the availability of electricity improves.

On the demand side, growth will continue to be driven by private investment and government consumption. Government consumption will be supported by increased spending on salaries, and on goods and services. In addition, efforts aimed at building capacity at the subnational levels coupled with the implementation of performance-based contracts is also likely to raise government spending. While private consumption will continue to be supported by steady remittance inflows, higher tariffs on some consumption goods could impact private consumption growth rates in FY2020. Private investment, in contrast, will be supported by the implementation of the 2019 national work plan to minimize the trade deficit, the establishment of the Nepal Infrastructure

Table 1. Macroeconomic projections of selected key indicators

	2016	2017	2018	2019 e	2020 f	2021 f
Real GDP growth, at constant market prices	**0.6**	**8.2**	**6.7**	**7.1**	**6.4**	**6.5**
Private Consumption	-0.7	2.6	2.5	6.5	0.9	1.5
Government Consumption	-0.4	10.5	13.4	8.3	44.4	7.2
Gross Fixed Capital Investment	-12.3	44.3	18.1	14.3	7.2	11.4
Exports, Goods and Services	-13.7	11.3	7.8	7.9	8.4	15
Imports, Goods and Services	2.8	27.2	19	17.9	7.7	5.5
Real GDP growth, at constant factor prices	0.2	7.7	6.3	6.8	6.4	6.5
Agriculture	0.2	5.2	2.8	5	4	4
Industry	-6.4	12.4	9.6	8.1	8.3	8.8
Services	2.3	8.1	7.6	7.5	7.2	7.2
Inflation (Consumer Price Index)	9.9	4.4	4.2	4.5	5	5
Current Account Balance (% of GDP)	6.2	-0.4	-8.2	-7.7	-6.8	-5.9
Fiscal Balance (% of GDP)	1.4	-3.1	-6.7	-1.9	-2.6	-3.3
Debt (% of GDP)	27.9	26.1	30.2	30.1	30.3	31.4
Primary Balance (% of GDP)	1.8	-2.7	-6.1	-1.3	-1.8	-2.5

Sources: MoF, NRB, and CBS for history and estimates. World Bank staff for forecasts.

Notes: e = estimate; f = forecast.

Bank[11], and the establishment of a one-stop service center. More recently, the government also decided to set up the Investment Reform Delivery Unit under the Prime Minister's office to advance doing business reforms. Given the low levels of FDI and large investment needs, critical reforms will be needed to improve the investment climate.

Inflation is expected to pick up slightly but will remain below 5 percent during the forecast period. Some increase in inflation is expected from higher public sector salaries, import duties on agricultural and industrial goods (to support import substitution policies), and the removal of VAT exemptions on some intermediate goods and services. The regular supply of electricity at low cost and low inflation in India will, however, help anchor inflation expectations and keep inflation below 5 percent over the medium term.

Reserves are expected to continue to be adequate to maintain the peg with the Indian rupee. Open market operations are the main instrument used to conduct monetary policy. For fiscal and monetary policy coordination, the Secretary of Finance sits on the NRB board that sets the monetary target (broad money growth). The target is based on projected economic growth and expected inflation. The target aims to achieve two explicit goals: price stability and external sector stability. The NRB also sets the target for private sector credit growth in line with monetary targets. Open market operations are conducted to stabilize liquidity in the BFIs, and the NRB uses the interbank rate of BFIs as the operating target. The IRC is used to minimize the volatility of interbank rates. However, more recently, interbank rates in Nepal have fallen below the IRC lower bound of 3.5 percent, while the same rates in India were around 5 percent. This accommodative policy of the NRB has increased the interest rate gap with India and has put pressure on the exchange rate peg. However, the NRB, is likely to undertake remedial action as it remains committed to the peg.

11 The infrastructure bank, mostly privately held, came into operation in March 2019. It will help finance large and critical infrastructure projects.

The current account deficit, which decreased marginally in FY2019, is expected to narrow over the medium term. The deficit is likely to moderate to 5.9 percent of GDP by FY2021 as the one-time spending on federalism-related infrastructure and post-earthquake reconstruction taper down further and the government starts implementing a work plan for encouraging export-oriented and import-substituting industries. Some increase in exports, particularly of hydroelectricity, is anticipated in the next few years, but broader growth in exports will happen only in the longer term as structural reforms start yielding results. Remittances as a share of GDP are expected to stabilize at around 25 percent over the medium term. The external gap will be financed primarily by long-term borrowing and some drawdown in reserves. International reserves are likely to cover close to five months of imports by FY2021. There are negligible portfolio investments in the country, and despite some expected increase in FDI, it will continue to remain low over the medium term.

Government expenditure is expected to pick up over the medium term as capacity is strengthened and vacant posts are filled at the subnational levels. Government spending as a percent of GDP decreased in FY2019 primarily because of capacity constraints and challenges in hiring new staff at the provincial and local levels. However, in the next two years (FY2020–FY2021), government spending is likely to increase due to salary increases, higher social security spending, and a pickup in capital investments. Transfers to the provincial and local governments will be sustained, and spending is likely to increase and thereafter stabilize at around 30 percent of GDP by FY2021.

Revenue mobilization efforts are primarily aimed at gradually shifting away from a system dependent on import taxes. These efforts include (a) broadening the tax base; (b) creating an environment friendly to private investment to promote productive industries and businesses; (c) improving tax administration through the operationalization of a vehicle and consignment tracking system, a biometric registration system, and an electronic payment system for all taxes; (d) strengthening VAT collection by providing an incentive for partial VAT refunds when payments are made electronically or through bank cards; and (e) formulating the Single Tax Code. These initiatives will help increase revenues to 26.4 percent of GDP by FY2021. Non-tax revenues are also expected to increase because of higher dividends (from institutions such as Nepal Telecom) and royalties from new hydropower projects.

At the provincial and local level, efforts are focused on establishing the legal and institutional framework to support enhanced own-tax revenue collection. These efforts are, however, likely to yield results only over the longer term. In the short to medium term, reforms are also being undertaken to increase spending efficiencies. This was supported, in part, by the Programmatic Fiscal and Public Financial Management DPC series (through reforms to strengthen the Medium-Term Expenditure Framework, fiscal procedures, and delegation of spending authority), and is also supported by the technical assistance from the Integrated Public Financial Management Reform Project on budget execution. A Federalism Capacity Needs Assessment led by the World Bank and UNDP was undertaken to assess capacity gaps in the transition to federalism, the results of which will be implemented over the short to medium term.

As provincial and local governments become fully functional, the fiscal deficit is projected to increase to 3.3 percent of GDP by FY2021. The transition to federalism is the key factor driving the fiscal deficit. The government has started implementing the recommendations of Public Expenditure Review Commission, which are aimed at improving spending efficiencies. In addition, Development Partners, including the World Bank, are working to improve various facets of Public Financial Management and Public Investment Management. Also, once the federalism transition has ended and there is more information on unit costs for service delivery at the local level, some spending efficiency gains can be achieved. The fiscal deficit will be financed by a mix of domestic

and international borrowing, and availability of concessional financing is expected to continue.

Risks and Challenges

One of the key risks to the outlook stems from the large external deficit, which is especially vulnerable to developments in migrant receiving countries. Increased uncertainty arising from the possibility of more protectionist policies, and the prospective impact on global economic growth and trade could hamper business sentiment in Malaysia and the Gulf countries (major destinations for Nepalese migrants). Malaysia recently experienced a contraction in investment. Should conditions in the major remittance receiving countries deteriorate, it could impact migration and reduce remittance inflows to Nepal. A reduction in remittances could also impact the liquidity in the financial system. This risk is mitigated, partly, by the government's recent program to reduce the trade deficit.

Climate-related natural disasters resulting from erratic monsoons could also adversely impact agricultural production and existing infrastructure and reverse the gains in poverty reduction. Recent delays in monsoons and outbreaks of armyworms damaged crops in parts of the country and could lower agricultural growth in FY2020. The government has been implementing reforms to strengthen the institutional framework for improved management of climate-related disasters, which will help mitigate some of these risks. Ongoing post-earthquake reconstruction has supported industrial growth, and the new investments will be more resilient to climatic shocks. Investments in irrigation will help to better manage the variability in weather due to monsoons. These investments will support growth, helping to compensate for any negative shocks to GDP from climate-related shocks. In addition, investments in the hydropower sector will support the use of renewables.

Capacity and staffing challenges persist, particularly at the subnational levels, and this could continue to affect budget execution at the provincial and local levels, impacting service delivery. Measures will be needed to strengthen planning and budgeting at the subnational levels, including the implementation of subnational Medium-Term Expenditure Frameworks. The government recently transferred experienced senior civil servants to the provinces, which should help support subnational capacity. However, it will be important to adopt a legal framework for hiring staff at the subnational level, and a capacity building program for all staff.

Underpinning the above challenges is the need for more and better data that support evidence-based reforms and risk mitigation efforts. This is the focus of the special section of this NDU, which assesses the key aspects of Nepal's evolving data ecosystem. It seeks to identify priority reforms needed to meet emerging data needs in the federal context. The aim is to assist the government in envisioning a future data ecosystem that harnesses new technologies and new data sources to meet the growing demand for evidence to steer Nepal's development progress. The analysis highlights the increasing potential of big data and digital transformation; identifies key data gaps; and outlines measures to close these gaps by establishing a governance framework for producing, sharing, and using data and statistics.

C. Special Focus – Envisioning a Future Data Ecosystem in Federal Nepal

C1. Data for Development in Federal Nepal

Nepal's historic transition to federalism has created a surge in demand for more and better data (Box SF.1). One of the primary purposes of decentralization is to improve public service delivery. Data and evidence-based analysis beyond heuristics and anecdotes plays a critical role in achieving and measuring results. Aspirations are apparent, as declared by the Rt. Hon. President of Nepal, Bidhya Devi Bhandari, during her address to the joint session of both Houses of the Federal Parliament in 2018, that the country's "development, in the days to come, will be based on intensive analysis of information and data, research and evidence."

Data can play a critical role in the successful implementation of federalism and accelerating development progress. Governments' core activities – including policy development, program implementation, and performance monitoring – all require data. The need for data is amplified as federalism brings the decision-making power to provinces and local governments. As the United Nations put it, "Data are the lifeblood of decision-

Box SF.1. Nepal's historic transition to federalism

Nepal has entered a new era with the transition to federalism, after going through arguably the most turbulent three decades in its modern history. The 1990 People's Movement put an end to the long-standing absolute monarchy and brought about democratic reforms. The nascent multiparty democracy, however, took a sour turn in 1996 and Nepal descended into a 10-year civil war that cost more than 10,000 lives. The 2006 Peace Agreement promised a constitutional democratic republic, but the drafting of a new constitution turned into a politically contested process. It was not until 2015 that the Constituency Assembly endorsed the Constitution, which restructured Nepal into a republic with federal, provincial, and local governments.

The 2015 Constitution reflects the aspiration for a prosperous Nepal, an ardent desire for more inclusive social contracts, and expectations for improved delivery of public services.[a] The peaceful and successful completion of the elections for all three tiers of government in 2017 was a historic milestone for the new federal republic, which marks a significant devolution of political and fiscal responsibilities away from Kathmandu. Results from recent nationally representative surveys showed that 90 percent of the adult respondents participated in the 2017 election;[b*] 52 percent of the respondents feel Nepal is heading in the right direction; and optimism is higher among the younger generation, in rural areas, and away from Kathmandu in the four western provinces (Gandaki, Karnali, Province 5, and Sudurpaschim).[c]

Like other new federal states, Nepal's nascent federalism is facing challenges. Improving public service delivery is one of the main motives behind decentralization in many countries. This is because many basic services such as education, health, and water and sanitation are consumed locally and can be better delivered by bringing the provider (government) and recipients (citizens) closer together. Yet decentralization often experiences challenges in the early stages, including misaligned or overlapping functions and weak capacity and accountability of subnational governments and newly established service delivery institutions.[d] Evidence suggests that Nepal is experiencing similar challenges.[e]

Sources: a. World Bank 2018a. b. Nepal Administrative Staff College 2018. c. Asia Foundation 2017; 2018. d. Ahmad et al. 2005. e. Government of Nepal 2019.
Note: *This is a survey-based estimate and deviates from other estimates such as the one by EU (2018), which reports a 69 percent voter turnout. The difference is likely attributable to the number of registered voters in the EU report, which likely includes the absentee population and those who passed away.

making,"[12] and it is difficult to successfully implement federalism without high-quality data.

Demand for data is increasing more than ever under federalism. The 2017 election was the first subnational government election in 17 years, during which there was a vacuum in the elected leadership in subnational governance across the country.

12 United Nations 2014, page 4.

About 60 percent of the newly elected local leaders are new to politics [13] and a renewed sense of accountability is emerging as they strive to deliver on their promises to their constituencies. Many of them see data as key inputs for local planning to set baselines and monitor progress.

Locally disaggregated data are essential for local decision making. Provincial governments are compiling statistical abstracts to accompany provincial budgets. As the authorizing power over revenue and budget appropriation has been decentralized to provincial assemblies, the need for trustworthy information about the social, environmental, and economic conditions in each province has become evident. Public availability and contestability of locally disaggregated data is critical for ensuring inclusive public services and promoting transparency and accountability. This demand was exacerbated by the newly introduced fiscal equalization scheme, which requires locally disaggregated data to drive equalization grant decisions and fiscal transfers from the central government to the subnational governments.

However, little data exist for Nepal's 753 local governments. One pertinent example of this data scarcity is Nepal's attempts to locally monitor the Sustainable Development Goals (SDGs). The NPC committed to monitoring more than 400 local SDG indicators. Of these, the NPC has produced 120 provincial-level indicators using traditional data collection methods such as household surveys, censuses, and aggregating district-level administrative data to the provincial level. At the local government level, however, fewer than five indicators could be produced, mainly from the 2011 Population and Housing Census data. This paucity of timely and locally disaggregated data is a bottleneck for measuring progress on Nepal's SDGs and its progress implementing federalism.

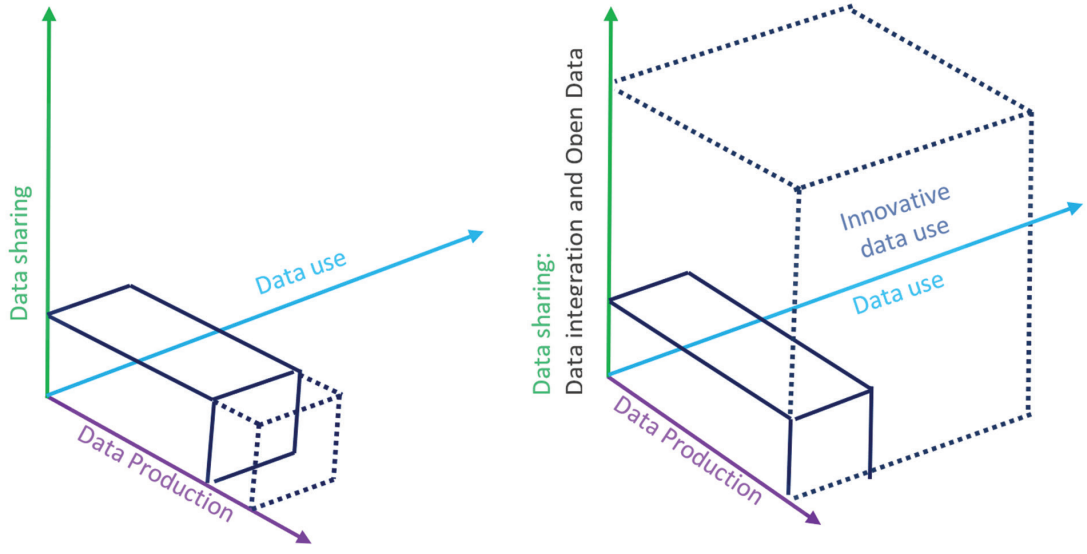
Long-term strategic planning around data and statistics is urgently needed to coalesce existing activities and harness innovation. The 2015 Constitution granted authorities to all three tiers of government to produce, analyze, and disseminate data in their respective jurisdictions. It is not realistic to rely on surveys to produce reliable statistics for all 753 local governments. Censuses will be too expensive to repeat at the frequencies soon to be demanded by the data users. New sources of data and innovative data use must be explored to satisfy the demand for high-frequency data and locally disaggregated data created by federalism.

Nepal's data ecosystem is facing a fundamental and inevitable paradigm shift. Since the adoption of the Statistics Act in 1958, Nepal's Central Bureau of Statistics (CBS) has been the sole custodian of official statistics. However, this is evolving as many public agencies now collect and maintain administrative databases. Moreover, the emerging private sector and provincial and local governments will become increasingly active in coming years. This paradigm shift is not unique to Nepal. National Statistics Offices around the world are facing the need to graduate from data producers, relying on traditional surveys and censuses, to data integrators that exercise leadership and coordinate key actors to foster an effective and sustainable data ecosystem.[14]

13 World Bank 2018a.
14 Arora 2018; Cheung 2018.

Figure SF.1. Conceptual visualization of Nepal's evolving data ecosystem

Now - focussed on data production Future - balanced focus on production, sharing and use



The objective of this special focus is to assist the Government of Nepal (GoN) to envision a future data ecosystem that meets the growing demand for data and evidence to support Nepal's federalism transition and, ultimately, to accelerate Nepal's development progress. Nepal's data ecosystem will evolve around three key dimensions that propelled the global data revolution: data production, data sharing, and data use. The focus so far in Nepal has been on production. Without improving data sharing and data use, however, additional data production will not contribute much to the growth and dynamism of the ecosystem, represented by the volume of the cube in Figure SF.1. The value of new data can be maximized only if the data can be widely shared and used. With the transition to federalism, there will need to be more focus on the kind of data and evidence in demand by the provincial and local governments, businesses, potential investors, and the general public. A major shift in the data culture and openness towards innovations will be necessary. This will also require establishing a complementary governance framework that supports better production, sharing, and use of data, including the development of new sources and systems to meet emerging needs of data users in the 21st century.

The rest of the document is organized as follows. Section C2 summarizes the data revolution that transformed the global data landscape over the last 20 years and elaborates on challenges and opportunities for Nepal. Section C3 describes Nepal's emerging data ecosystem and its growing complexity and potential. Section C4 discusses the emerging data demands propelled by the federalism transition. Section C5 discusses a set of recommendations to meet the growing gap between data supply and demand.

C2. A data revolution is transforming the world

The internet and other digital technologies have led to an unprecedented increase in data production during the last two decades. At the turn of the 21st century, there was approximately

the equivalent of 5 exabytes[15] of information available in the world. [16]Approximately three-quarters of that information were stored in non-digital formats such as film, paper, and cassette tapes. By 2012, the same volume of information was created every two days, [17] with less than 2 percent of the newly created information in non-digital format.[18] By 2013, 90 percent of data in existence was produced during the preceding two years.[19] By 2016, 90 percent was produced in the preceding year,[20] which was also nine times as much data as the world had produced previously.

Data have become cheaper, faster, and easier to collect, analyze, and share. Data storage costs have declined dramatically in the last two decades; the price of hard drive storage per gigabyte decreased from US$1,120 in 1995 to US$0.03 in 2014.[21] Data have also become faster as computer processing power improved. For example, low-end smartphones worth US$50 today have more computing power than home computers from the 1980s or NASA's Apollo 11 moon landing computers from 1969.[22] Moreover, the cost of sharing data is virtually zero with anyone with an internet connection, almost instantly anywhere in the world.[23]

New sources of data dominate data collection today. In the past, surveys, censuses, and personal interviews were the dominant methods to collect data, but now, much of the new data comes from so-called "big data," or extremely large data sets collected through the internet and other digital technologies such as satellite imagery. Internet users leave digital footprints from their searches, credit card transactions, ride-sharing services, and the Internet of Things (IoT), all new sources of big data.[24] An ever-increasing amount of data is captured from tweets, emails, or text messages that can be used to understand culture, social networks, and human interactions.[25] Administrative data collected by governments are also an increasingly important source of big data used for cutting-edge research and public policy evaluation.[26]

Big data has many advantages over traditional sample-based data. Data from satellite imagery, for example, can be collected frequently with low marginal costs, on a much larger scale, and with much lower granularity than sample-based survey data.[27] Government administrative data often have ideal panel structures with much less attrition and fewer non-responses, leading to very broad, if not universal, coverage of the population over time.[28] Although privately collected data are often proprietary,[29] many are available free of charge, and in some cases, will continue to be updated regularly, unlike surveys and censuses, which require previous planning and budget allocations. Big data can benefit countries like Nepal where high-frequency and locally disaggregated data are in high demand.

Big data is pushing the boundary of data analytics. Private sector firms use big data to improve operational efficiencies and provide new products and services. For example, Netflix

15 Five exabytes are equal to 5 billion gigabytes.
16 Also see references in Einav and Levin (2013) for more details.
17 McAfee and Brynjolfsson 2012.
18 Mayer-Schönberger and Cukier 2014.
19 IBM 2013.
20 IBM 2016.
21 Komorowski 2014; Malomo and Sena 2017.
22 Hollingham 2019; World Bank 2016.
23 Goldfarb and Tucker 2019.
24 World Bank 2018b.
25 Gentzkow, Kelly, and Taddy 2019.
26 Card et al. 2010.
27 Donaldson and Storeygard 2016.
28 Einav and Levin 2013.
29 See Section C3 for data philanthropy and private sector data.

and Amazon are famous for applying predictive modeling, which uses transaction data to recommend what products customers might want to purchase next. The use of big data is not limited to tech companies. Target, a U.S.-based retailer, developed an algorithm to analyze consumer purchases to identify pregnant women and promote maternity and baby care products.[30] The United Parcel Service (UPS), an American multinational delivery and supply chain management firm, uses geocoded location tracking data to analyze delivery delay patterns. This helped UPS save 3 million gallons of fuel in 2011.[31]

Big data analytics are increasingly relevant to development.[32] They can provide hard-to-measure information to policy makers on pressing development issues such as small area estimation of poverty across multiple countries,[33] income and inequality changes,[34] air pollution and its impact on infant mortality,[35] climate change and agricultural productivity,[36] real-time price index changes using online price data,[37] and the spread of epidemics by analyzing internet search records and social media data.[38]

There are early examples of big data being used in Nepal. Perhaps the most widely cited example is the work by Flowminder, a Swedish nonprofit organization, that analyzed call detail records (CRD) data to understand the movement of people shortly after Nepal's 2015 Gorkha earthquakes. [39] The Flowminder study, using data from mobile phone users, provided critical information about displaced populations in need of support.

Another example is the application of geospatial data to estimate inequality of access across Nepal.[40] . Because simple linear distances between origin and destination poorly describe travel time in rural Nepal, it is more appropriate to quantify accessibility by expected travel times. Figure SF.2 summarizes the population shares by estimated travel time to nearest hospital at the national and province levels, and at local governments in Karnali. This study underscores the advantage of geospatial data that can produce locally disaggregated estimates to solve locally specific development challenges.

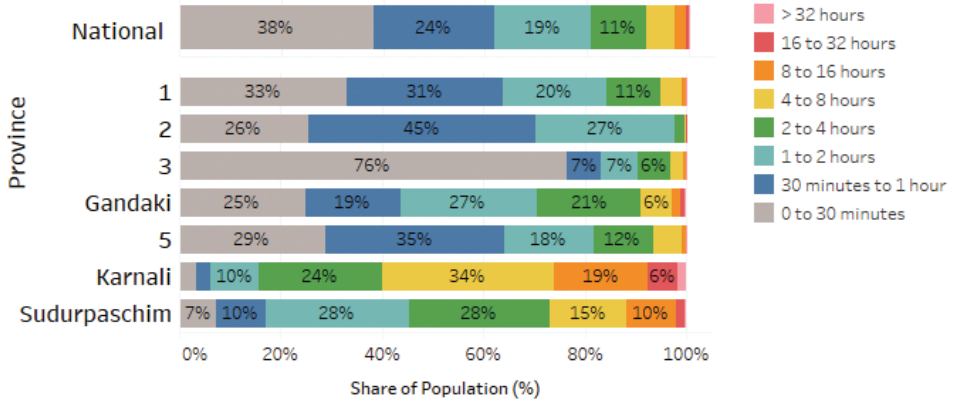
Digital transformation and data deluge are redefining the way people access and use data. Prior to the advent of digital technologies and the internet, even the wealthiest segment of the population in the developed world had a limited volume of information, such as own collection of books, newspapers, radio, television, and libraries. Only a generation later, with the expansion of internet coverage and the pervasive dissemination of digital devices, nearly everyone on Earth will have at their fingertips virtually all the information that exists, automatically translated into his or her language of choice.[41] Those who access data can also contribute to the ever-increasing stock of data. Digital transformation connects people with data and information more closely than ever.

Citizen-generated data (CGD) is one such example. Digital transformation is allowing people

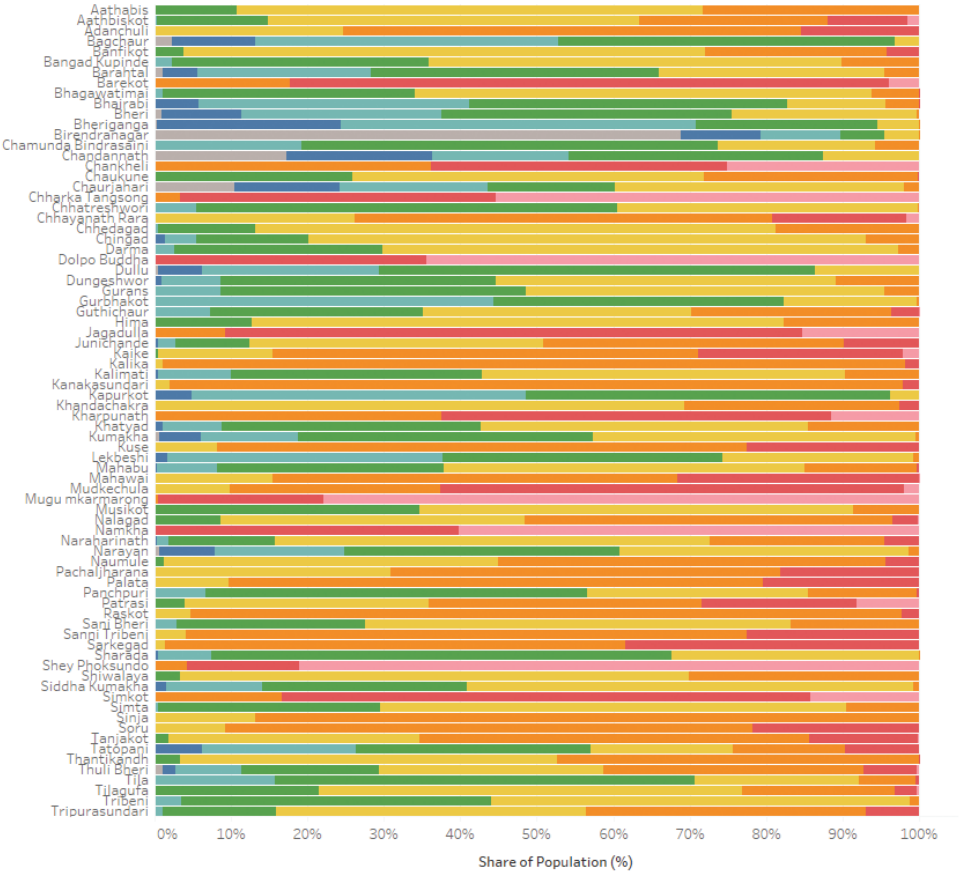
30 Although this was controversial. See Duhigg (2012) for more details.
31 Mayer-Schönberger and Cukier 2014.
32 Although big data are not suitable for drawing causal inferences. See Mayer-Schönberger and Cukier 2014.
33 Jean et al. 2016; 2019.
34 Piketty and Saez 2003.
35 Jayachandran 2009.
36 Costinot, Donaldson and Smith 2016.
37 Cavallo and Rigobon 2016.
38 Schmidt 2019.
39 Wilson et al. 2016.
40 Banick and Kawasoe 2019.
41 McAfee and Brynjolfsson 2017.

Figure SF.2. Inequality of access in Nepal -Travel time to nearest hospital

Panel A. National and provincial: Results demonstrate significant variations in accessibility challenges across the country; approximately 20 percent of Nepalese need to travel at least two hours to a nearest hospital, while more than 80 percent do in Karnali Province



Panel B. Local governments within Karnali Province: Results show that there is tremendous heterogeneity in accessibility in local governments within Karnali



Source: World Bank staff using data from Banick and Kawasoe (2019).

and organizations to generate and directly monitor data.[42] This CGD can contribute to development by fostering participatory government, informing project performance, enhancing government accountability, and complementing or contributing to official government statistics. For example, in Beijing, CGD was used to build air quality sensors on kites to produce timely, accurate data on the city's air quality.[43] During the 2015 Nepal earthquake, OpenStreetMap was leveraged to collaboratively produce maps of disaster-affected areas. By allowing local actors to share their knowledge with remote mappers, better and more accurate maps were produced, which led to better emergency responses and resource allocation. [44] Likewise, Statistics Canada successfully used OpenStreetMap to crowdsource housing statistics to complement its existing data sets.[45]

Globally, there are strong positive correlations among economic development, innovation, and digital adoption (Figure SF.3). Nepal has a relatively high digital adoption index and a modest global innovation index relative to the countries with a similar level of economic development measured by gross national income per capita, yet lags behind many middle-income countries, which it aspires to be. To unleash the potential of digital technologies that drive economic growth, the Government of Nepal adopted its first Digital Framework in 2018. [46]

Digital transformation and data revolution must go hand in hand. It was the advent of digital technologies and the expansion of internet coverage that triggered the data deluge. Advancement in computing power made it possible to analyze big data. More and more data are generated through digital transformation, and the data are in turn used to produce new insights that are otherwise unattainable to accelerate digital transformation by developing new business opportunities and solutions to development challenges.[47] Digital transformation will not fulfill its potential without data, and the power of data cannot be fully realized without a digitally connected society.

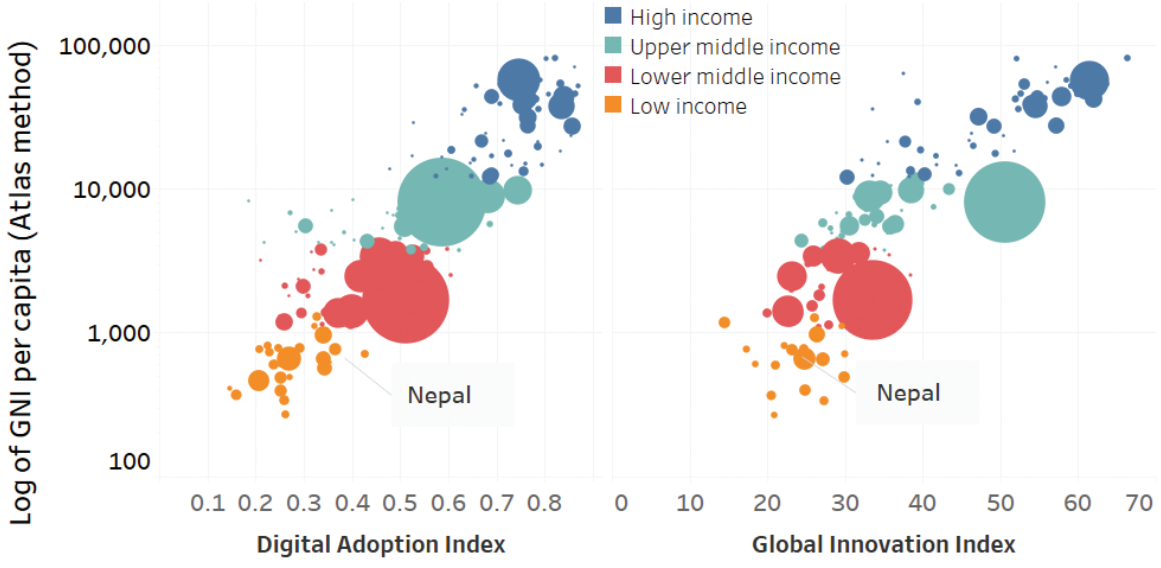
The utmost priority for Nepal is to reduce geographic disparities in digital access. A survey of 115 local governments showed that many Gaunpalika and Nagarpalika [48] offices lack internet access or electricity via the national grid or generators (Figure SF.4). Only about 50 percent of male and 25 percent of female Nepalese use the internet, with significant regional variations, according to the 2016 Demographic and Health Survey. It is critical that the government, businesses, and citizens in Nepal have access to reliable electricity, the internet, and digital devices to realize the benefits of digitization and the data revolution.

For Nepal to fully harness the benefits of the data revolution, the focus must be on its people. Policy makers, civil servants, entrepreneurs, and citizens must be digitally connected and equipped with the skills that meet the demands of an increasingly data-driven world. They must be empowered enough to create a data ecosystem in which the growing volume of data generated from digital transformation is freely exchanged and fully used by the government, businesses, journalists, and citizens to maximize the potential of the data revolution.

An inevitable paradigm shift is upon us in the way we think about data in Nepal. Data evolve in an ecosystem, an environment in which a wide range of actors produce, use, and exchange

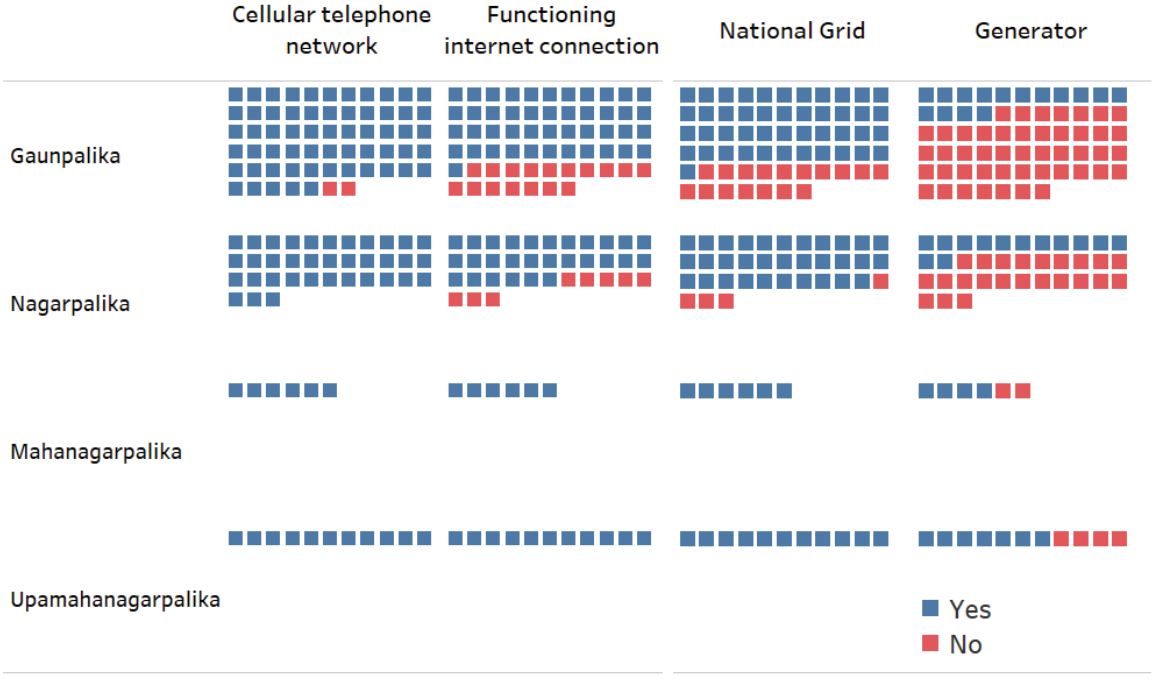
42 DataShift 2015.
43 Maly 2012.
44 Poiani, dos S. Rocha, and Degrossi 2016.
45 Lämmerhirt et al. 2018.
46 Government of Nepal 2018.
47 McAfee and Brynjolfsson 2017.
48 Gaunpalika is a rural municipality and Nagarpalika is an urban municipality.

Figure SF.3. Nepal in global perspective: Digital adoption index[a] and global innovation index[b]



Note: The size of the bubble represents countries' population from World Development Indicators.c All data as of 2016.
Sources: a World Bank 2016. b Cornell INSEAD WIPO 2019 c World Bank 2019

Figure SF.4. Internet and electricity access for local governments



Source: World Bank staff based on Government of Nepal (2019).

Box SF.2. Differentiating between a data ecosystem and a national statistical system

The national statistical system (NSS) is "the ensemble of statistical organizations and units within a country that jointly collect, process and disseminate official statistics on behalf of national government."a The NSS is a concept that centered around official statistics, and its scope is explicitly limited geographically by national boundaries. In contrast, a data ecosystem is a much broader concept. As discussed in Section B, a data ecosystem can be defined as an environment in which a wide range of actors produce, use, and exchange data and data analytics across sectors and national boundaries.b

A data ecosystem differs from the NSS in that it can be transboundary. Many of the emerging sources of data such as satellite imagery data are not limited by national boarders, which presents a remarkable advantage over surveys and censuses that are by design limited in the context of a given country. A data ecosystem also goes beyond official statistics. With the exponential increase in data supply in recent years, data-driven decisions are applicable for a wide array of social and economic phenomena that goes far beyond the realm of official statistics. For example, advanced data analytics by private firms to cultivate new business opportunities and develop new products are the main driving force of the rapidly growing data ecosystem globally, though are not considered part of official statistics.

In a country context such as Nepal, the NSS is a subset of the data ecosystem. We argue that the NSS makes up the foundation of the country's data ecosystem. A data ecosystem without a strong core may expand with the data deluge, but the power of data to drive policy actions in such a precarious ecosystem could be limited without a clearly defined legal and institutional framework to produce, share, and use data and data analytics.

Source: a. Government of Nepal 2017 (p.1). b. Schmidt 2019.

data and data analytics across sectors and national boundaries.[49] A data ecosystem involves significantly more than official statistics and encompasses foundational databases such as civil registration, business registration, and land records. It consists of more than government actors, such as the private sector which leads innovations in advanced data analytics, as discussed above.

Envisioning a future data ecosystem in Nepal is essential at this critical juncture, as the historic transition to federalism has created a surge in demand for more and better data. Inaction will leave Nepal behind in the global data revolution and jeopardize the government's goals for building a prosperous Nepal. Timely and visionary leadership will enable Nepal to unlock the value of the data ecosystem to propel the economy and society forward.

C3. Nepal's growing data ecosystem

The National Statistical System and the Central Bureau of Statistics are at the core of Nepal's data ecosystem (Box SF.2). Many line ministries and specialized agencies maintain administrative databases. Provincial and local governments are emerging as key players, with the enactment of the 2015 Constitution. The ecosystem also includes other stakeholders such as development partners (bilateral and multilateral organizations and international NGOs), private sector firms, and citizens.

49 OECD 2015.

Box SF.3. First and second amendment of the Statistical Act **Box SF.3. First and second amendment of the Statistical Act**

First amendment (1958)

Penalty for deliberately holding or refusing to supply the information wanted by CBS
Penalty for collecting or publishing data without CBS notice.

Second amendment (1974)

The second amendment mandated that any other institutions or individuals, national or foreign, public or private, desiring "to collect any details, information or statistics of any economic matters for professional purpose" needs to obtain permission from the Bureau. The collected information then should be authenticated by the CBS. It further barred the sharing of data with any foreign national or institutions or international institution without permission of the CBS.

Amendments through judicial reform are not highlighted in this box.

Established under the Statistical Act 1958, CBS has long been regarded as the sole custodian of official statistics for the Government of Nepal in the NSS, and an operational arm of the NPC. Sections 3 and 4 of the Statistics Act 2015 grant the CBS the "Power to require the production of details" and the "Power to give direction to collect statistics," that is, the authority to collect and interpret statistics. In addition, several amendments have granted the CBS the power to collect, consolidate, and disseminate national statistics in the country (Box SF.3).

More than 60 years after the original Statistics Act, the CBS continues to play a critical role in Nepal's national statistical system. For example, the recently completed National Economic Census 2018 is a historical landmark, as it is the first such census in Nepal (Box SF.4). The CBS is also preparing for the next round of the Population and Housing Census in 2021. That census presents an opportunity to bring a fresh set of benchmark data for all three tiers of government. The NPC issued Census Order 2076 to establish provincial census coordination committees and census offices across the country. These core statistical activities must continue to be executed by the federal government as it has institutional knowledge and experience and is in the best position to exploit the economies of scale for nationwide statistical activities.

While the CBS continues to have core functions in the NSS, it is no longer the sole government authority collecting and analyzing data. As in many other countries, public agencies in Nepal maintain administrative data, which are generated from the operation of public agencies such as registrations, transactions, recordkeeping, and service delivery. Administrative records are governed by regulations, and their management and maintenance are entrusted to a public administration body with operational guidelines. For instance, the Ministry of Education, Science and Technology (MoEST) maintains the education management information system (eMIS), and the ministry produces biannual flash reports that summarize statistics generated by the eMIS. The Ministry of Health and Population produces health statistics from the health management information system. Many other public agencies also produce numerous other types of statistics from administrative databases.

An assessment of the major administrative databases conducted for this report shed light

Box SF.4. Nepal's first ever national economic census

The Central Bureau of Statistics conducted its first National Economic Census from April to June 2018, with support from the Japan International Cooperation Agency (JICA). An economic census is the complete enumeration of all commercial establishments and their key attributes within geographic boundaries of a country at a particular time. Prior to this, there was no comprehensive information on all commercial establishments in Nepal except for sectoral censuses, such as the 2008 Manufacturing Sector Census.

National Economic Census results released on July 1, 2019, revealed that there were 923,356 establishments in Nepal of which about 43 percent came into existence only after April 2015. There were about 460,000 "non-registered" establishments, accounting for 49.9 percent of the total number of establishments. The wholesale and retail trade and motor vehicle repair industry were the industry with the largest number of establishments (498,069). This was followed by the accommodation and food services industry (130,540), and manufacturing (104,058). Single-unit establishments accounted for more than 97 percent of the total.

The economic census is a major source of statistics on economic activities in the country. The complete list of commercial establishments could serve as a frame for future sample surveys such as enterprise surveys and, more importantly, can be used as the foundation for the development of a statistical business register to generate a range of economic and business statistics. The successful completion of the national economic census is indeed a major milestone for statistical development in Nepal.

Source: Government of Nepal 2019

on a non-trivial amount of overlapping data collection across the existing databases and within the NSS. For instance, at least seven government departments in their administrative system register and collect individual-level details.[50] A least 11 departments capture information at the local level in their system.[51] Company-level information is available in at least six government departments (Figure SF.5).[52]

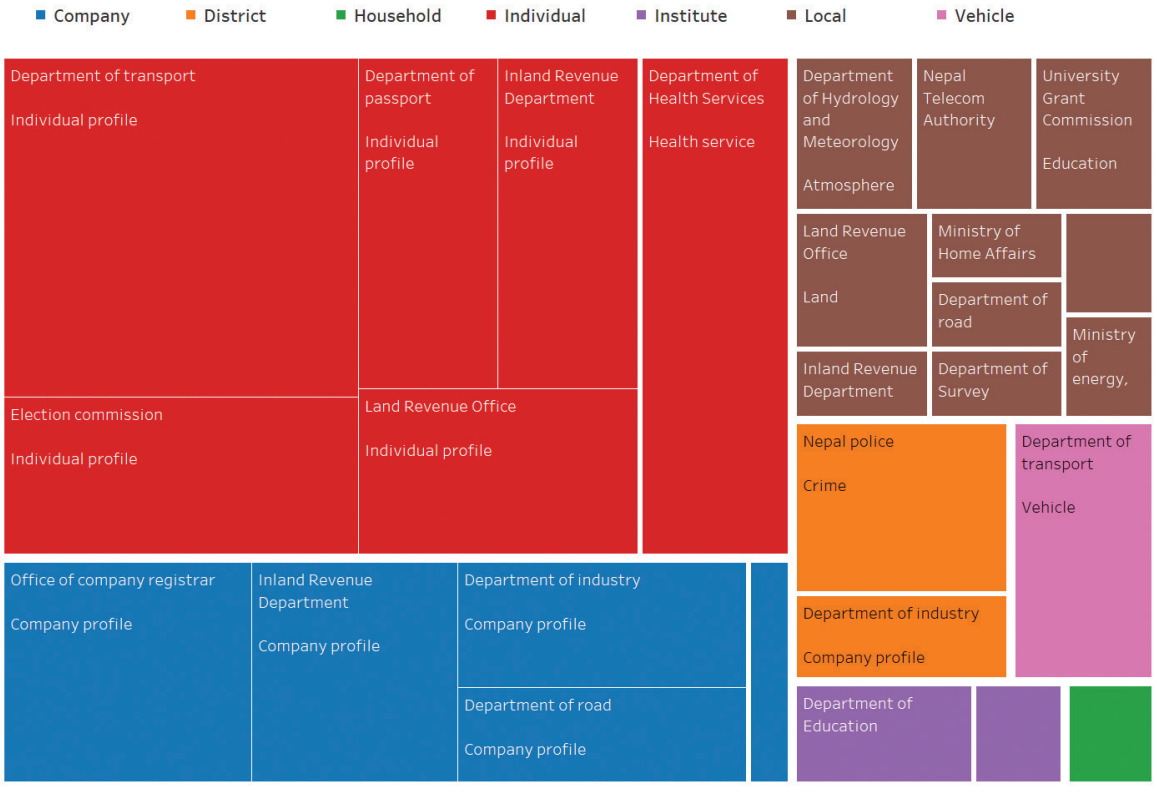
The Government of Nepal holds a lot of data, but the system is siloed. Government data systems in Nepal are highly compartmentalized and mostly inaccessible to users from other ministries and departments. This is partly due to the lack of a legal framework for integration with data from other sources. The administrative databases are usually under the jurisdiction of different verticals of ministries, and they have little interaction with other databases and registers. Data sharing across organizational boundaries is rare, and when it happens, the requestor must overcome extensive bureaucratic hurdles. There are also significant technical constraints such as a lack of common standards (Box SF.5). The lack of coordination across government agencies can lead to a duplication of effort, which can affect citizens, who must provide the same information

50 The national ID and vital registration system captures: name, date of birth, citizenship number, and so forth. The Department of Transport registration system captures: name of the license holder, citizenship, and birthdate, in addition to other information. The Land revenue information management system captures: beneficiary name, citizenship number, and some information already captured by other vertical registries.

51 Local level here does not imply local governments. It means the local-level information or address of the locality stored in the system. For instance, Inland Revenue Departments have information about the local address of the individual or company; the Department of Survey and Land Revenue office captures land information in addition to the core information captured for the respective department.

52 The office of company registrar captures the company-level information, which is also captured by the inland revenue department, and by the Department of Roads through the bidder information system. The Department of Education has information captured at the school (institute) level.

Figure SF.5. Overview of administrative databases in Nepal[53]



Source: World Bank staff based on a review of guidelines and documents (including Health Management Information System guidelines, the Department of Education Management Information System [MIS] Manual, Office of Company Registrar; the online business registration manual and SAMARTHA MIS guidelines; Inland Revenue Department, Taxpayers Portal; and Department of Passport (application form). The sizes of the tiles are indicative of the number of relevant indicators maintained in respective databases.

53 The figure is for demonstration and does not capture all available administrative database and its information in Nepal.

to each agency with whom they interact. It also leads to information gaps as each department has only one piece of the picture. It can lead to a lack of authoritative estimates and an erosion of trust in government data and statistics.

The 2015 Constitution and federalism transition significantly expanded the scope of Nepal's NSS and data ecosystem. The Constitution of Nepal allows all three layers of government (federal, provincial, and local), under both exclusive and concurrent power, to autonomously enact their laws, formulate policies, and create programs related to statistics (see Schedule 5, 6 and 8; and part 4 of the Unbundling Report 2017).[54]

All provincial and local governments will join the ranks of data producers and users in Nepal's data ecosystem as they need quality data to generate robust evidence for provincial and local planning. The potential number of government officials who need to use data in public sector decision-making is not merely doubling or tripling. It is expanding potentially hundred-fold. The Ministry of Federal Affairs and General Administration issued guidelines for creating profiles of socioeconomic and demographic indicators by the local governments. A survey of 115 local governments showed that approximately 60 percent of the local governments interviewed had already completed the profiling exercise.[55] In addition, some provincial governments intend to conduct surveys or censuses on their own, and many local governments have already mobilized their own resources to hire private firms to conduct household surveys or even a Population Census in their localities.

Intergovernmental coordination becomes increasingly important to support Nepal's data ecosystem. The Constitution assigned all three tiers of government various responsibilities around data and statistics beyond data collection. The unbundling report of the Constitution[56] lists almost 50 responsibilities directly or indirectly related to data. These include but are not limited to data collection and management, coordination, capacity development, quality assurance, and protection of statistics.[57] A proper coordination mechanism is extremely important to minimize duplicative efforts as most of these are concurrent functions across tiers, and data and statistics are cross-cutting by nature.

Federalism poses a complex challenge rooted in an intrinsic opportunity to redesign the data governance architecture. There is immense scope to metamorphose the current statistical system into a robust statistical architecture that encompasses all three tiers of government to strengthen coordination, avoid duplication, and maximize the value of data produced by public agencies. The "transition to federalism is the fundamental change in the whole DNA of the country."[58] The data governance should be institutionalized in such a way that data coming from different sources would "complement" rather than "compete" with each other and abide the "cooperation," "coexisting," and "coordination" principle enshrined in the Constitution of Nepal.

Private sector firms play two key roles in today's growing data ecosystem: by leading innovations in advanced data analytics and by becoming data philanthropists. When private sector entities share their "private data assets to serve the public good," they engage in data philanthropy. Today's private sector, especially those using digital technologies, are gathering and producing large sets of data. Companies can help improve their public standing, inspire innovation, and increase their customer base by sharing their

54 "Unbundling/Detailing of List of Exclusive and Concurrent Powers of the Federation, the State (Province) and the Local Level Provisioned in the Schedule 5, 6, 7, 8, 9 of the Constitution of Nepal," Government of Nepal, 2017.

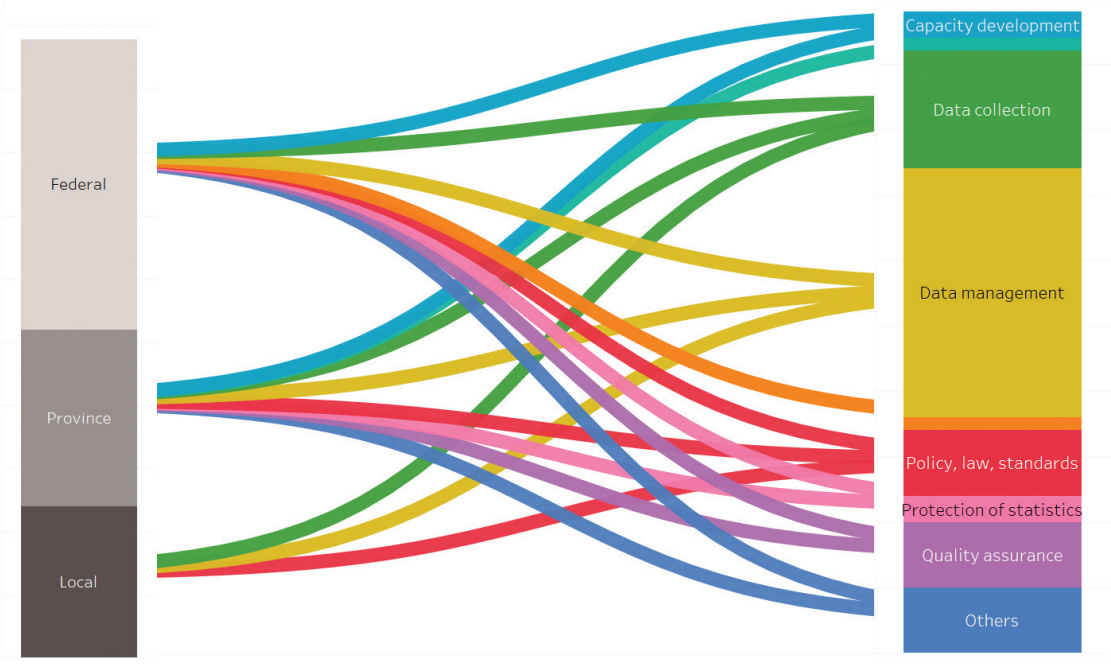
55 Government of Nepal 2019.

56 "Unbundling/Detailing of List of Exclusive and Concurrent Powers of the Federation, the State (Province) and the Local Level Provisioned in the Schedule 5, 6, 7, 8, 9 of the Constitution of Nepal," Government of Nepal, Kathmandu, Nepal, 2017.

57 Although not explicitly stated under data and statistics, provincial and local governments are constitutional entities, and as such, are primarily responsible for their own capacity development.

58 New Business Age 2019.

Figure SF.6. Constitutional responsibility around data and statistics



Source: World Bank staff based on the report "Unbundling/Detailing of List of Exclusive and Concurrent Powers of the Federation, the Province and the Local Level Provisioned in the Schedule 5, 6, 7, 8, 9 of the Constitution of Nepal," Government of Nepal, Kathmandu, Nepal, 2017.

data, which can be critical inputs to tackling public policy challenges.[59]

Data philanthropy and private sector data could make significant contributions to Nepal's data ecosystem. Data philanthropy as such remains a new concept to many private firms in Nepal, and it takes pioneering champions and incremental changes for this to be part of data culture in Nepal. However, the aforementioned example of big data and private sector data application in Nepal is initiated by Ncell, one of the major private mobile network operators in Nepal. In the aftermath of the devastating earthquakes in 2015, Ncell shared its aggregate and anonymized call detailed record (CDR) data with Flowminder, a Swedish nonprofit company, to create a map of population movements. Near real-time and locally disaggregated measurement of population movements after natural disasters provided critical information about displaced populations, who are often vulnerable and in need of support.[60]

An emerging group of private firms and nonprofit organizations are working to enhance the production, supply, and use of data in Nepal.[61] A growing collaborative of government agencies, for-profit initiatives, civil society organizations, and think tanks is contributing to a nascent yet emerging open data community in Nepal. For example, Kathmandu

59 Mckeever, Greene, and Tatian 2018.
60 Wilson et al. 2016.
61 Dennison and Rana 2017.

Box SF.5. Challenges of data merging under federalism

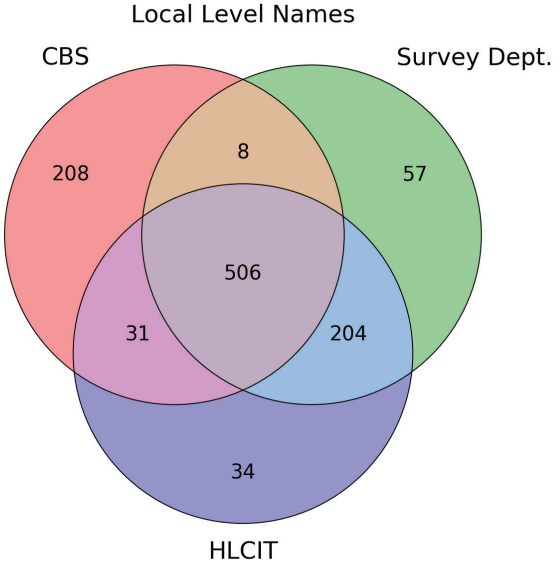
The 2015 Constitution created three tiers of government, including the 753 local governments with new geographic demarcations. Multiple government agencies have published administrative coding of newly established government units, including but not limited the Central Bureau of Statistics, the Survey Department, and the High-Level Commission for Information and Technology (HLCIT) codes.

All three coding schemes have pros and cons, with notable inconsistencies across the coding schemes. For example, the number of total geographic areas coded is not consistent. The CBS coding scheme is perhaps the clearest of all, following the standard coding convention. However, it assigns coding to local government units only, while the other two assign coding to protected areas such as national parks and wildlife reserves. As depicted in Figure SF.7, of the 753 local governments, only about 500 local government units use the same spelling convention.

This poses significant challenges to data users, both inside and outside the government. For instance, in order to merge two data sets at the local level, one with CBS coding and the other with HLCIT coding, only 537 local governments have the same spelling, leaving the users to manually match more than 200 local units. This is time-consuming and prone to mistakes, leading users to resort to inconsistent and ad-hoc solutions.

One practical solution would be to create a master data set that includes an exhaustive list of all geographic units as well as all coding schemes officially recognized by the government. Such a data set, which must be coordinated by a public authority such as CBS, should be made widely available to data producers and user groups, and would be a practical first step toward data integration.

Figure SF.7. Local level names -Difference and Overlaps

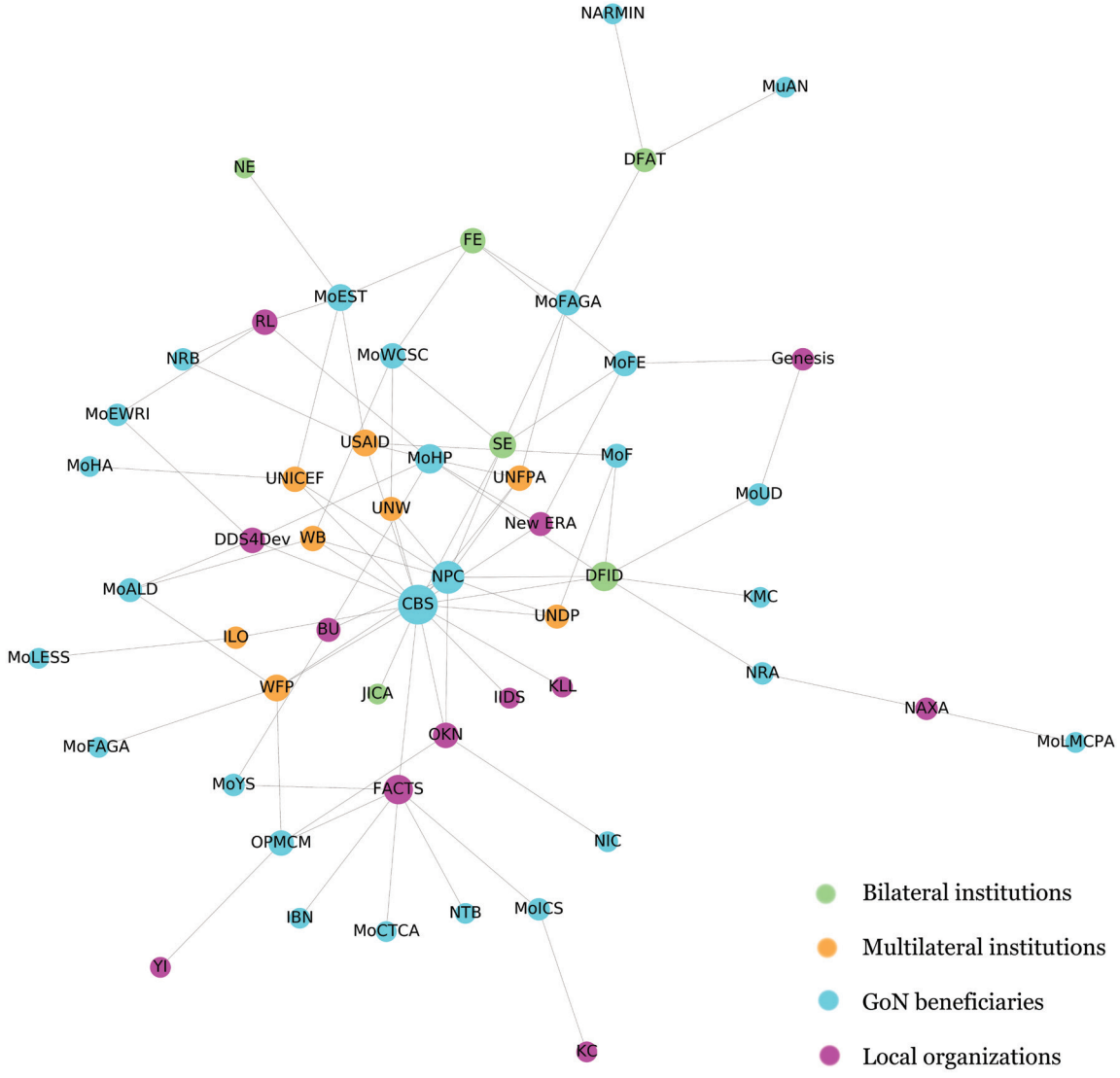


Living Labs, a civic technology company, in partnership with the NPC and the Central Bureau of Statistics, has created an interactive data portal and published post-earthquake reconstruction census data for open access. A group of young open data enthusiasts at Open Knowledge Nepal, a local chapter of Open Knowledge, have launched Open Data Nepal[62] by scraping and curating Government of Nepal data in a machine-readable format, making it easier for the public to find and use data. As of this writing, users can access over 700 indicators from more than 40 government agencies from Open Data Nepal.

Nepalese citizens are also playing an increasingly important role in the growing data ecosystem of Nepal. They are actively engaged in generating data for monitoring changes in their environment and improving safety and government accountability. For example, during the 2018 monsoon, SmartPhones4Water (S4W) Nepal partnered with 154 citizen scientists to generate 6,656 precipitation measurements in Nepal with low-cost (less than US$1) S4W gauges constructed from repurposed soda bottles, concrete, and rulers. An ex-post quality assessment review determined that this project had helped fill the precipitation data gaps in the country and signified the potential of citizen-generated data in other data-scarce regions.[63]Another example where a CGD partnership has been integral is Nepal Monitor, a protection and conflict prevention initiative that allows citizens to share human rights and security-related incidents through a website-based platform.[64] Integrating CGD on public perceptions with objective government data directly supports participatory government and helps improve programs by addressing the real needs of the people. In rural Nepal, bridging information gaps precipitated a more accurate flow of information that translated into better decisions.

62 Open Knowledge Nepal, n.d.
63 Davids et al. 2019.
64 Nepal Monitor, n.d.

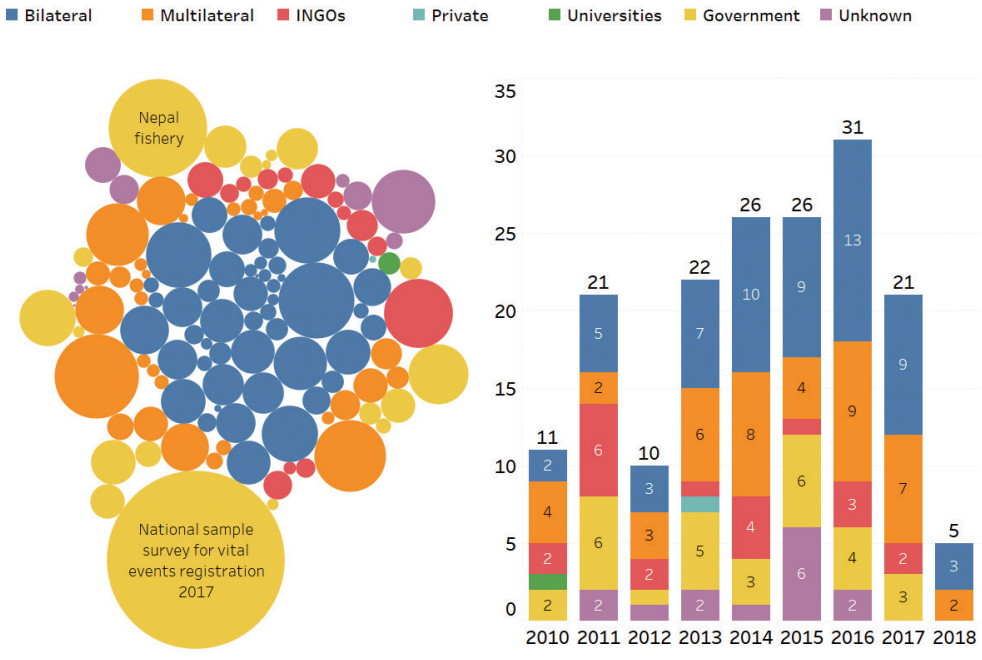
Figure SF.8. Development partner support to the Government of Nepal on data and statistics



Source: World Bank staff visualization based on Data for Development in Nepal 2018. [65]
Note: Development partners might also have supported local organizations to work with government agencies.

65 Data for Devtelopment in Nepal. 2018.

Figure SF.9. List of available surveys in Nepal since 2010



Source: World Bank staff calculations.
Note: Size of the bubbles represents sample sizes of the surveys. Colors indicate primary funding source.

Development partners play a significant supporting role in Nepal's data ecosystem. There are at least 14 multilateral and bilateral agencies providing support to more than 25 public agencies in Nepal in the area of data and statistics (Figure SF.8), according to the analysis conducted by the Asia Foundation and the Development Initiatives. [66]The types of support they provide ranges from financial and technical support to CBS for surveys and censuses to a range of technical assistance programs.

Data collection through surveys and censuses is one area to which development partners have provided intensive support. Most of the nationally representative surveys in Nepal are supported by development partners.[67] But development partner interventions are not limited to large-scale, nationally representative surveys and censuses. A World Bank analysis revealed that there have been at least 200 surveys conducted in Nepal since 2010, and at least 75 percent of them were funded by development partners (Figure SF.9). While these surveys come in different forms with different objectives, geographic coverage, sample size, and questionnaire design, a quick analysis of these surveys reveals important trends. The overwhelming majority of these surveys are not archived in the international databases of household surveys.[68] About 80

66 Data for Development in Nepal. 2018.
67 For example, the ILO supports Labor Force Surveys; UNICEF supports Multiple Indicators Cluster Surveys; USAID supports Demographic and Health Surveys; the World Bank supports Nepal Living Standard Surveys; and the United Nations Population Fund (UNFPA) supports Population and Housing Censuses. Most recently, JICA supported the National Economic Census 2018.
68 Only about 10 percent of the surveys are archived in the International Household Survey Network (IHSN), and only 7 percent in the World Bank's Microdata library, two of the most well-known repositories of survey data in the world.

percent of the survey data we identified are not available for public access.[69] There is no mechanism to systematically capture these surveys in Nepal. This makes it extremely difficult to find information about existing surveys. In such an environment, researchers or funding agencies in need of data may choose to conduct their own survey simply because they do not know similar surveys already exist. Even in cases where a new survey is warranted, there is little opportunity to learn from past surveys to improve data quality. This is another example of data existing in silos. There is an urgent need for coordination among development partners as they are the major funding sources of these surveys.

The reality of development partner involvement is likely much more complex. Many sectoral projects supported by development partners typically have a component to improve administrative data management and management information systems that are not captured in the analysis above. Some development partners have already started supporting provincial and local governments, and this trend is likely to increase in the coming years. With the adoption of the digital Nepal framework, many sectoral interventions will adopt digital technologies through which more data will be generated. As such, development partner support to the GoN will have bigger implications for the development of Nepal's data ecosystem and beyond production of official statistics.

With Nepal's growing data ecosystem, a greater volume of data will be generated. While the CBS has been at the core of the National Statistical System in producing data and statistics, going forward, provincial and local governments will also be an integral part of the growing data ecosystem and produce data as the federalism transition fully unfolds. As the global wave of big data and citizen-generated data reaches Nepal, more unstructured data will be generated compared to core data produced by the CBS in all sectors. As such, the GoN needs to think about synergies among these new players and new data sources and plan accordingly to lead, collaborate, and coordinate data production and management. Amidst all of this, one question remains: Is this growing data ecosystem meeting the emerging data needs in the new era of federalism?

C4. Emerging data needs in the era of federalism

Successful implementation of federalism hinges on nurturing an effective data ecosystem. The devolution of resources and responsibilities to provincial and local governments allow locally elected leaders to put forward locally specific plans to meet the needs of their constituencies. Citizens will soon become more aware of the potential of the global data revolution and demand more evidence-based policy decisions. Investors will demand timely and high-quality data to assess business potential in Nepal. In the era of federalism, there is an emerging need for locally disaggregated data in both the public and private sector; a paucity of accurate, reliable, and complete data can be a major deterrent for Nepal to maximizing finance for development.

A dearth of data, especially at the subnational level, is already surfacing as a challenge for many prominent federal initiatives. For instance, the GoN has launched the National Data Profile,[70] which is an open data platform maintained by the CBS to compile and disseminate data from all relevant sectors across all three tiers of government. The National Data Profile is a clear manifestation of the federal government's growing recognition of the data needs propelled by the federalism transition. This data platform, if populated with relevant and timely indicators, could serve as a model for data sharing and exchange across government institutions. However, there are teething problems. It is not easy to access and

69 Or there are no clear instructions on how to access the data available online.
70 Government of Nepal, n.d.

Box SF.6. Data needs for Fiscal Equalization Grants

Intergovernmental fiscal transfers are an important component of fiscal federalism in Nepal. The Constitution of Nepal has made several provisions for equitable distribution of resources among the federal, provincial, and local level. The National Natural Resources and Fiscal Commission (NNRFC) is charged with recommending the amount of fiscal transfers to the provinces and local entities based on the following criteria as per the NNRFC Act of 2017:

- Human development index such as education, health, and drinking water in province and at local level
- Status of balanced development of province and local level
- Socioeconomic and any other forms of discrimination/disparity existing in province and at the local level
- Services to be delivered by the provincial and local level
- Status and capacity of revenue collection of province and local level
- Expenditure needs of the province and local level.

To operationalize the above-mentioned criteria, the NNRFC adopted the following indexes on which to base recommendations of revenue sharing and fiscal equalization in the FY2019 budget: Human Development Index, Human Poverty Index, Infrastructure Index, Socio-economic Discrimination Index/Disparity Index, and the Underdevelopment Index.

integrate data from various sources and harmonize them in a common format. Another challenge is to set standards and ensure the quality of the data submitted by subnational government units where human resources may be limited. At the time of writing, the Profile could only draw on its 2011 Population and Housing Census data to populate the Profile.

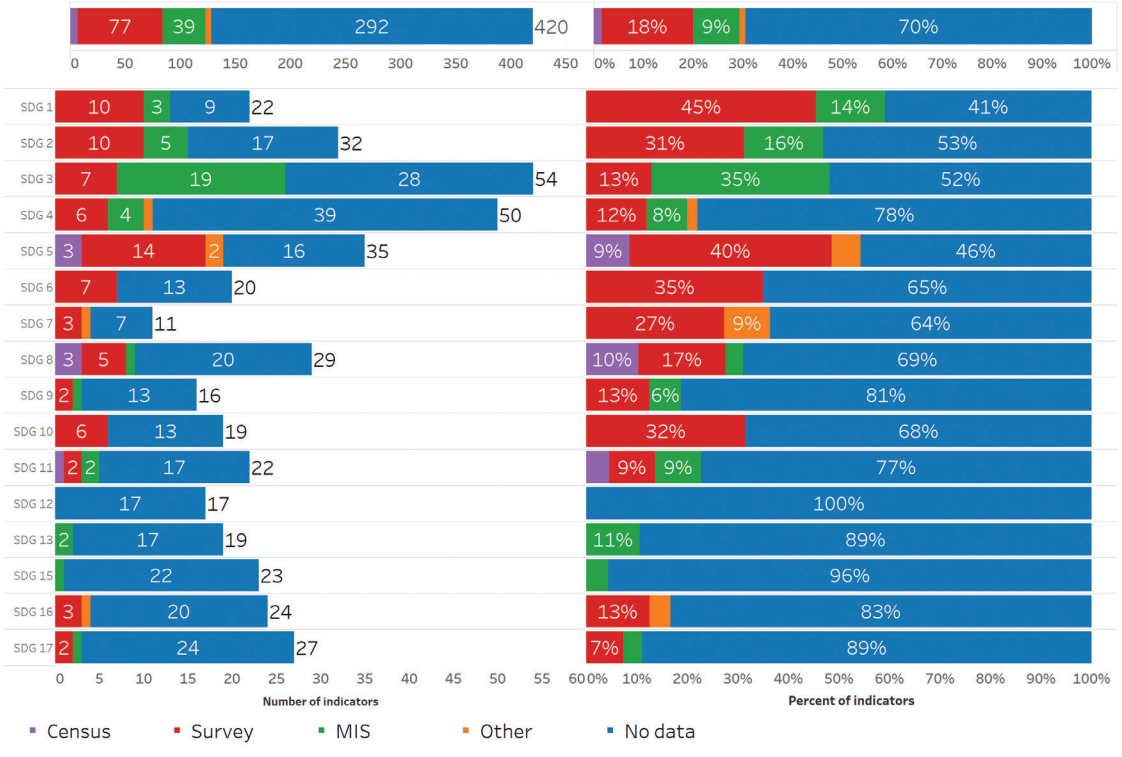
Fiscal equalization policies achieved through intergovernmental fiscal transfers from the central government to the new provinces and local governments are also being affected by the lack of locally disaggregated data. The purpose of the fiscal transfers is to offset differences in revenue raising capacity and public expenditure needs in different jurisdictions. The federal budget of FY2018 was the first to allocate fiscal equalization grants. The scheme is heavily data-driven but so far mostly relies on data compiled pre-federalism (Box SF.6). Given the dearth of timely and locally disaggregated data, data validation, consistency, and transparency will be key to securing public trust and confidence in the system. Openness about sources, methods, and outcomes is a must.Localization of SDG calls for more and better data; however, subnational data are glaringly lacking. The SDG monitoring framework outlined in the SDGs' baseline report by the NPC commits to the concept of "no one left behind" that necessitates "the availability of high-quality, timely and reliable data."[71] As such, the NSS has a herculean task of producing reliable, consistent, and comparable statistics for at least 420 SDG indicators for the SDG monitoring. A rapid assessment by the World Bank team reveals that at the province level 292 indicators (70 percent) cannot be measured due to lack of data (Figure SF.10).[72] The paucity of data for SDGs 12 and 13 is of great concern as they are at the core

71 Government of Nepal, 2016.

72 In particular, data availability does not bode well for goals relating to zero hunger (SDG 2), quality education (SDG 4), clean water and sanitation (SDG 6), reduced inequalities (SDG 10), sustainable cities and communities (SDG 11), responsible consumption and production (SDG 12), life on land (SDG 15), and peace and justice (SDG 16).

of the sustainable development agenda, but less than 12 percent of the indicators can be measured.

Figure SF.10. Province-level SDG data gaps



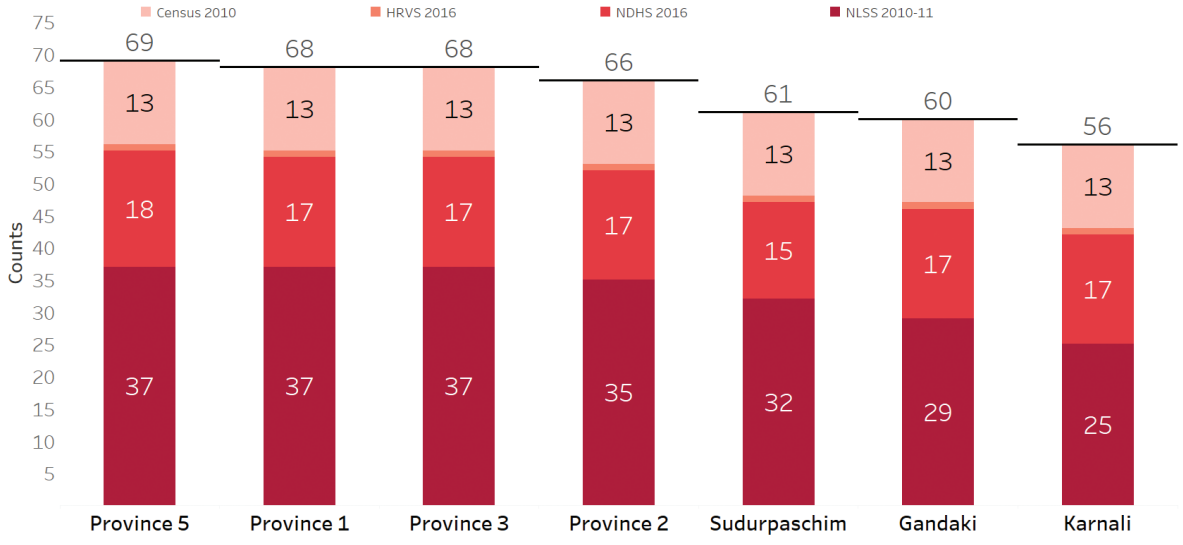
Sources: National Planning Commission 2016; National Planning Commission-World Bank subnational estimates.

Survey data are the most common sources of SDG indicators at the provincial level. Seventy-seven indicators use survey data, whereas 39 indicators come from administrative sources and seven from the Population and Housing Census. However, the total count of indicators decreases substantially when estimates with a considerable margin of errors are excluded. For instance, when we use relative standard errors of 20 percent (Figure SF. 11). Provinces such as Gandaki, Karnali, and Sudurpaschim are more prone to inaccurate survey-based estimates due to comparatively small sample sizes and the lack of explicit stratification by provinces in surveys conducted prior to the 2015 Constitution. Future surveys must address these issues.

Averages and other consolidated indicators derived from national surveys are of national relevance only, as many of these indicators do not necessarily answer questions raised, explicitly or implicitly, by local policy makers and development stakeholders. [73] The challenges for effective policy interventions at the subnational level will only worsen as fewer data are available to understand varying living conditions across local governments.

73 PARIS21 2016.

Figure SF.11. Number of SDG indicators (relative standard errors less than 20 percent)



Source: World Bank staff calculations.

Disaster risk management is another area desperately in need of better data. Nepal is highly vulnerable to a range of natural hazards, particularly earthquakes, flood, drought, and landslides. During and in the immediate aftermath of a disaster, first responders must be briefed and deployed, resources and supplies brought into the disaster zone, and victims evacuated. Maps of road networks, bridges, and other critical infrastructure, as well as household rosters, must be up-to-date and accessible for emergency response efforts to be effective.

The need for reliable data extends beyond the immediate emergency response. Reconstruction and recovery efforts require data to identify victims and to verify and assess losses. The devastating 2015 Gorkha earthquakes revealed critical information gaps that affected both the emergency response and post-disaster reconstruction. In the immediate aftermath, post-quake maps were urgently needed by relief agencies, some of which had to be crowdsourced by volunteer organizations.[74] Absent up-to-date population and building registers, the GoN had to design and conduct a house-by-house damage assessment and eligibility survey in affected districts. A census was conducted in the 11 most affected districts and a sample survey was conducted in another 20 districts. The initial data collection was not completed until May 2016,[75] more than a year after the earthquake, which may have delayed support for victims. Investments in foundational databases such as a civil register, a building register, and geographic information systems will not only improve government administration and planning on a day-to-day basis, but also help the country prepare for future disasters and build resilience.

Provincial and local governments face data challenges distinct from the federal government. Traditional statistical activities do not fully serve the growing data demands of the subnational governments. Decennial population censuses are often outdated, and sample-based surveys are unable to generate reliable estimates

74 McMurren, et al. 2017.
75 Government of Nepal. 2017.

Box SF.7. Deliberative decision making in rural municipalities of Nepal

With the goal of building a practice of "deliberative" local governance, the International Institute for Democracy and Electoral Assistance (International IDEA) launched the Coherence Programme in 2017. The program mobilizes young graduates to help elected local government officials understand the federal system and their roles in fostering evidence-based and inclusive decision making. To date, the program has been piloted in six rural municipalities in Humla, Salyan, and West Rukum.

In rural municipalities like Adanchuli and Chankheli, the Coherence mentors helped local governments with data collection, analysis, and visualization to support decision making. One of the Coherence mentors recalls a finding from his data visualization – an uneven student-teacher ratio across schools within a small area in Chankheli – that allowed his team to make recommendations on the municipality's budget allocation in education for the following year.

A collaboration between the World Bank and the Coherence program occurred when the World Bank presented accessibility maps by Banick and Kawasoe (2019) (Figure SF.2.). The Coherence team thought the maps were useful but too advanced, highlighting policy makers' limited capacity. Adapting its approach, the World Bank team trained the Coherence mentors to collect Global Positioning System (GPS) points and related information on public services (for example, ward offices, schools, and clinics) using SW Maps, a free Android app. With this data, the World Bank team in Kathmandu prepared simple reference maps of each municipality's public service facilities, road network, and ward boundaries (Figure SF.12). Although basic, these maps were popular among the local government officials and have generated interest in the more detailed accessibility maps the World Bank team originally presented (Figure SF.13).

for local governments. Data demands vary across the country. For instance, Karnali province, due to its challenging topography and limited accessibility, intends to establish a Geographic Information System lab to gather more geospatial data and build capacity to use them for policy planning purposes. Gandaki province needs more tourism data, with its capital city Pokhara being one of the most popular tourist destinations in the country.

Data demands by local governments are even more diverse, as are the local development challenges and priorities. Metropolitan cities like Kathmandu and Lalitpur would need data for urban planning, much like other metropolitan cities in other countries. They would benefit from real-time traffic data, for example, to understand traffic congestion patters. Some municipalities may need, for example, highly disaggregated geospatial data layers to create flood hazard maps to alert residents in areas prone to flooding during the monsoon season. Many others are likely in need of basic demographic and socioeconomic indicators to set baselines.

The way data are communicated must be carefully customized to local contexts because the capacity to understand data is extremely diverse. In some of the rural municipalities in Karnali province, for example, locally elected officials were not well exposed to data and statistics, yet they do demonstrate good understanding of the information when presented in a visually appealing manner (Box SF.7). This underscores the importance of a demand-driven approach to cater to the diverse demands and capacities of the local municipalities.

Nepal's private sector would also benefit immensely from increased availability and proper use of data. Many Nepalese businesses recognize the value of data for various purposes such as market research and new product development, but practical challenges exist for them to integrate data analytics into operations. Many remain unaware of government data that

Figure SF.12. Basic reference map developed using QGIS for Chaurjahari

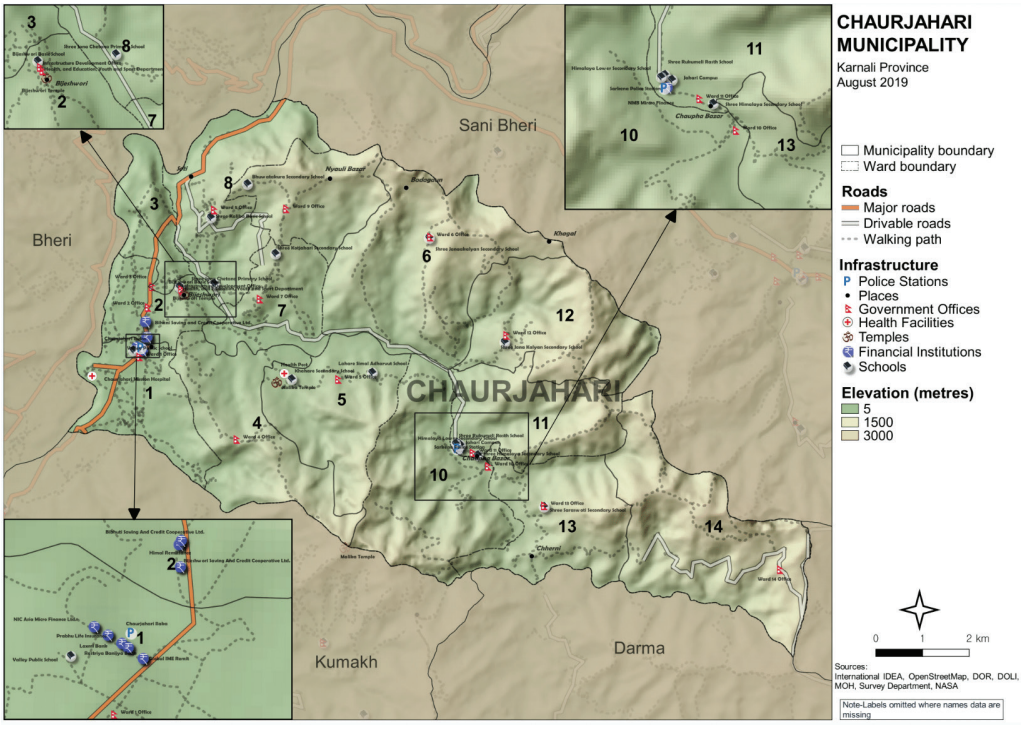
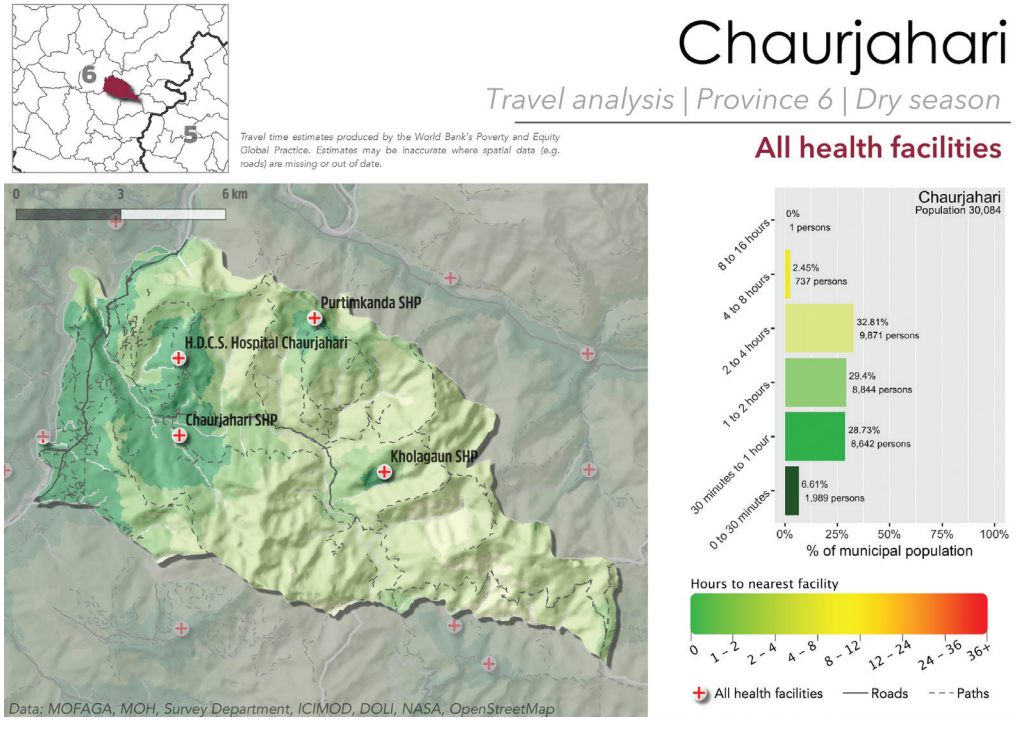


Figure SF.13. Chaurjahari accessibility map from Banick and Kawasoe (2019)



Box SF.8. Use and need of data in Nepal's financial sector

The World Bank conducted an explorational learning exercise to understand how the financial sector – commercial, development, financial, microfinance banks, and fintech – uses data for business decisions. Thirteen CEOs, CFOs, CTOs, and others in leadership positions of select financial institutions were interviewed.

When asked to what extent their organization uses data in everyday operations, the majority (67 percent) of the respondents said that data were "extensively" used. When it comes to government data, however, more than 80 percent of the financial institutions interviewed make no or limited use of government data. The most significant barriers to using government data were concerns over its timeliness, reliability, and quality.

Numerous institutions have asked the GoN for locally disaggregated demographic and economic data such as age, gender, per capita income, and tax revenue. Such data would help private firms improve their decision making, such as where to open new branches and how to attract clients, but most of such data are not readily available. "We don't have access to data which would allow us to assess the condition of the banking sector or reasonably predict what will happen next week or month in the sector," said one of the executives. Rather than using government data, financial institutions sometimes use their own surveys to conduct a cost-benefit analysis of opening a new branch.

The majority of leaders (75 percent) also acknowledge that there is a need for significant investment in capacity building of their own staff within the next two to three years. Few financial institutions had an in-house analytics department or an operational data reporting framework. The most significant barrier to financial institutions using internal data is a lack of technical skills (70 percent). Outside of descriptive statistics and financial reporting, financial institutions struggle to turn the raw data they collect into actionable information and visual narratives for management to use.

is publicly available and cite the need for capacity strengthening to make sense of data.[76] Even if they exist, lack of timely and reliable government data is impacting the private sector's ability to grow. Many ministries publish reports with data on their websites. However, the data they publish are rarely available in a disaggregated and machine-readable format and are generally not timely or are immaterial. Leaders in the private sector say they are not effectively able to make decisions about product development, investment, or marketing due to lack of data. They also recognize limitations in their own firms' ability to use internal data and government data (Box SF.8).

Private sector development is one of the key priority areas for Nepal's development goals to reach middle-income status by 2030.[77] Data are imperative for private sector development. From a government policy perspective, data are needed on the business cycle, profitability, and business demographics. The CBS conducted its first National Economic Census in 2018. It is an important source of information about the structure of the Nepalese business sector and is used as an input in the compilation of national accounts. Economic Census data can be the basis of a statistical business register when combined with administrative data sets such as the Office

76 FACTS Research and Analytics. 2019.
77 World Bank 2018a.

Box SF.9. Data needs to improve ease of doing business

Nepal ranks 94th of 190 countries in the World Bank's Ease of Doing Business 2020 report.[a] The country improved significantly in access to credit information and expanding credit information coverage. However, the report highlighted as bottlenecks the lack of an electronic immovable property database for checking encumbrances (liens, mortgages, restrictions, and so forth), and the lack of an electronic database for recording boundaries, checking plans, and accessing cadastral information (geographic information system).

In addition, the information recorded by the immovable property registration agency and the cadastral or mapping agency are kept in separate, unlinked databases, which assigns a lower score on the reliability of infrastructure index (Figure SF.14). The report also noted the lack of a national database to verify the accuracy of identity documents.

Source: a. World Bank 2020.

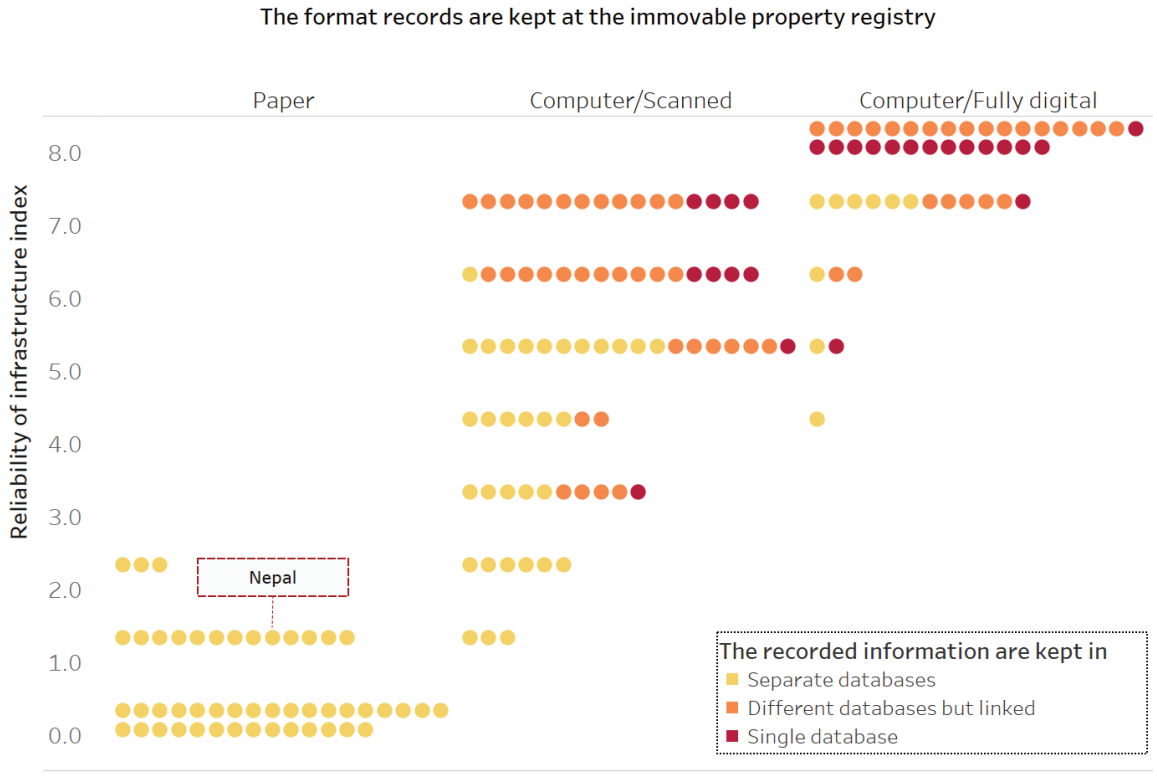
of Company Registrar and Inland Revenue Department. Unlike census or survey data that only provide a snapshot of the country at a point in time, such a register can be updated frequently when properly integrated with administrative data sources and become a dynamic database to produce up-to-date business statistics.

Integration of enterprise data can produce high-quality economic and business statistics. In some areas, Nepal has started implementing streamlined procedures for company and tax registration. The two main administrative data sources for company data in Nepal are the Office of Company Registrar (OCR) and the Inland Revenue Department (IRD). An integration initiative between the OCR and IRD has enabled the OCR to issue permanent account numbers (PANs) for tax registration purposes at the time of company registration, and the IRD to retrieve information about noncompliant or inactive companies from the OCR database. In the past, when new companies registered with the OCR, many waited up to a year to apply for the tax identification number or a PAN. Others never applied for or received a PAN and therefore never paid taxes. Government has adopted the same enterprise service system to integrate the tax and NRB systems. Further work is ongoing in FY2020r to integrate the land revenue management system with the same enterprise service system as well as the Institute of Chartered Accountants of Nepal to facilitate data sharing. The IRD has also established connectivity with the Customs Department, which provides them with PAN details to generate the export-import, or EXIM, code. This greatly reduces the compliance burden on firms and reduces red tape and could also have major benefits for statistics and research, if shared more widely.

Nepal needs a set of common, foundational, national databases on people, places, and business to form the backbone of the new data ecosystem, with links to sectoral management information systems. A national ID scheme embedded in a strengthened Civil Registration System could be the foundation for an integrated system of data on people. Similarly, on the business side, a statistical business register that combines data from the National Economic Census and administrative data sets from the Company Registrar and Inland Revenue Department could be a starting point, with the potential of evolving into a powerful information tool for industrial policy and private sector development (Box SF.9). Finally, the usefulness of these core registers of people and businesses would be further amplified if they could be linked to a land and property register (Cadaster) via a national address database.

Integration of data on individuals, households, and businesses holds vast potential for governance, service delivery, policy making, and statistics. As the suite of services offered by the public sector grows, the need for a

Figure SF.14. Reliability of infrastructure index and format of records at immovable property registry



Source: a. World Bank 2020.

comprehensive picture of government-to-citizens (G2C), government-to-business (G2B), and government to government (G2G) relationships is becoming increasingly important, not only for Nepal, but for governments everywhere. Business intelligence and compliance processes, sometimes referred to as "know your customer" in the private sector, are crucial for also managing public service delivery, particularly as government-citizen engagements become more complex and multifaceted, comprising a multitude of schemes managed by disparate departments and agencies. Furthermore, there is an increasing demand on governments to track resources from the stage of budget appropriation through execution to outputs and outcomes. This again requires integration of financial data across appropriating and implementing arms of governments combined with feedback data from beneficiaries.

Nepal's efforts to strengthen the Civil Registration System in combination with the introduction of a single National ID could be the foundation for an integrated system of data on people and households. Nepal's current civil registration system originated in the late 1970s. Each municipality is designated as a local registrar responsible for recording vital events when residents come forward to report an event. The main outputs from the system are birth, death, marriage, and divorce certificates. Registration is voluntary, but certificates are required to access certain services, for example, birth certificates for school enrollments, and marriage and death certificates of a spouse to receive survivor benefits. Hitherto, registration and recordkeeping has largely

been paper-based and decentralized with no back-end central registry and absent a unique ID for identity verification and deduplication of records. The ongoing introduction of a unique National ID in Nepal and the advent of digital technology and secure database systems have created new opportunities to make government more effective and more responsive to citizen needs.

A unique National ID, which is universally used for government-citizen interaction, is instrumental for data integration. The Government of Nepal manages a multitude of service delivery and social protection schemes. Common to the effectiveness of all schemes is that administrators can easily and reliably verify people's identity and integrate data across different registers and databases. This is particularly the case for social protection schemes, where government agencies must be able to identify eligible beneficiaries and ensure benefits reach them, while excluding ineligible individuals. Integration and the sharing of data among government departments is imperative for the overall effectiveness of the social protection system. Another example would be the integration of school records by matching student IDs to the National ID and CR system, which can allow better provision of services to individuals in remote areas, and for monitoring school attendance. The World Bank is supporting the Government of Nepal in strengthening the Civil Registration and national ID system and selected social protection schemes (Box SF.10).

Enhanced data integration opportunities at the individual, household, and enterprise level would be a boon to Nepal's data ecosystem. An integrated system consisting of interoperable

Box SF.10. The Strengthening Systems for Social Protection and Civil Registration (SSSPCR) Project

Since 2016, the Government of Nepal, with the support of the World Bank, has been implementing a project to strengthen systems for civil registration and certain social protection schemes. In 2019, following the merger of the Department of Civil Registration and National ID Management Center under the Ministry of Home Affairs, the project was restructured to also include support for the rollout of the new national ID system. While the stated objective of the project is to strengthen social protection schemes, there are many additional benefits to a comprehensive, regularly updated civil registration system in combination with a national ID system for verification of individual identity. These include:

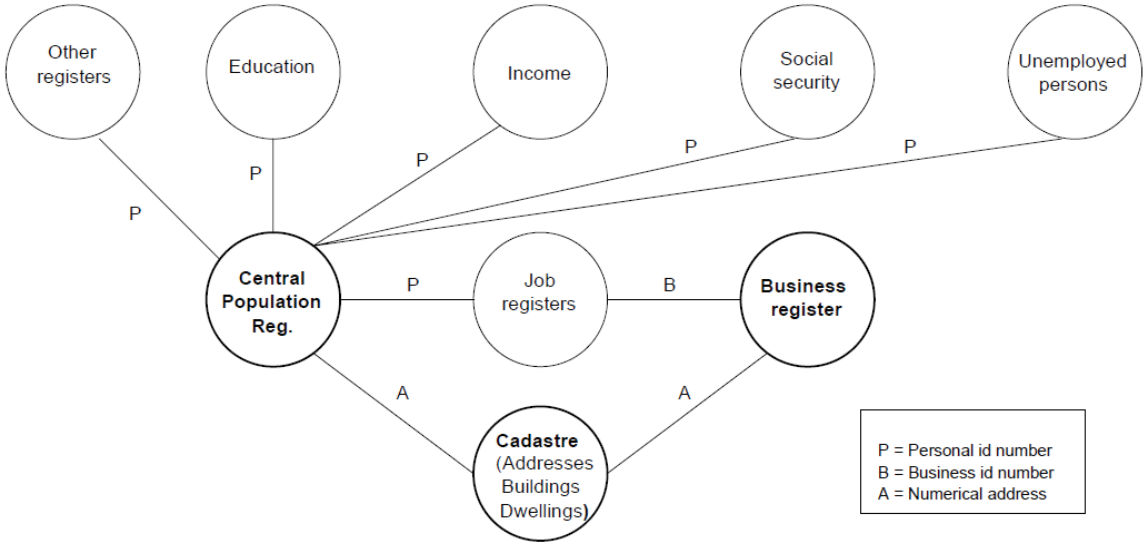
- Documentation to secure recognition of legal identity, family relationships, nationality and ensuing rights, including inheritance
- Facilitating access to essential services, such as health, education, and social welfare
- Documentation needed for formal employment, exercising electoral rights, transferring property, and opening bank accounts
- Crisis recovery and prevention of statelessness after natural disasters
- Statistics on population dynamics, health, and inequities in service delivery on a continuous basis for the country and for local administrative subdivisions.

Box SF.11. "Statistics Norway – An institution that counts" [a]

In Norway, the civil registration of vital events was started by the church in the 17th century. Today, civil registration has evolved into a comprehensive, high-quality administrative system with more than 400 variables in the statistical database, of which the Central Population Register (CPR) alone captures at least 75. The most prominent feature of present-day Statistics Norway is that the Statistics Act 1989 gives the institution unlimited "access" to administrative registers as it can "impose obligation to provide information" (see Chapter 1, 1-2),* which has greatly reduced response burden and cost.

The census in 2011 was estimated to cost US$0.5 per person, which is almost 80 times cheaper in per capita terms than the U.S. Census in 2010. In Norway, the last traditional census was carried out more than five decades ago. Since then, the only recent population and housing census was in 2001, which was to assign the dwellings unique addresses and upgrade the national register for property and buildings. The Norwegian census system consists of a set of registers on individuals that are linked to the Central Population Register through unique ID numbers and addresses, as shown in Figure SF.15.

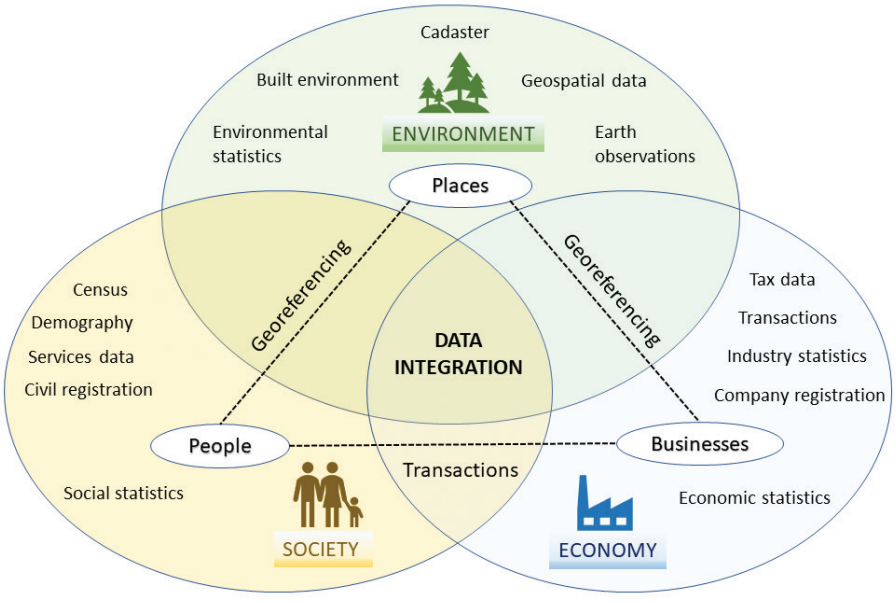
Figure SF. 15. The Norwegian register-based statistics system



Sources: Statistics Norway. 2004, Andersen and Utne. 2016

Note: *Norway has a new statistics act that will be fully operational in 2020.

Figure SF. 16. Schematic representation of an integrated statistical system



Source: Global Statistics Geospatial Framework: Linking Statistics and Place, UN Expert Group on the Integration of Statistics and Geospatial Information, July 2018

national registers and administrative data systems have great potential for official statistics production. Some countries have successfully introduced register-based statistical models and mixed-mode methods that enable the merger of traditional surveys with administrative data to produce powerful new insights at higher frequency, increased granularity, and reduced cost. The statistical systems of the Nordic countries, Denmark, Finland, Norway, and Sweden are good examples of primarily register-based statistical systems supplemented by household and enterprise surveys (Box SF.11). Other countries use administrative data or other non-statistical sources of data as substitutes for all or some of the variables directly collected from surveys, resulting in greater efficiencies and reduced response burden. Figure SF.16 represents a stylized model of an integrated statistical system.

Integration of national development plans, budgets, and socioeconomic outcomes will improve policy, planning, and accountability. Countries need systems that allow the government and citizens to link revenue collection and allocation of resources with policy objectives, and with performance in achieving those objectives (Box SF.12). Government Finance Statistics (GFS) is a specialized macroeconomic statistical framework designed to support such fiscal analysis, and in turn, fiscal policy.[78] GFS allows the detailed breakdown of government expenditure to priority areas such as education and health. Some countries have gone a step further and integrated SDGs directly into national policy, planning, and budgeting processes, for example, Kenya[79] and Sri Lanka.[80] These efforts to strengthen the links among fiscal policy, planning, budgeting, and socioeconomic outcomes involve integrating

78 International Monetary Fund. 2014.
79 Government of Kenya. 2017.
80 Government of Sri Lanka. 2018.

Box SF.12. Methods of data integration [a]

Data integration is the process of combining data from one or more sources to create new and enhanced information to drive government operations, business development, and citizen engagement. There are several ways data integration can occur.

The most common is data matching, whereby records from administrative registers are linked with other administrative records or survey data through a common identifier. An example of this would be linking demographic information from a national population register or civil registry to a specialized management information system, for example, for education, by using a national ID or other unique identifier.

Matching can also be done at a higher level of aggregation, for example, at the household, company, or community level. Integration of georeferenced statistical data or non-statistical data is a very common form of data integration, often done through specialized Geographic Information Systems (GISs).

Data pooling is another commonly used method of integrating data. Data pooling is done by appending two or more sets of records of similar types of units, for example, a data set of large enterprises with one containing small and medium-sized enterprises.

[a] UNECE. 2017

macro-fiscal data with socioeconomic outputs and outcome aggregates. Different departments will have different pieces of this puzzle. In Nepal, this would require close cooperation at the central level among primarily the Ministry of Finance, the National Natural Resources and Fiscal Commission, the National Planning Commission, and the Central Bureau of Statistics, and at the provincial level with planning and statistical authorities. The National Data Profile could be a useful tool for such data integration and dissemination.

Amid emerging data needs across the spectrum of the data ecosystem, further attention is warranted to whether the financial resources allocated to the statistical functions is sufficient. The budget allocated to statistics in 2018 was NPR 0.49 billion, a mere NPR 0.08 billion higher than that allocated almost eight years ago, without accounting for inflation.[81] In fact, the allocation decreased from 0.13 percent of the total fiscal budget in 2010 to 0.06 percent in 2018 (Figure SF.17). This does not include support from development partners.[82]

A cross-country comparison of staffing of the National Statistics Offices indicates that Nepal's Central Bureau of Statistics (CBS) is indeed understaffed, especially in light of the increased expectations of the CBS (Figure SF.18). Compared to countries with a similar population size, such as Malaysia, the CBS has about one-fifth the staff. Many countries with a similar level of National Statistics Office staffing typically have much smaller populations, such as Cambodia and

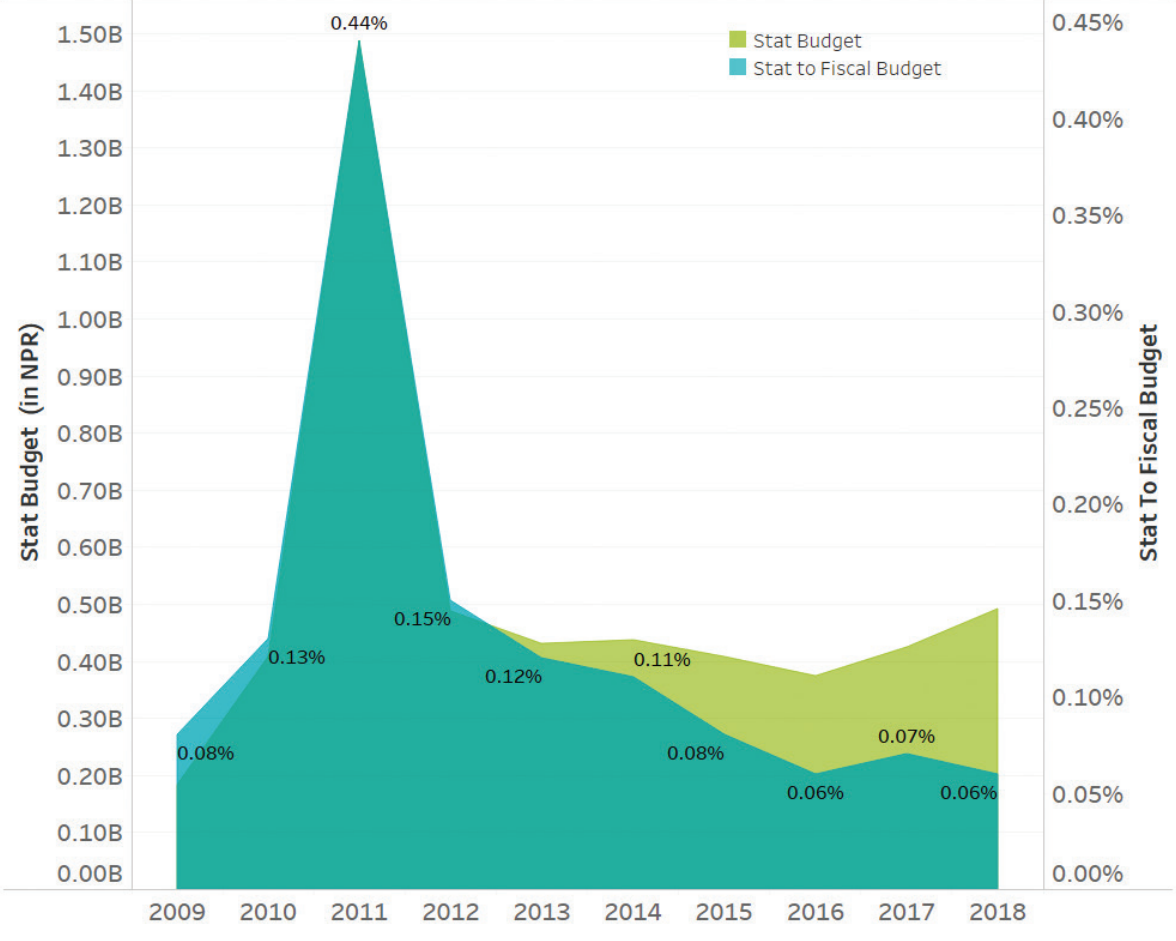
81 Includes budget funds to the CBS, district offices, the economic statistics development program, the social statistics development program, and planning and the human resources development program.

82 There exists considerable off-budget support for planning and statistics for improving periodicity and quality of data. As of 2019, there are eight off-budget projects for strengthening planning and statistics. The areas covered include economic, social, and disaster recovery, and most are designed to improve the periodicity and quality of data needed to monitor progress on development indicators. The highest contribution comes from the Evidence for Development (E4D) Programme funded by the UK Department for International Development (DFID) in the amount of US$18 million. This allocation is more than half of the total off-budget commitments for planning and statistics.

Jamaica. Every CBS staff member in Nepal serves at least twice as many people as in high-income countries, without accounting for the likely gap in technical capacity. The fact that about half of CBS positions are not statisticians adds to the above argument. The CBS and 33 district statistics offices (SO) together have 532 staff, of which 51 percent are related to statistics. At the CBS alone, almost 61 percent (90 posts) are related to a statistical group (Figure SF.19).

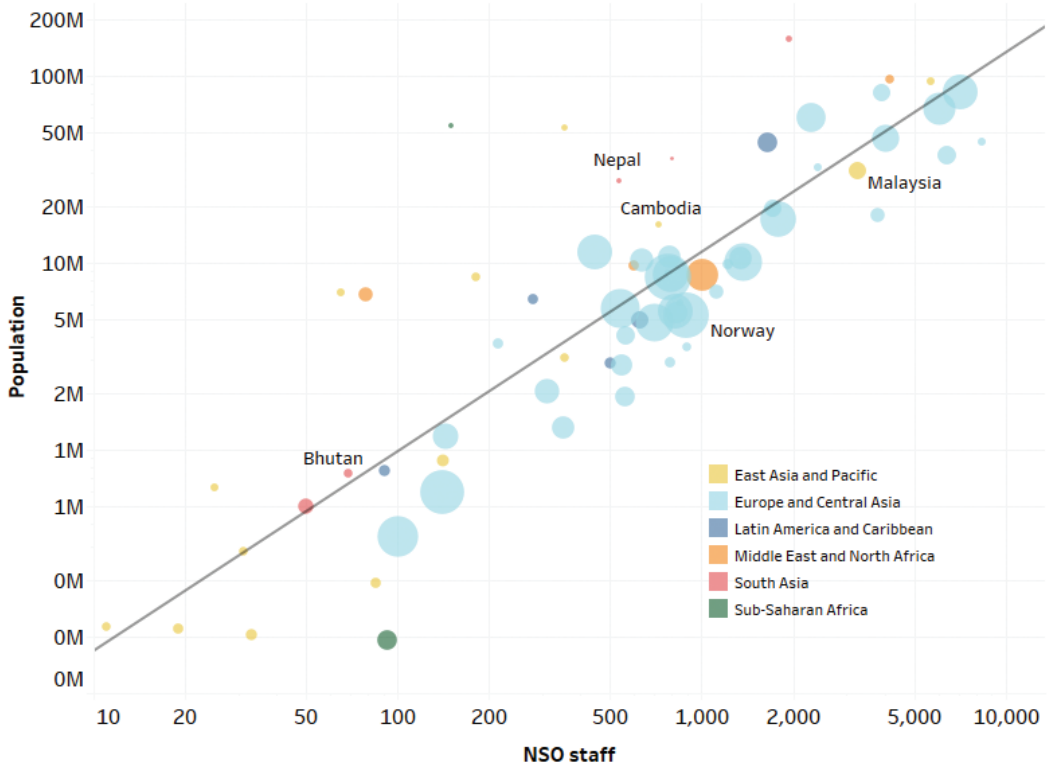
Nepal's data ecosystem already holds a lot of data, and it is growing. Yet the surge in data demands under the federalism transition creates an increasing data gap. All three tiers of government and the private sector demand timely and locally disaggregated data. The types of data in need and capacity to digest data-driven insights differ significantly across the country. The need to grow the capacity to use data is echoed across the spectrum of the data ecosystem, as is the need to carefully customize the way data are communicated. What are the practical steps Nepal needs to take to develop a data ecosystem that meets the growing thirst for data and knowledge?

Figure SF.17. Statistical budget and its share in the total fiscal budget



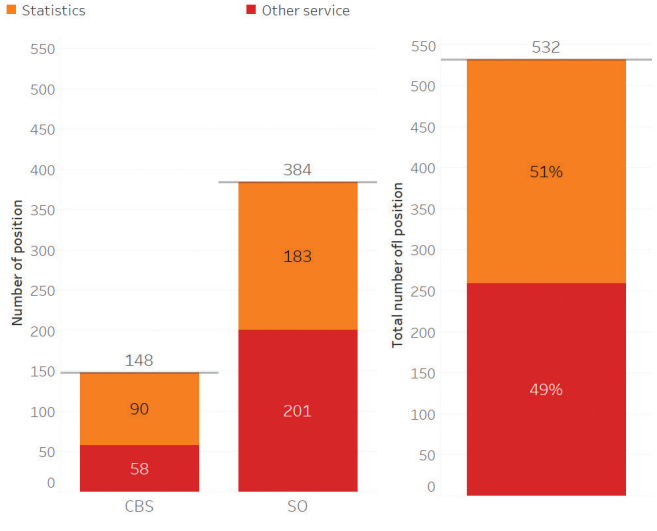
Source: Ministry of Finance (budget speeches, and Red Book years 2009-18).

Figure SF.18. Staffing of National Statistics Offices



Source: World Development Indicators and various country-level sources.
Note: Population data as of 2017. Size of the bubbles represents gross national income per capita in 2017.
Detailed country-level records are available upon request

Figure SF. 19. Number of posts in CBS and statistical offices in the districts



Source: CBS official website (https://cbs.gov.np/organizational-structure/).

C5. The way forward

The global data revolution was propelled by three mutually reinforcing factors: the ability to collect and store data digitally, the ability to share and integrate data cheaply and instantaneously through the internet, and the ability to analyze large volumes of data owing to the vast improvements in computer processing power.[83] We argue that the future of Nepal's data ecosystem evolves around three analogous dimensions that spurred the global data revolution: data production, data sharing, and data use, all of which must be built upon a strong data governance structure (Figure SF.1.).

The long-term vision is of a data ecosystem that can fulfill the demand for reliable data from users inside and outside of government. Figure SF.1 is a conceptual representation of Nepal's data ecosystem today and in the future that builds on the three dimensions. Most of the focus thus far has been on data production. Without improving data sharing and data use, however, additional data production will not contribute much to the vitality of the ecosystem, represented by the volume of the cube. The value of new data can be maximized only if the data can be widely shared and used by many.

Realizing this vision will be a long journey. Strategic planning and investments under strong leadership are of the utmost importance. Given the cross-cutting nature of data, much deeper coordination will be needed across government agencies, the private sector, civil society, media, academia, and development partners. We organize our recommendations around two broad themes: (1) making the most of existing data, which focuses on short-term priorities; and (2) creating an enabling environment to nurture the data ecosystem, which mainly consists of long-term reforms. Table SF.1 summarizes key reform areas and recommendations.

Making the most of existing data

Every effort should be made to continue successful implementation of core statistical activities. The National Economic Census 2018 was a major accomplishment for Nepal. The 2021 Population and Housing Census offers an extremely important opportunity for Nepal to establish statistical benchmarks for the central, provincial, and local governments. It also enables the government to build a statistical platform for data integration and for program monitoring and evaluation. The main statistical censuses will need to be reinforced to remain authoritative data sources and to serve the purposes of subnational jurisdictions to avoid parallel data collection.

Develop a long-term data production schedule for national censuses and surveys. Such a schedule would help avoid bunching of large-scale data production activities as observed in recent years. The government should use it to plan ahead of time and to strategically align donor support to ensure that these core activities cater to the data needs of the country over the long run. This is one area where development partner coordination is critical. Provinces and local governments are planning to conduct or already are conducting surveys and censuses on their own. In the short run, it is important to develop guidelines for subnational data collection in order to minimize duplication and to maximize comparability of otherwise disparate data production efforts.

A modernized data dissemination policy will boost data use. While privately collected data are often proprietary, data collected through public funds should be a public good. Data are not considered a public good unless no one is excluded from accessing them. In Nepal today, data products are disseminated in an ad-hoc manner. Development partners contribute to literally hundreds of surveys but few of them are available for public access online. There is no clear overview of existing data products. In such an environment, those in need

83 McAfee and Brynjolfsson 2017.

Reform Themes	Key recommendations	
Make the most of the existing data	**Data Production**	Leadership and long-term vision
	• Continue to focus on core statistical products (censuses and national surveys)	
	• Introduce geo-tagging in all relevant surveys, censuses and administrative registers	
	• Develop a long-term calendar of censuses and priority surveys, reflecting user feedback	
	• Establish a data producer-user network to reflect user feedback in data production	
	Data Sharing	
	• Develop a comprehensive data dissemination policy and open government strategy	
	• Promote data sharing in machine-readable formats	
	• Invest more and further develop national data profile as a model for improved data sharing and exchange	
	Data Use	
	• Cultivate demand for data use by government agencies, private firms, academic institutions, and the general public	
	• Promote innovations in data use that explore new sources of data such as geospatial data, citizen-generated data, and private sector data	
Create an enabling environment	**Data Governance**	
	• Establish a new data governance structure conducive for federal Nepal that clarifies leadership and coordination roles across the three tiers of government	
	• Update the Statistics Act and follow through on recommendations in the National Strategy for the Development of Statistics	
	Data Sharing	
	• Develop a long-term vision for enhanced data integration	
	• Develop an enabling legal and institutional framework conducive to active data exchanges across public agencies	
	• Develop a set of common, foundational registers on people, places, and business	
	Data Use	
	• Invest more in staffing and capacity development for data and statistics.	

of data may choose to conduct their own survey simply because they do not know similar surveys already exist. The short-term priority, therefore, is to develop a more open and transparent approach to data access and dissemination.

Small immediate changes will drastically improve data accessibility. In addition to a modernized data dissemination policy, several immediate steps can be taken to improve data accessibility. First, all data appendixes in statistical abstracts and reports that utilize data collected through public funds should be made available in a machine-readable format. This will immediately boost data usability and reduce the chances of data misuse as users will no longer have to manually "scrape" data from PDF files. To the extent possible, methodological notes and programs to replicate the results should also be made available. Transparency around how statistics are generated is essential for building and maintaining trust. Second, access to anonymized microdata from sample household surveys free-of-charge should be a standard. The revenue from sales of microdata is marginal compared to the value of the data sets to society. Today the practice of charging for data limits use.[84] However, it is crucial that the privacy of respondents and confidentiality are ensured. Trust is the main currency of national statistical agencies and must be protected.

This is not a matter of technical issues. The CBS maintains a National Data Archive, a repository of surveys and censuses conducted by the government. This platform is compatible with international databases of household surveys and censuses and can be an excellent model for other countries to follow. The problem, however, is that none of the data sets is currently available for download online, although the platform is equipped with such functionality. Some survey data are only accessible at external websites maintained by development partner organizations. This is a missed opportunity for the GoN to accurately measure demand for their survey products.

There is an opportunity for the GoN to adopt an Open Government Data Action Plan. The National Information Commission (NIC) has drafted a National Open Government Data Strategy and Action Plan to better meet the needs of citizens and enable innovation and civic participation (DRAFT OGD Action Plan, NIC 2016). A cross-country analysis demonstrates a positive correlation between data accessibility as measured by the Open Data Barometer and research output and quality.[85] The recently approved National Strategy for the Development of Statistics mentions open data but provides no details. As one of the largest producers of data, the GoN has an instrumental role to play in improving data sharing within government agencies and with the general public.

National Data Profile will significantly benefit from improved data sharing. A robust data governance structure will enable data sharing across government institutions and facilitate enhanced data integration that can connect data on people, businesses, and places, and produce timely and locally disaggregated data. A modernized data sharing policy would allow National Data Profile to feature more data and make them more accessible. As more data users realize the value of National Data Profile, a positive feedback loop will emerge between data producers and users to

84 For example, Multiple Indicators Clusters Survey and Demographic Health Survey data are available for download free of charge online, while other survey data are available for a nominal fee. The NPC has disseminated the microdata from the post-earthquake reconstruction census free of charge, but for other census and survey data such as the Population Census, users must pay a nominal fee to access anonymized public user files. More importantly, there is no mechanism for accessing data online.
85 Chuah and Loayza 2017.

further improve the profiles. Further developing National Data Profile by organizing existing administrative datasets by local governments could be a great starting point to demonstrate the value of data integration.

A culture of effective data use must be developed. In most cases, data are only used for descriptive statistics. The need for capacity building for data collection, sharing, and use is echoed across all three tiers of government and across the spectrum of the data ecosystem. Data visualization is one area where positive impacts can be expected immediately. For example, the capacity of local governments varies significantly, but even very basic data visualization can assist them in identifying problems and devising solution when key messages are clearly visualized (Box SF.6).

The Constitution aims to introduce a bottom-up, modern, collaborative, inclusive public administration system for which data driven decisions are indispensable. Provincial and local officials and their counterparts in civil society need to be exposed to the importance of data-driven analysis and policy making and implementation. Without conspicuous efforts to narrow this capacity gap, it is not possible to fulfill the promise of "leaving no one behind."

At the other end of the spectrum, Nepal can promote innovations in data use that explore new sources of data such as geospatial data, remote sensing data, private sector data, and citizen-generated data. New data sources must be sought out as not all data demands will be satisfied in the near future. To maximize the value of citizen-generated data, governments should reaffirm citizens' rights to produce data, and experiment to determine when the quality of CDG is "fit for purpose," proactively communicate how people can provide data, and expand past efforts to open more government data. To maximize the value of data produced by the private sector, governments should partner with one or two data providers to develop pathways for private data to flow for public good. In developing pathways, the government must win the trust of the data provider. Elements that forge an effective partnership include ensuring privacy and security, minimizing transaction costs, and mitigating reputational risks. Big data can improve many aspects of citizens' lives and their relationships with governments and businesses.[86] Businesses are already using big data to improve sales and profit margins.[87] Governments can also improve their productivity by leveraging big data (Box SF.13).[88]

Creating an enabling environment to nurture the data ecosystem

A core data governance architecture is a critical prerequisite for a functional data ecosystem. The Government of Nepal has adopted the National Strategy for the Development of Statistics as a strategic platform for improving the NSS. It is imperative for the government to follow through on the recommendations and establish an implementation mechanism based on an agreed roadmap. The Statistics Act needs to be updated urgently. A draft is now being considered. The draft changes should be considered carefully and include the best practices that have been adopted around the world. An explicit consultation mechanism should be established so that the private sector and the public can provide their views. The eventual adoption of a new Statistics Act is critical for the establishment of a sound national statistical system that makes up the core of the overall data ecosystem under the new federalism.

The new federal structure must have a revamped statistical infrastructure at the core of the NSS. The CBS has continued to operate its 33 branch offices to support its data-collection efforts. These 33 branch offices do not have a formal mandate to support provincial or local governments. The Constitution has made provisions for a statistical or data office to be established in each province

86 Executive Office of the President, "Big Data : Seizing Opportunities, Executive Office of the President."
87 World Bank 2018.
88 Manyika et al., "Big Data: The next Frontier for Innovation, Competition, and Productivity."

Box SF. 13. Governments across the world are launching big data projects

In 2013, the UK government adopted an Information Economy Strategy* and launched a plan to seize the opportunity provided by big data, by building "a skilled workforce, and data-confident citizens."[a] The Office of National Statistics in the UK has also created a Big Data Research Center to understand how big data might impact its "statistical processes and outputs." In the United States, the government launched the Big Data Research and Development Initiative in 2012 to "derive the greatest benefits" from big data. The U.S. government is using big data for numerous purposes including to "assess risks to the financial stability" of the country,[b] and to advance its understanding of health and disease.[c]

In 2018, the Government of the Netherlands published its strategy to prepare for digitization, including taking advantage of big data. The government has also launched Commit2Data, "a long-term national research and innovation" program to increase "cross-sectoral cooperation on big data issues." Statistics Netherlands has established the Center for Big Data Statistics to facilitate "collaboration in the field of big data." To further create an environment to take full advantage of data, the government published its vision on data sharing among businesses.[d]

The Australian Government in 2013 launched its Big Data Strategy to "to enhance data analytic capability of agencies in support of improved service delivery and the development of better policies" and invest in skills development of its citizens to thrive in data-driven world.[e]

In India, the planning commission published its "Strategy for New India @ 75," which recommends the use of "tertiary big data collected by private third parties" for evidence-based policymaking.[f]

Source: a. Government of the United Kingdom 2013. b. National Science and Technology Council. 2016. c. Bourne, et al. 2015. d. Government of the Netherlands. 2018, 2019 e. Government of Australia. 2013. f. NITI Aayog 2018

to provide leadership for local government statistical operations and to meet data needs of the provincial and local government planners. This has yet to materialize, however. These units would address the provincial and local government data needs. The establishment of such units should be implemented as soon as possible to enhance the functioning of the provincial and local governments.

Several models could be considered for the new multitier statistical governance architecture. One is to reorganize CBS's branch offices and align them with current provincial boundaries. Each province could be supported by a main CBS branch office with sub-offices located in local governments. In this option, the provincial branch office would functionally report to the CBS headquarters but implement statistical activities for both CBS and the local governments. This is akin to the Malaysia or Thailand model. The advantage of this system would be strong central coordination that would ensure a coherent national statistical system. The disadvantage could be that the system would be more oriented towards national statistics and not as responsive to provincial and local government needs.

Another option would leave the CBS structure intact to continue to deal with national statistics,

and not burden the CBS with subnational statistical activities. Instead, Provincial Data Offices would be established to manage the data needs of the provinces, as provided for by the Constitution. Local government data offices would correspondingly be established that would report to the Provincial Data Office.

There could be two variants to this option. The first could be that the Provincial Data Office would be the apex entity for each province without explicit coordination mechanism across the provinces. This governance structure is akin to other large countries such as China, Indonesia, and the Philippines where each province has its own statistical or data department. This model would make the system highly responsive to provincial and local data needs, but the absence of a central coordinator would risk creating a disconnect between national and sub-national statistics. The second variant takes the view that at the initial stage, it is important to provide national leadership in building capabilities and establishing supporting infrastructure for the provinces and local governments. Under this variant, a national data office could be considered which would facilitate the establishment of the provincial data offices and help with coordination. For this model to work, CBS and the national data office would need to coordinate very closely on statistical standards and definitions, quality control frameworks, etc.

Exercise leadership in coordination, quality assurance, and setting standards. Data will not exercise its value unless it is trusted, and trust comes from quality assurance. A lack of confidence in government data limits the ability of governments and society to take decisions based on evidence. At its core, data must be relevant to decision making. But producing the relevant data is insufficient to instill confidence in its users.

There must be trust in the data itself, as well as trust in the institutions that produce the data. Moreover, the fragmentation of data production must be addressed with a structure that facilitates coordination across the three tiers of government, and with development partners.

Equally important is measuring the trustworthiness of the institutions that produce the data. Assessing the quality of the institution that produces the data also requires a multidimensional perspective. How data-producing institutions are regulated and empowered is the final ingredient to ensure trust and confidence in data. Legislation that articulates institutional roles and responsibilities is vital. External and internal advisory committees may provide the governance structure necessary for the institution to be effective.

Data integration is imperative for a cohesive federated data ecosystem. However, it requires a long-term vision as it needs significant investment in many different areas. As described in more detail below, there must be legal provisions and an institutional framework that allow active data sharing across government agencies. Foundational databases of people, businesses, and places must be established and continuously updated. Unique identifiers must be developed for these databases to be integrated. All data contributors must agree on common standards and definitions and commit to implementing them. This requires strong leadership and coordination beyond the traditional statistical system. This is an opportunity for Nepal to leapfrog as many middle-income countries struggle to overcome these challenges.

Data integration requires an enabling legal framework and supporting institutional arrangements. Policies and procedures on data exchange and integration across government departments with provisions for data privacy must be developed and encoded in legislation as required. In Nepal, there are at least 15 acts/ bills that grant different verticals or layers of

Box SF. 14. Data sharing among government agencies as a first step to data integration

Government agencies possess tremendous amounts of data generated through regulatory activities. Accessing such administrative data has always been difficult. Government agencies are often hesitant to share the data under their control. Current concerns about the privacy of personal information has created new barriers to the sharing of data across agencies.

The National Statistical Offices (NSOs) are probably the most successful government agencies in their ability to access data across the government. This is due to the legal provisions mandated in the Statistics Act under which NSOs operate. The provisions cover both the legal authority to access government information and the confidentiality guarantee. This is due to the recognition that for the NSOs to do the job of compiling social and economic indicators, they need to have access to all kinds of data. Data integration is a key part of the production process of NSOs, and it forms the basis for all national statistical work.

There are many international examples of such data accessibility provisions in Statistics Acts. In Singapore, the Statistics Act (2017) allows the Chief of Statistics to direct "any public agency to furnish or supply to him any particulars or information in the possession of the public agency." In areas where there is specific legislation to protect the release of data, such as income tax data, appropriate exemptions are made in the legislation to make the release possible. In Canada, Section 13 of the Statistics Act makes similar provisions for the Chief Statistician to access government data. Sections 24 through 29 of the act provide for access to specified types of information, namely those related to income tax, excise tax, imports and exports, and criminal statistics. Similar legislation exists in Australia, New Zealand, and the Nordic countries.

There have been no reported abuses of such privileged access to government data. It has now been accepted that data sharing with NSOs as the integrator has generated great advantages and is considered a best practice internationally.

government the authority to collect the data or maintain the secrecy of the information (Box SF.14). [89]

A government-wide data policy comprising ownership, standards, and protocols for data creation and sharing might require review and amendment of existing laws. Three important pieces of legislation are currently being debated: draft bills entitled, "A Bill to Provide for Information Technology," and "A Bill Made to Provide for Provisions Relating to National ID and Civil Registration," as well as the work in progress Statistics Act. These bills, when enacted, need to provide the legal framework to enable data integration.

Data integration must build on a solid

89 For instance, the authority to produce voter data resides with the Election commission (see Section 11 Other work and authority), while the NRB under the aegis of the NRB Act 2002 (see Section 12 Flow of public information), produces monetary statistics. The Ministry of Home Affairs is responsible for civil registration and the collection of vital statistics. The tourism policy, for instance, envisions collecting tourist arrival data (including those from India via land transport). The Disaster Risk Management (Act) has a separate provision under "right and duties" that empowers the National Reconstruction Authority to collect, analyze, store, and disseminate information and data related to disasters.

technical foundation. The CBS, as the national statistical authority, plays an important role as the custodian of statistical standards and definitions and national data quality frameworks. Harmonization of standards and definitions is a prerequisite for system interoperability and data integration. The GoN through the CBS should review and adapt the main statistical classifications used in statistical production and disseminate them to statistical units at the national and subnational level. As the custodian of statistical terms and definitions, the CBS also has a role to play in the design of base registers to ensure that these can also serve statistical purposes. The process of data integration should also shed lights on areas needing improvements in existing administrative databases.

Unique identifiers are necessary for linking data on people, businesses, and places. The strong push for digitization of the Civil Registry and implementation of a national ID should be expanded to other base registers like the Company Register and the Cadaster. Together, these three registers could form the nexus of an integrated, register-based data system with the potential to vastly increase the efficiency of government operations. As a positive side effect, it would also boost Nepal's data ecosystem by providing data to answer fundamental questions about Nepal's society and economy. A quick-win would be to introduce geo-tagging of basic infrastructure and service delivery facilities such as schools and health clinics.

Some countries have appointed a Chief Data Officer (CDO) to oversee government data systems to supplement the Chief Statistician, who oversees the national statistical system. Experience from other countries has shown that strong central leadership is needed to make interdepartmental and intergovernmental cooperation work. The position of the CDO has been created in national and subnational governments and even in larger cities and enterprises with complex and sprawling data systems. CDOs are usually responsible for designing and implementing data strategies and systems, and for overseeing the collection, storage, management, quality, and protection of data. A common objective of most CDOs is to create value to a business or organization using data-powered business intelligence tools.

Invest more resources – financial and human – to build capacity and grow the data ecosystem. The need for capacity building for data collection, sharing, and use is echoed across all three tiers of the government and across the spectrum of the data ecosystem. Meeting the growing data demands such as the fiscal federalism and National Data Profile needs significant financial and human resource support to cover the bottom line. National statistical agencies have limited opportunities for generating revenue, and given the public good nature of their product, sufficient public funding via national and subnational budgets is needed.

The transition to federalism is a testament to Nepal's desire to accelerate its development progress to achieve a series of ambitious goals. Nepal aspires to be a prosperous middle-income country by 2030, and committed to achieving a range of aspirational development goals including the Sustainable Development Goals. Goals cannot be achieved without monitoring progress, and progress cannot be monitored without high-quality data. To translate aspirations into actions, there is an emerging thirst for more data and knowledge to design effective policies to accelerate development progress by all three tiers of government.

Nepal's data ecosystem needs long-term strategic direction to modernize itself and improve data sharing and data use. As mentioned, Nepal already has a lot of data to start its own data revolution, but they exist in silos. In a way, Nepal's data ecosystem today is like a society at the dawn of the digital transformation in which many have a computer, but no internet. The volume of information exchange would be severely limited in such a constrained environment. The culture of data use will not grow unless there is an active exchange of data that encourages data-driven innovations. A positive feedback loop must be created, whereby improved data sharing leads

to enhanced data use, which in turn can reveal data gaps and quality issues to improve data production.

For all this to happen, there must be a robust data governance architecture that clearly defines the roles and responsibilities of key actors. The future data ecosystem must be responsive to the data needs of all levels of government, and of the private sector, academia, and society more broadly. Decisive steps have already been taken by the government, but more is needed. A cultural shift in the perception and use of data for decision making is equally important. More and better data will foster more demand.

Even in the age of artificial intelligence, it will remain a distinctive advantage of humans to ask the right questions.[90] Data itself have no value, no matter how big they may be. Data must be used to measure things we care about and generate knowledge that inspires change. Data must drive actions on results that count.[91] This requires visionary leadership to push through the necessary reforms to create an enabling legal and institutional environment for the data ecosystem to thrive and contribute to Nepal's development.

90 McAfee and Brynjolfsson 2017.
91 Copeland 2015.

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