THE STATE OF IDENTIFICATION SYSTEMS IN AFRICA

A Synthesis of Country Assessments

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This report was prepared by Julia Clark on behalf of the Identification for Development (ID4D) initiative, the World Bank Group's cross-departmental effort to support progress towards identification systems using 21st century solutions.

The findings in the report are based on detailed assessments of identification systems (IMSAs) in 17 countries—Botswana, Chad, Cameroon, Côte d'Ivoire, the Democratic Republic of Congo (DRC), Ethiopia, Guinea, Kenya, Liberia, Madagascar, Morocco, Namibia, Nigeria, Rwanda, Sierra Leone, Tanzania, and Zambia—that were conducted between 2015 and 2016 as part of the ID4D initiative. As a result, the information presented here represents a snapshot of identification systems in these countries at the time the reports were written, and may not reflect recent developments.

This summary report relies heavily on the teams that conducted the individual assessments, as well as the many local officials and professionals whose expertise informed their analysis. Specifically, the report would not have been possible without the work of the authors and contributors to the IMSAs, including Joseph Atick (Chad, Côte d'Ivoire, DRC, Liberia, Morocco, Rwanda, Sierra Leone), Vasumathi Anandan (Kenya), Heriniaina Andrianasy (Madagascar), Diego Angel-Urdinola (Moroc-co), Kenabetsho Bainame (Botswana), Nathalie Tchoumba Bitnga (Cameroon), Motsholathebe Bowe-lo (Botswana), Dorothee Chen (Morocco), Ndoe Dir (Cameroon), Fatima El Kadiri (Morocco), Jean Ferry (Guinea), Alan Gelb (Ethiopia, Kenya, Tanzania), Mia Harbitz (Madagascar, Namibia), Diane Hubbard (Namibia), Linda C. Kasonde (Zambia), Mpho Keetile (Botswana), Anne-Lucie Lefebvre (Madagascar), Neo Corneliah Lepang (Botswana), Marc Lixi (Guinea), Kannan Navaneetham (Botswana), Azedine Ouerghi (Côte d'Ivoire), Robert Palacios (Ethiopia, Côte d'Ivoire, Morocco), Krish-na Pidatala (Namibia, Tanzania, Zambia), Ariel Pino (Morocco), Serai Daniel Rakgoasi (Botswana), Antsanirina Ramanantsoa (Madagascar), Manuel Salazar (Cameroon), Zaid Safdar (Liberia, Nigeria, Sierra Leone), Arleen Cannata Seed (Kenya), Jaap van der Straaten (Cameroon, Zambia), Emily Weedon (Cameroon), and Matthias Witt (Madagascar).

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Glossary[1]

Autonomous

In the context of government administration, an entity legally entitled to administrative and budgetary self-rule within the executive branch of the government, but outside of the line ministries.

Civil register

The repository of loose-leaf files, ledger books, electronic files, or any other official files or database set up for the universal, continuous, and permanent recording—in accordance with established procedures—of each type of vital event and its associated data for the population of a defined area (e.g., county, district, municipality, or parish).

Credential

A mechanism, process, device or document that vouches for the identity of a person through some method of trust and authentication. Examples include birth certificates, national ID cards, digital and mobile certificates, unique ID numbers, etc.

Deduplication

A specialized data compression technique for eliminating duplicate copies of repeating data. Biometric data—including fingerprints and iris scans—is commonly used to deduplicate identities and establish uniqueness.

Digital identity

A set of electronically captured and stored attributes and credentials that can uniquely identify a person that individualize a person in a computer-based environment.

Electronic identification (eID)

An credential used to identify and authenticate an individual in a digital environment. Generally, a smartcard that contains a contact- or contactless chip.

Foundational identification system

Identification system created for general public administration and identification—including civil registries, national IDs, and national population registers—which may serve as the basis for a wide variety of public and private transactions, services, and derivative identity credentials. Common examples include national IDs, civil registers, and population registers.

Functional identification system

Identification system created in response to a demand for a particular service or transaction, and may issue identity credentials such as voter IDs, health and insurance records, bank cards, etc. These may be commonly accepted for broader identification purposes, but may not always bestow legal identity.

1 Unless otherwise noted, definitions are based on IMSA Guidelines and additional ID4D publications, including the Principles on Identification for Sustainable Development, the ID4D Strategic Framework, and a joint World Bank Group–GSMA–Secure Identity Alliance Discussion Paper, "Digital Identity: Towards Shared Principles for Public and Private Sector Cooperation".

Glossary

Identification	The determination of identity and recognition of who a person is; the action or process of determining what a thing is; or the recognition of a thing as being what it is.
Identification/identity system	Systems—including databases, credentials, and the processes, procedures, and infrastructure to create and manage them—that register and identify individuals for a general or specific purpose.
Identity	A unique set of features and characteristics that individualize a person, including biographical and biometric attributes.
Interoperability	The ability of information systems and procedures to share or authenticate data and enable the exchange of information and knowledge among them.
National population register (NPR)	A register of every unique individual that has the right to reside in the country (citizens, adult, children, resident foreigners, diaspora, and refugees).
Legal identification system	Identification systems that provide government-recognized credentials (e.g., identifying numbers, cards, digital certificates, etc.) that can be used as proof of identity. Legal identification need not be linked with nationality or citizenship, and may encompass both foundational and functional systems.
Social register	Databases that contain socioeconomic data on the population—at the individual and/or household level—for the purpose of unifying the targeting and distribution of social programs, such as social safety nets and pensions.
Unique identity number (UIN)	A number—normally based on biometric identification—that uniquely identifies an individual for their lifetime and can be used to link an identity across databases and systems in both the public and private sector.

Abbreviations

ABIS	automated biometric identification system
AFIS	automated fingerprint identification system
A.N.GE.IE	Agency for Electronic Governance and Information Technology (Guinea)
BOT	build-own-transfer
BUNEC	National Civil Status Bureau (Cameroon)
CRVS	civil registration and vital statistics
DAPEC	Direction des Affaires Politiques et de l'Etat Civil (Chad)
DCNR	Department of Civil and National Registration (Botswana)
DNEC	Direction Nationale de l'Etat Civil (Guinea)
DNRPC	Department of National Registration, Passport and Citizenship (Zambia)
DRC	Department of Civil Registration (Namibia)
ECOWAS	Economic Community of West Africa States
ICT	information and communications technology
ID	identity document
ID4D	Identification for Development (World Bank Group Initiative)
IPRS	Integrated Population Registration Service (Kenya)
INCRS	Integrated National Civil Registration System (Sierra Leone)
ISMA	Identity Management System Analysis (the World Bank's ID4D assessment tool)
MINALOC	Ministry of Local Government (Rwanda)
MINATD	Ministry of Territorial Administration and Decentralization (Cameroon)
MSPC	Ministry of Security and Civil Protection (Guinea)
NASSIT	National Social Security Insurance and Trust (Sierra Leone)
NFC	near-field communication
NIA	national identity authority (general)
NID	national identity document
NIDA	National Identity Agency (Rwanda) or National Identification Authority (Tanzania)
NIMC	National Identity Management Commission (Nigeria)
NIN	national identity number (may or may not be unique, i.e., a UIN)
NIR	National Identification Register (Liberia)
NPR	national population register (general, see glossary)
NPRS	National Population Registration System (Namibia)
NRS	National Registration Secretariat (Sierra Leone)
NSSNP	National Social Safety Net Program (Nigeria)
ONIP	Office National D'Identification de la Population (DRC)

Abbreviations

OVCs	orphans and other vulnerable children
PII	personally identifying information
PPP	public-private partnership
TASAF	Tanzania Social Action Fund (Tanzania)
UIN	unique identity number
UNDP	United National Development Program
UNICEF	United Nations Children's Emergency Fund
WBG	World Bank Group

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Executive Summary

THE ABILITY TO PROVE ONE'S IDENTITY IS A CORNERSTONE OF PARTICIPATION IN MODERN LIFE, YET OVER 1.5 BILLION PEOPLE LACK PROOF OF LEGAL IDENTITY.

As a first step in assisting its client countries to close this identity gap, the World Bank Group's ID4D initiative conducts Identity Management Systems Analyses (IMSAs) to evaluate countries' identity ecosystems and facilitate collaboration with governments for future work. To date, analyses have been conducted in 17 African countries, including Botswana, Chad, Cameroon, Côte d'Ivoire, the Democratic Republic of Congo (DRC), Ethiopia, Guinea, Kenya, Liberia, Madagascar, Morocco, Namibia, Nigeria, Rwanda, Sierra Leone, Tanzania, and Zambia.

Overall, these analyses reveal a wide range of identity system types and levels of development. Some countries, such as Botswana, Kenya, Morocco, and Rwanda have systems that are relatively advanced in terms of coverage, robustness, integration, and utility. Many others (e.g., Chad, Nigeria, and Tanzania) are in intermediate levels of development, while others still have non-existent or newly emerging identity systems (e.g., DRC, Guinea, Liberia). In these countries, a historic lack of strong foundational identity systems has often led to a proliferation of disconnected functional registers. Many are currently faced with the challenge of reverse-engineering civil registers and national IDs in order to improve efficiency and meet demand for identification services. Figure 1 provides an overview of the relative development of identity ecosystems in these countries across key dimensions of the IMSA.

The first section of this paper synthesizes the findings from these reports according to the five dimensions of the IMSA: administration, accessibility, technology, integration, and legal frameworks. Based on these findings, the second offers some general conclusions about the current state of identity systems in these countries. A final section offers recommendations from these IMSAs that may be broadly applicable to other developing contexts, as well as recommendations for future WBG engagement in this area.

KEY FINDINGS

- **Administrative framework and capacity**: The institutional arrangements that govern identity systems vary substantially by country. In many cases, civil registries and national ID registries are housed in different ministries or departments, and only a few countries have autonomous identification agencies. A handful have or have begun to develop national population and/or social registers to identify individuals and beneficiaries for life. Civil registration is highly decentralized in most countries, while national ID systems tend to be centralized. There are a variety of fiscal arrangements to fund identity systems, although in most cases they are funded as line items in the national budget. On the whole, identity systems are underfunded and under-resourced. The lack of ICT infrastructure, including internet and power, is a major barrier for the extension and utility of identity ecosystems in most countries.

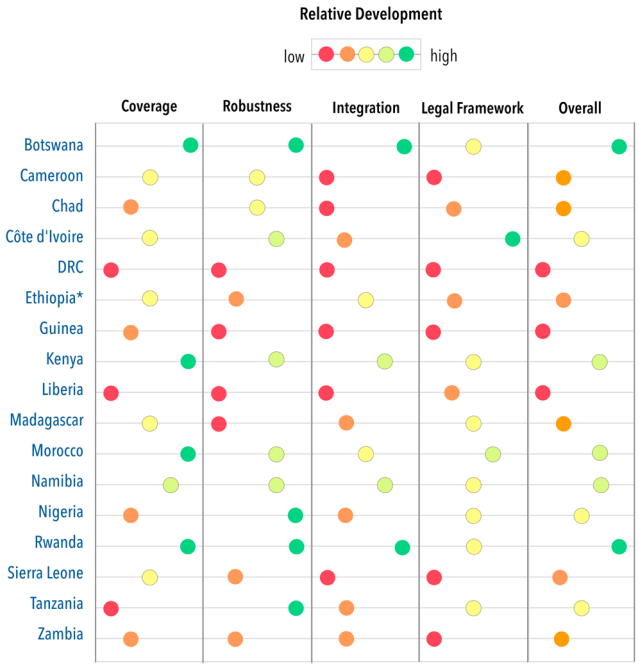
- **Accessibility: In most countries, accessibility of identity systems and services is low;** only a few countries have achieved substantial coverage in both civil registration and identification. A number of persistent barriers have limited accessibility and coverage, including high direct and (particularly) indirect costs to users, complex

legal and administrative requirements, paper-based records systems that are vulnerable to damage, geographic constraints including difficult terrain and sparse populations, and a lack of demand from users.

- **Technology:** The technology used for identity enrollment, credentialing, and authentication varies by country, as do methods of data storage and levels of system security. A majority of countries still have paper-based civil registers, while most civil identity systems are electronic and use biometric technology to de-duplicate individuals. Most have adopted plastic cards and smartcards with advanced security features, although a few maintain paper-based ID cards. And although a few countries allow service providers (including government ministries, banks, etc.) to authenticate credentials against a central database, almost none have developed infrastructure to securely authenticate individuals using biometrics, despite the existence of smartcards that are capable of performing this function. Only a few countries store and manage their data according to international best practices to protect against theft or unintentional data loss.

- **Integration**: The integration and interoperability of identity systems is low in most countries. Identity remains fragmented, with multiple agencies in charge of foundational identity systems—including civil registration and identification—and a multitude of functional identity registers operated in isolation by different ministries. In some countries, service providers use the national ID as a basis for services or for issuing a functional IDs, however the verification of these credentials is often manual. A few countries have made progress with integration by creating unique identity numbers (UINs) that link civil registration and identification records and provide a unique identifier from birth, and a

FIGURE 1. SNAPSHOT OF RELATIVE IDENTITY ECOSYSTEM DEVELOPMENT



Notes: **Coverage** refers to the population coverage of foundational systems, including civil registration, national IDs, and national population registries. **Robustness** includes uniqueness, accuracy and security of identity data, credentials, authentication. **Integration** refers to the harmonization, interoperability and interconnectivity of the identity ecosystem. **Legal framework** includes the strength of laws governing institutional roles and mandates, data protection and privacy, and oversight and accountability. *Ethiopia does not have a centralized national ID system and its birth registration rate is low. However, the country has an extensive local ID system (*kebele* cards) that serve as the primary proof of ID for most transactions. *Source:* IMSA reports, based on identity systems as of the individual report date; does not take into account recent developments and improvements.

of integrating multiple foundational databases to create true national population registers and enable records to be updated across the system in real-time.

- **Legal frameworks:** A majority of countries lack adequate legal frameworks to support and regulate modern identity management systems. Some have adopted laws to effectively govern identity institutions and processes, while others have legislation with overlapping or unclear mandates for identity actors. Nearly all countries lack sufficient regulations to protect personal data and uphold individual rights to privacy and fair use of data. In addition, many identity-related laws are outdated and do not take into account the digital nature of modern data capture,

storage, and use.

CONCLUSIONS

Based on the above findings, the IMSA reports offer a number of conclusions about the general strengths and weaknesses of identification systems in the assessed African countries:

Strengths:

- **Strong commitment:** Overall, there is a growing commitment to build identification systems in these countries, evidenced by its inclusion in national development and e-Governance plans and efforts to coordinate identity stakeholders in a number of countries. Many of the countries in this study are currently in the process of developing ambitious plans to roll out new or improved identity systems.
- **Efforts to improve coverage:** Many countries have made significant progress in improving the coverage of their identification systems—birth registration in particular—over the last decade. This has been achieved by outreach campaigns to remote and underserved populations and the increasing deployment of technology to facilitate inclusion.
- **Innovations in governance:** A number of countries have also used technology to improve the delivery of identification services, including the use of mobile devices to register births, SMS notifications to help applicants track the status of ID applications, and one-stop-shops to increase the efficiency of access to ID and eGovernance services. A few countries have also undergone substantial civil service reforms to improve the operation of identification-providing agencies.

Weaknesses:

- **Lack of stakeholder coordination and integration:** Despite political commitment to identity, there is an ongoing lack of coordination and planned integration among identity stakeholders in a number of countries. Identification systems remain highly fragmented and duplicative, wasting valuable resources and capacity. Where efforts have been uncoordinated or rivalrous, the quality and coverage of legal identification systems have suffered.
- **Limited administrative, fiscal, and technical capacity:** There is a persistent lack of implementation capacity in a number of countries. This problem is particularly evident in those areas that have faced violent conflict or economic crises and lack general administrative capacity and resources, although many other countries also lack staff with adequate technical knowledge and face chronic underfunding. Even those countries that are well-resourced often face crucial deficits in ICT infrastructure.
- **Inaccessibility and unmet demand:** Barriers to enrollment—particularly high indirect costs and administrative hurdles to accessing identification—keep the coverage of identification systems low in many countries. Unmet demand for foundational identity documents is evident in the high uptake of many functional programs such as voter registration.
- **Unrealized technology potential:** Nearly all countries have moved toward digital identity for national ID systems, many civil registers remain paper-based, and most transactions using national IDs are manual. In many countries, registration and identification offices in the countryside remain disconnected from central databases. In addition, most countries, including those with advanced smartcards, lack the ability to authenticate individuals securely against their identity credentials.
- **Problems with vendors and procurement:** A number of countries have experienced delays

and failures in their identification projects due to problems with the procurement process, vendor lock-in and the use of proprietary technology that raises costs and inhibits growth and adaptation of identification systems.

- **Missing legal and regulatory foundations:** A majority of the surveyed countries lack adequate legal frameworks to support and regulate modern identity management systems. This includes overlapping mandates for identity providers, inadequate privacy and data protection laws, and out-of-date regulations that do not sufficiently cover digital identity.

RECOMMENDATIONS

Although the IMSA tool is designed to provide country-specific analyses, in aggregate they offer a number of recommendations common to all or most countries. In addition, the reports indicate several important areas for continued engagement by the World Bank.

Country Recommendations:

- **Harmonize and modernize identity systems** by empowering national identity coordinating agencies or authorities (NIAs), adopting a unified approach to identity management, establishing UINs, modernizing civil registries, and planning for international interoperability.
- **Plan for fiscal sustainability** by considering various options for financing identification systems (including corporate financing and PPPs), ensuring that cost is not a barrier to identification, and taking into account potential long-term savings from improvements to the system (e.g., increased tax collection, rationalized wage bills, reduced program leakage, etc.).
- **Extend coverage in an inclusive manner** by removing cost barriers, increasing points of contact with citizens (e.g., though partnerships with health and education ministries, inclusive enrollment campaigns, and mobile technology), boosting the demand for identification by increasing its utility in everyday life, and extending systems by integrating legacy databases and identifying residents at a younger age.
- **Follow best practices for technology** by using open-source and off-the-shelf (OTS) technology, adopting international standards for biometrics, encrypting data and transactions, weighing the costs and benefits of credentials carefully, collecting the minimum amount of data required, and considering technology options to reach remote and unconnected places.
- **Build authentication infrastructure** that increases linkages with service providers to authenticate credentials, and introduces the capacity to authenticate individuals either against a card or a central database (via the cloud).
- **Reform legal and administrative frameworks** by implementing international guidelines for privacy and protection of digital data (e.g., ECOWAS or OECD frameworks), creating clear lines of authority for identification, and updating legal requirements and administrative procedures to reduce barriers to access.

Areas for Further Engagement by the WBG:

- **Additional IMSAs and feasibility assessments:** Continued use and development of the IMSA tool will provide a solid and productive foundation for future partnerships. In addition, the WBG should also assist countries in completing feasibility studies before finalizing identification programs and (especially) before beginning procurement.
- **Technical assistance:** There is substantial demand for more technical assistance following the IMSAs, particularly for independent experts

to consult on technology systems, legal experts to help develop frameworks for data protection and privacy, and experts from identification leaders in developing countries (e.g., Peru, India, Pakistan, Rwanda, Thailand) to share their experiences and expertise.

- **Programmatic support for identity systems:** Many WBG projects involve the creation or use of identification systems for functional programs, including for social protection programs, pension and civil service reforms, and financial inclusion. These projects can be an important instrument to boost demand for identification and—where creating foundational systems is not feasible in the short-term—create functional identity systems that reinforce or lay the groundwork for modern foundational identification systems in the future.
- **Investment in foundational identity systems.** The WBG can continue to play a direct role in supporting the development of robust and inclusive foundational identification systems. This may involve investment in modernizing and integrating data systems, including digitization of records, ICT equipment and infrastructure, staffing and training, setting up enabling agencies such as Data Ombudsman offices, etc.

Introduction

UNIVERSAL, ROBUST IDENTIFICATION SYSTEMS ARE ESSENTIAL FOR NATIONAL DEVELOPMENT AND THE FULFILLMENT OF INDIVIDUAL RIGHTS AND OPPORTUNITIES.

However, many low and middle income countries lack effective identification systems with the capacity to deliver basic identity credentials and services. As a result, an estimated 1.5 billion people across the world have no form of legal identification.[2] This deficit disproportionately affects poor and vulnerable groups—including women, children, rural-dwellers, minorities, migrants, and refugees—and often prevents them from accessing basic political rights, economic opportunities, and social services.

In 2014, the World Bank Group (WBG) created the Identity for Development (ID4D) initiative to assist client countries in closing this identity gap. A key pillar of the ID4D Action Framework is country and regional engagement, which begins with an Identity Management Systems Analysis (IMSA). The IMSA is a tool used to evaluate a country's identity ecosystem, including laws, policies, practices, governance institutions, capacity, and technology. An IMSA facilitates collaboration with governments to improve legal identification systems—including civil registration, national IDs (NIDs), and population registers—and their interoperability with functional registers. Specifically, it assesses a country's identification system along five dimensions:

1. administration, including institutional frameworks and capacity,
2. accessibility, including barriers and obstacles to timely and universal registration,
3. technology use and management,
4. interoperability and interconnectivity, and
5. legal and regulatory frameworks.

The resulting analysis details identity assets and gaps, and gives country-specific recommendations for improving the integrity and utility of identity ecosystems.

From 2014 to 2016[3], IMSAs were conducted in 17 countries in Sub-Saharan and North Africa: Botswana, Chad, Cameroon, Côte d'Ivoire, the Democratic Republic of Congo (DRC), Ethiopia, Guinea, Kenya, Liberia, Madagascar, Morocco, Namibia, Nigeria, Rwanda, Sierra Leone, Tanzania, and Zambia[4]. These analyses were based on in-country missions to interview key government and private sector identity stakeholders, as well as desk reviews of primary and secondary material, including country development plans, operations manuals, legal documents, and more. This document summarizes the results of these reports. It begins by presenting key findings and then identifies general conclusions regarding the state of identity management in these countries. Finally, it summarizes recommendations for the development of identity systems in Africa and other developing regions, and for further engagement by the WBG. For additional context and resources, this report should be read in conjunction with the World Bank's ID4D Strategic Framework and the Digital Identity Toolkit[5].

2 Estimates by the World Bank ID4D Dataset, as of February 2016. This dataset is updated annually.

3 As these assessments were carried out over two years, this report does not take into account recent developments in identification systems in these countries. However, the general trends and lessons remain the same. For more detail, consult the individual country reports listed in Appendix 1.

4 Additional IMSAs conducted in Burkina Faso, Lesotho, Niger, São Tomé and Príncipe, and Somalia have not been included in this summary as their reports had not yet been finalized at the date of publication.

5 Available at http://pubdocs.worldbank.org/en/179901454620206363/Jan-2016-ID4D-Strategic-Roadmap.pdf and http://documents.worldbank.org/curated/en/2014/06/20272197/digital-identity-toolkit-guide-stakeholders-africa.

Key Findings

THIS SECTION SYNTHESIZES KEY FINDINGS ABOUT THE IDENTIFICATION SYSTEMS IN 17 AFRICAN COUNTRIES THAT COMPRISE ROUGHLY 50 PERCENT OF THE TOTAL POPULATION OF THE CONTINENT.

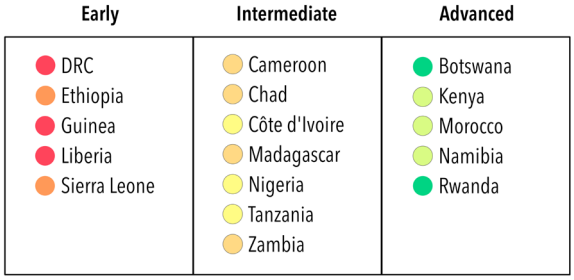
It focuses on *foundational* legal identification systems, including civil registries, national IDs, and population registers[6]. It is organized according to the five dimensions used by the IMSA—administration, accessibility, technology, integration, and legal frameworks—and begins with a general overview of countries' identification ecosystems.

ECOSYSTEM OVERVIEW

The assessed countries vary substantially in the structure, quality, and utility of their identity ecosystems. As shown in Figure 2, they can be loosely groups into one of three categories: *advanced, intermediate, and early*. Although these categories are simplifications of complex systems, they provide a rough idea of the relative development of major foundational systems, including civil registries, national IDs, and other population registers among the IMSA countries.

Five countries have relatively *advanced* identity ecosystems compared to the rest: Botswana, Kenya, Morocco, Namibia and Rwanda. These countries have long (mostly colonial) histories of civil registration and identity documents. In Kenya, for example, birth registration (initially for Europeans and Asians only) dates back to 1904, and an ID card has been in place since 1915. What sets these countries apart, however, is the progress they have made in increasing the coverage and use of their foundational identity systems and ensuring that processes to register individuals and establish uniqueness

FIGURE 2. RELATIVE DEVELOPMENT OF CIVIL REGISTRATION AND IDENTIFICATION ECOSYSTEMS



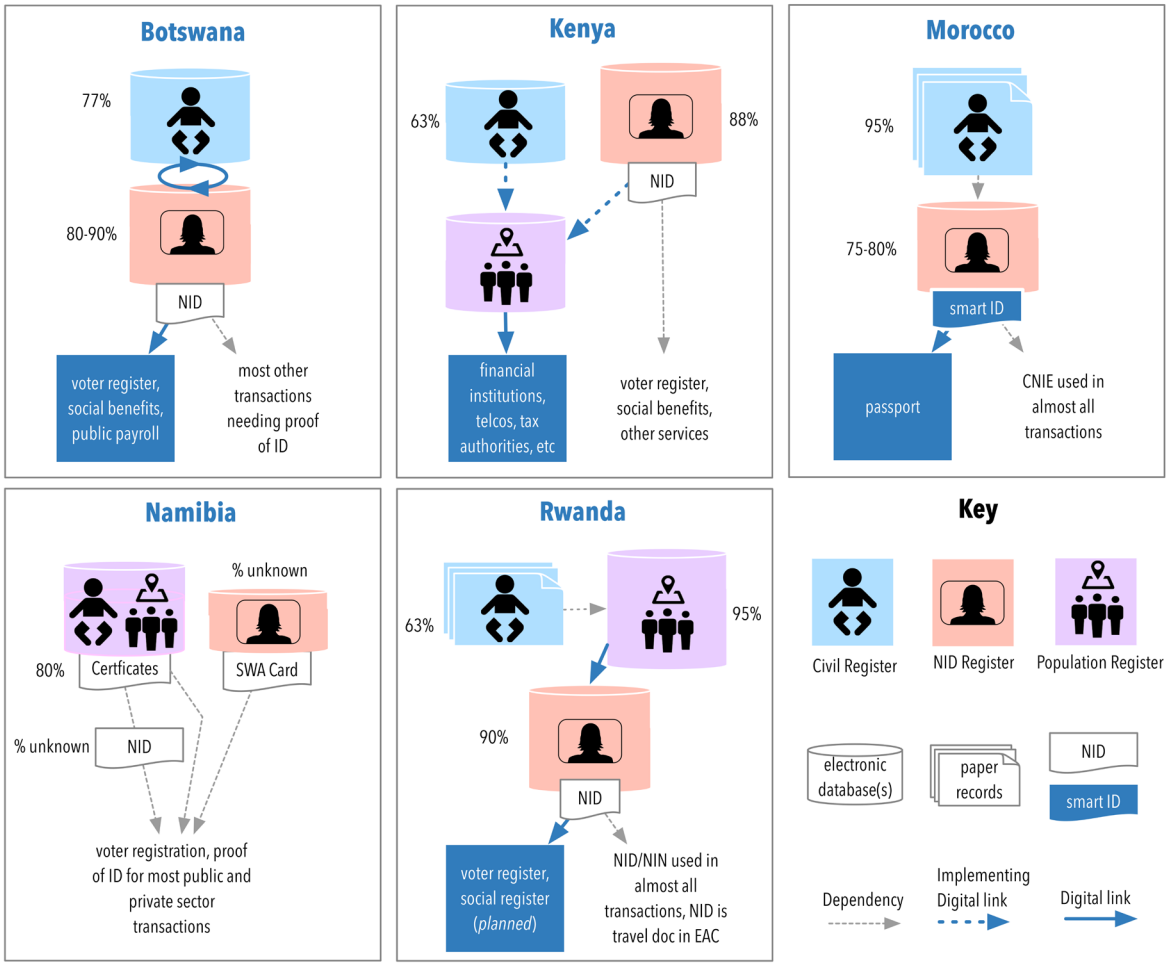
Source: Author's analysis based on IMSAs. Development is relative to the other IMSA countries, and does not take into account other SSA countries that may have more advanced identity systems, such as South Africa.

are relatively robust. This robustness relies both on technology (e.g., biometric deduplication and credential security features) and local-level vetting and identity validation. In addition, they have partially or fully digitized and harmonized their identity ecosystems, creating dependencies and some level of integration between foundational and functional registers (see Figure 2). In Rwanda, for example, the NID is held by approximately 90 percent of the adult population (or 52 percent of the total population), and is used to access virtually all government services, travel in the EAC region, open bank accounts, and vote in elections.

The second category are countries with intermediate identity systems. For the most part, this includes those that are in the process of modernizing decades-old legacy identification systems and paper-based civil registers, or implementing new identification projects to leapfrog past these systems. Although each of

6 See glossary for definitions of these terms.

FIGURE 3. ADVANCED IDENTITY ECOSYSTEMS: COVERAGE AND LINKAGES BETWEEN FOUNDATIONAL ASSETS

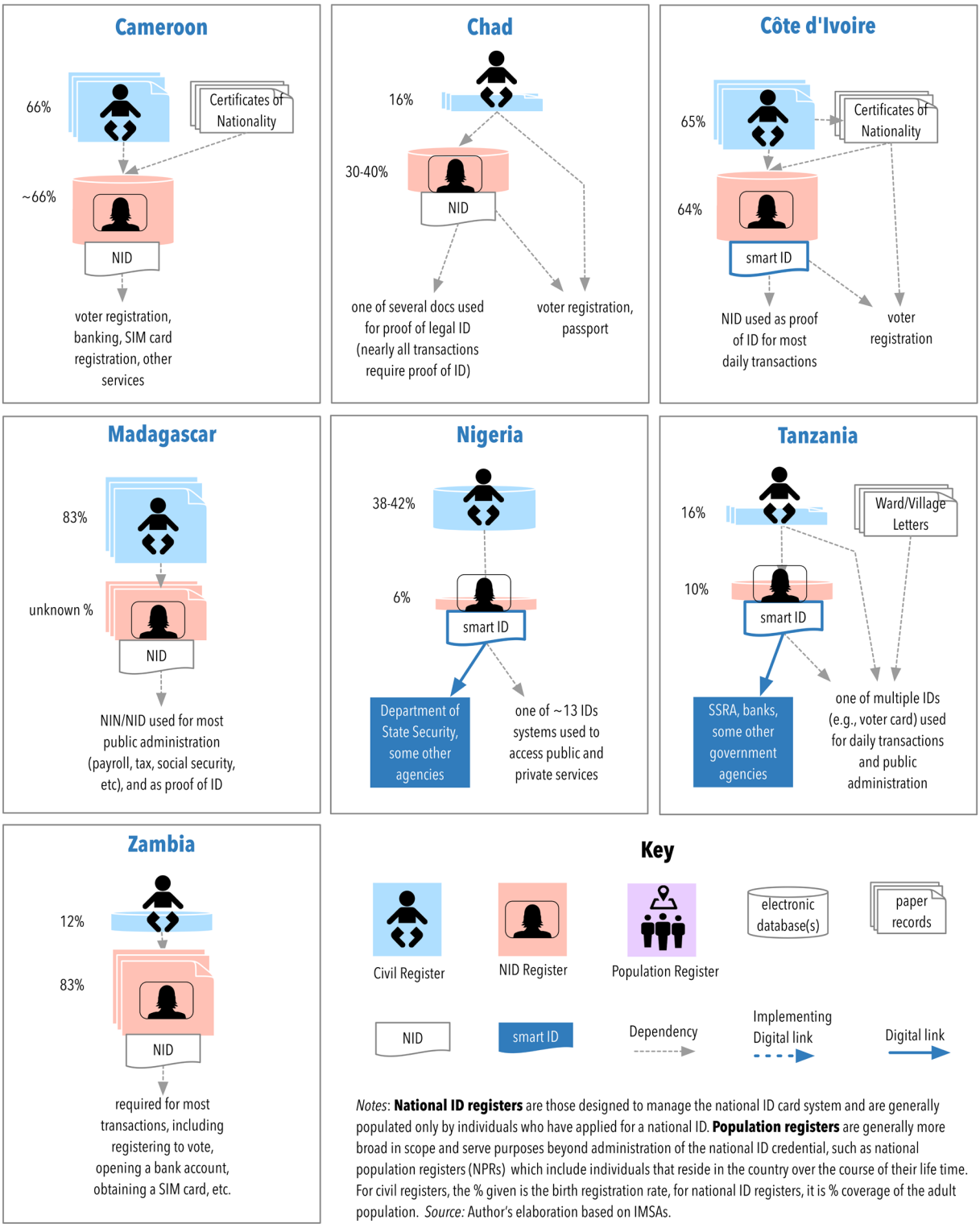


Notes: **National ID registers** are those designed to manage the national ID card system and are generally populated only by individuals who have applied for a national ID. **Population registers** are generally more broad in scope and serve purposes beyond administration of the national ID credential, such as national population registers (NPRs) which include individuals that reside in the country over the course of their life time. For civil registers, the % given is the birth registration rate, for national ID registers, it is % coverage of the adult population. *Source:* Author's elaboration based on IMSAs.

these countries has operational civil registration and identification systems, they have not yet reached the level of coverage, harmonization, or functionality of the more advanced countries (see Figure 4). Absent widespread, streamlined foundational documents, many residents rely on alternative credentials for proof of ID, such as voter cards or village-issued certificates. In some cases, continued reliance on legacy registers and analog processes makes for less robust systems and credentials that are susceptible to fraud. Although a few have recently rolled out state-of-the-art national ID cards, these lack widespread adoption and integration with other systems. One example is Nigeria, which has a fragmented identity landscape and ongoing efforts to increase the coverage of it's technowlogically advanced national ID card[7]. Although Nigeria's rollout has been slow, the system has the potential to form a

7 The National Identity Management Identity Management Commission (NIMC) was created in 2007 by an act of Parliament, and work to create a new identity system began in earnest in 2009. National Identity Numbers (NINs) have been issued since 2012, and cards have been issued since 2014.

FIGURE 4. INTERMEDIATE IDENTITY ECOSYSTEMS: COVERAGE AND LINKAGES BETWEEN FOUNDATIONAL ASSETS



Notes: **National ID registers** are those designed to manage the national ID card system and are generally populated only by individuals who have applied for a national ID. **Population registers** are generally more broad in scope and serve purposes beyond administration of the national ID credential, such as national population registers (NPRs) which include individuals that reside in the country over the course of their life time. For civil registers, the % given is the birth registration rate, for national ID registers, it is % coverage of the adult population. *Source:* Author's elaboration based on IMSAs.

robust foundation for identity management.

A final category are those countries in the early stages of providing proof of legal identity. These countries currently lack major identity assets and are in various stages of planning new identification initiatives that have not yet been implemented. As with the intermediate category, the demand for identity documents in the early-stage countries has often been met by functional identification programs, such as voter IDs and social security cards. In both the DRC and Guinea, for example, there is no national identity cards or centralized population register, and citizens must rely on voter ID cards for legal proof of identity. Liberia similarly lacks a national ID program, although it has concrete plans to implement a new biometric-based system. Sierra Leone is slightly more advanced, and is in the beginning stages of rolling out a new eID card and database, which will eventually be integrated with the civil registry system.

Ethiopia is an unusual case in that it has only recently created a civil registry, but has for several decades achieved high coverage of its kebele cards, which are issued independently by more than 17,000 local administrative units. Although the cards do not constitute a national ID—the central government is not involved in issuing them, and there is no centralized database—they represent a nationally recognized form of identification and are highly integrated into many functional uses (e.g., opening bank accounts, obtaining a passport etc.). Therefore, while Ethiopia's overall identity ecosystem may be classified as "early" due to its nascent civil registry system and lack of a centralized, robust foundational ID, its kebele cards offer more widespread coverage and functionality than other systems in this category. The country is also in the planning stages of developing a national ID system.

Many of the countries in the early and intermediate categories are now in the process of "reverse engineering" their identity ecosystems, rather than attempting to develop them "linearly" (i.e., birth registration national ID functional IDs). Some (e.g., Chad) are focusing on national IDs before developing civil registration capacity, while others (e.g., Sierra Leone) are working to strengthen civil registration and the national ID simultaneously. Others are attempting to use existing functional registers (e.g. a voter list, as in Tanzania) to help populate their national ID register[8]. An exception is Ethiopia, which has begun to create a civil registry before rolling out a national ID card.

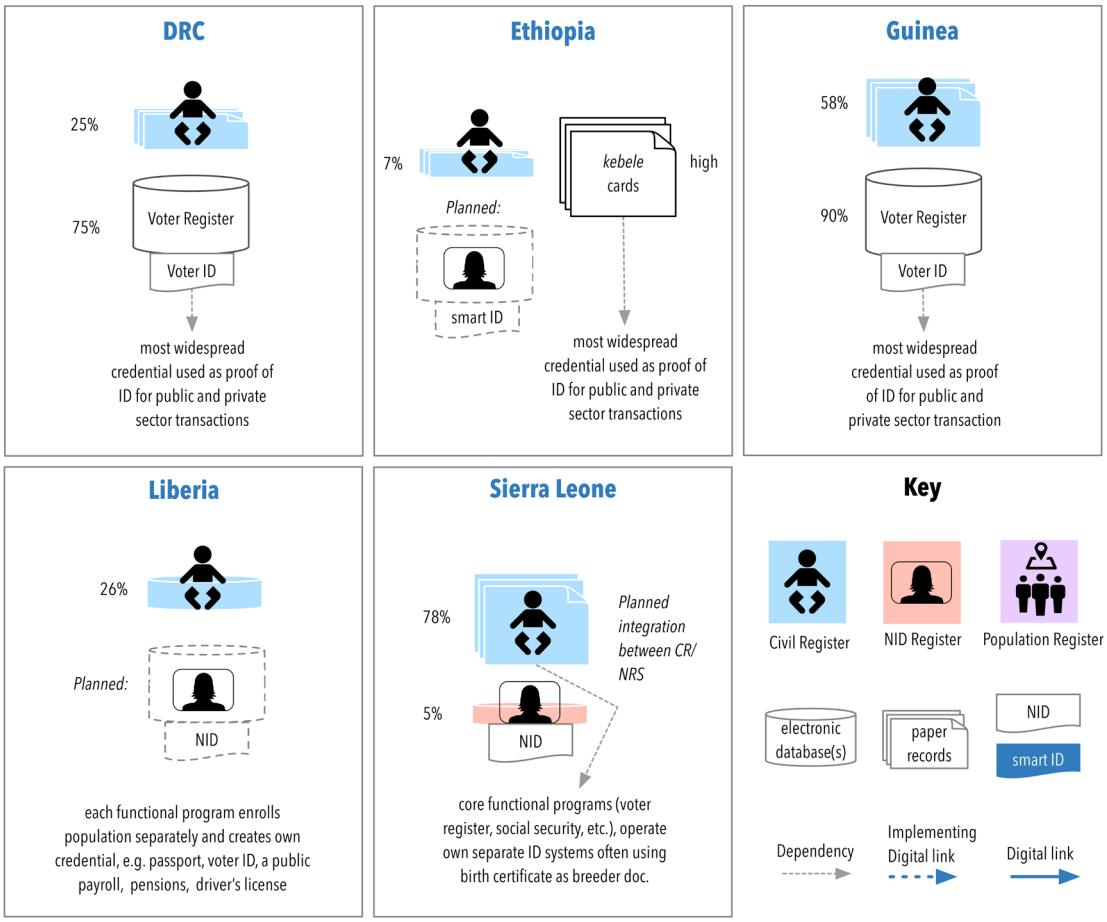
GOVERNANCE : INSTITUTIONS AND CAPACITY

Governance institutions, practices, and capacity are critical components of an effective and robust identification system. In particular, a well-functioning identity system requires political consensus, support, and solid institutional frameworks. Although the appropriate institutional architecture for an identity ecosystem will vary by country, strong systems will include harmonization across government agencies and private sector stakeholders, with well-defined and codified roles. In addition, agencies that manage civil registration and identification must be equipped to carry out their missions, including access to sufficient financial, human, and technological resources.

The IMSAs in Africa reveal a wide variety of institutional arrangements and practices, along with differing levels of staff capacity and technology assets. A few countries have well institutionalized and resourced legal identity providers. However, many others have identity agencies that lack clear mandates and institutional coordination, despite the political consensus around the importance of

8 In Tanzania, the National Identification Authority (NIDA) is currently in the process of migrating the voter registry data into the national ID database in order to pre-register individuals, who will then be verified at a later date.

FIGURE 5. EARLY IDENTITY ECOSYSTEMS: COVERAGE AND LINKAGES BETWEEN FOUNDATIONAL ASSETS



Notes: **National ID registers** are those designed to manage the national ID card system and are generally populated only by individuals who have applied for a national ID. **Population registers** are generally more broad in scope and serve purposes beyond administration of the national ID credential, such as national population registers (NPRs) which include individuals that reside in the country over the course of their life time. For civil registers, the % given is the birth registration rate, for national ID registers, it is % coverage of the adult population. *Source:* Author's elaboration based on IMSAs.

identification that exists in most countries. As a result, most of the assessed countries have highly fragmented identity systems, with multiple authorities and databases responsible for civil registration and identification, and for functional uses. In addition, a majority of the surveyed agencies have been hampered by inadequate funding, lack of high-speed internet connectivity, and/or insufficient power supply.

Institutional Frameworks

There are two main areas of variation in the institutional arrangements for identity systems: the degree to which identity agencies are autonomous institutions and the level of horizontal and vertical decentralization of identity management systems. Each has implications for organizational efficiency, fiscal sustainability, and harmonization across the identity ecosystem.

TABLE 1. INSTITUTIONAL ARRANGEMENTS FOR FOUNDATIONAL IDENTITY SYSTEMS

	Autonomous NID Agency	Same Agency for CR/NID	NPR	Social Register	NID/Voter Register Link
Botswana	no	**Yes**	*implementing*	*planned*	VR generated from NID
Cameroon	no	no	*planned*	no	separate (VR requires NID)
Chad	no	no	no	no	separate
Côte d'Ivoire	no	**Yes**	no	no	separate (VR requires NID or cert. of nat'l)
DRC	*n/a**	*n/a*	no	no	*n/a*
Ethiopia	*n/a**	no	no	no	*n/a*
Guinea	*n/a**	*n/a*	no	no	*n/a*
Kenya	no	no	*implementing*	no	separate (VR requires NID)
Liberia	*planned*	no	no	no	*n/a*
Madagascar	no	no	no	no	separate
Morocco	no	no	no	no	separate
Namibia	no	**Yes**	**Yes**	no	MHAI provides info on deceased voters (VR requires NID, SWA card, or birth cert.)
Nigeria	**Yes**	no	no	*planned (NSSNP)*	separate
Rwanda	**Yes**	no	**Yes**	**Yes** (Ubudehe)	VR generated from NID
Sierra Leone	*semi, planned full*	*planned*	*planned*	*planned* (NASSIT)	*planned integration*
Tanzania	no	no	no	**Yes** (TASAF)	separate (VR will be used to extend NID)
Zambia	no	**Yes**	no	no	separate (VR requires NID)

Notes: CR = civil registration; NID = national ID; NPR = national population register. *The DRC, Ethiopia, Guinea, and Liberia do not currently have national ID cards. In Ethiopia, *kebele* (neighborhood or ward) cards are issued locally rather than by a centralized agency; however, a centralized NID is planned. The DRC technically has a national ID agency (ONIP), however it is non-functional. In Madagascar, both civil registration and national ID cards are technically under the purview of the Ministry of Interior, however they are managed and executed separately by municipal (CR) and district (NID) staff. *Source:* Summarized from IMSA reports.

National Identity Agency Autonomy

The responsibility for administering legal identity systems may be delegated to an agency or directorate of an existing ministry, or to an autonomous body that reports directly to the executive (e.g., UIDAI in India) or a stakeholder board (e.g., NADRA in Pakistan). Among the assessed countries, the former is far more typical. As shown in Table 1, only two of the surveyed agencies that manage national ID systems and population registries are autonomous and governed by stakeholder boards: Nigeria's National Identity Management Commission (NIMC) and Rwanda's National Identity Agency (NIDA)[9]. Sierra Leone is also planning to transition its semiautonomous National Registration Secretariat (NRS)—which currently handles only the national ID database—into a fully autonomous agency that manages a national population registry. Liberia is also in the early stages of creating an autonomous National Identification Register (NIR). In all other countries, legal identification systems are owned by one or more departments within a cabinet-level ministry, most often the Ministry of Interior or Home Affairs.

Although agency autonomy is not a requirement for creating a robust, inclusive system, it can be beneficial in a number of ways. Establishing an autonomous national identity agency (NIA) can help to coordinate key stakeholders and insulate the identification

9 Rwanda's NIDA is nominally under the Ministry of Local Government (MINALOC), however it is a fully autonomous and self-financing agency.

projects from politically-based manipulation. In addition, autonomous agencies generally have the authority to raise and spend their own revenues, and may be partially or completely self-funded (e.g., as in Rwanda). This requires, however, sufficient technical capacity, political consensus, and appropriate legal and regulatory frameworks. Autonomous agencies created in the absence of these conditions will face significant challenges. In the DRC, for example the Office National D'Identification de la Population (ONIP) was created in 2011 to serve as an autonomous NIA. However, it has overlapping mandates with other identity agencies and little political capital, hampering its ability to function or begin any new identity initiatives.

Horizontal Centralization of Identity

In addition to autonomy, institutions for managing identity systems vary in their level of centralization along both horizontal and vertical dimensions. Horizontally centralized identity ecosystems are those with a small number of core identity agencies—e.g., a civil registration agency that issues certificates of vital and civil events, and a national identity agency that maintains a population register and issues an ID card—that provide foundational documents on which all or most other identity systems depend. In a high centralized system, these foundational or "breeder" documents serve as the basis for public and private service providers to issue derivative forms of identity for the administration of voter registration, pensions, and safety nets, health insurance, driver's licenses, and more. In the most centralized systems, single agencies may be responsible for both civil registration and national identification, with high levels of interoperability or integration between databases and services. In horizontally decentralized systems, foundational and functional providers maintain separate, standalone identity systems. Some decentralized systems are integrated with a unique identity number (UIN); others are "fractured" with systems that exist in distinct, non-interoperable silos.

Most countries have horizontally decentralized systems, with various agencies and departments responsible for maintaining separate databases for foundational identification and the administration of a variety of programs (see Figures 3, 4, and 5). Combined with a lack of integration between these databases (described below), this leads to highly fractured identity systems. Decentralization of identity is evident in a number of institutional arrangements. As shown in Table 2 and Appendix 2, civil registration and identification agencies are housed in different ministries or departments in a majority of countries. Notable exceptions are Botswana, where the Department of Civil and National Registration (DCNR) manages the birth and death registry and the national identification database; Namibia, where the Department of Civil Registration (DCR) manages the national population register that issues both civil/vital certificates and the national ID; and Zambia, where the Department of National Registration, Passport and Citizenship (DNRPC) maintains both the civil registry system and national ID records. Botswana's IMSA indicates that bringing these agencies under one roof has greatly stabilized the registration process and facilitated improvements in the identity system. A few other countries (e.g., Côte d'Ivoire, Kenya, Morocco, and Rwanda) have a single ministry in charge of civil registration, national IDs, national population and/or social registries, but these are systems are managed by different departments or agencies within the ministry.

Another common feature of centralized identity systems is the establishment of a National population register (NPR), a database of the entire population that is continuously updated with data on civil and vital events, potentially along with demographic and/or socioeconomic characteristics, and can serve as the basis for a number of identity-related applications. NPRs are uncommon among the assessed countries but are growing in number (see Table 1). Rwanda

maintains an NPR that covers roughly 95 percent of the population and serves as a basis for generating national ID numbers (NINs) and ID cards to those over 16 years. In Namibia, the National Population Registration System (NPRS) integrates a variety of civil registry data for individuals and uses an NIN to link children with their parents. Kenya is also building an Integrated Population Registration Service (IPRS) that aggregates data from the civil register, national ID database, and immigration services for the purpose of offering online validation of identity documents to public and private service providers. Botswana's Department of Civil and National Registration (DCNR) has already established live links between the civil registration and national identity database and is working to integrate this with the immigration and Citizenship System in order to create a full-fledged NPR or "People Hub."

In addition, countries may also centralize the administration of social programs by creating social registers—databases that contain socioeconomic data on the population for the purpose of unifying the targeting and distribution of social programs. To date, only a few of the assessed countries have created social registers (see Table 1). Rwanda's Ubudehe register is the most established, and aggregates individuals into households based on periodic surveys and assigns each a poverty or vulnerability score used to target safety net programs. The register covers approximately 100 percent of households in Rwanda, and in 2015 began recording national ID numbers in order to harmonize it with the national population register and ID system. Tanzania's Social Action Fund (TASAF) has recently completed a Unified Registry of Beneficiaries, however it is not yet linked to the NID or any other identity system. Other social registers in various stages of implementation include Nigeria's planned Social Registry for the Poor (NSSNP, which will be linked with the NIMC number), Botswana's planned development of a social registry with technical assistance from the World Bank, and Sierra Leone's planned National Social Security Insurance and Trust (NASSIT).

Finally, centralization is evident in the degree to which other government agencies and service providers depend on or are integrated with foundational identity systems. Voter registers, for example, are typically the functional identity system with the highest coverage rate, and generally require basic identity data including name, age, citizenship, address. Because this information needs to be updated every few years ahead of elections, there are large efficiencies to be gained either by using national ID or NPR databases to generate voter lists on behalf of electoral agencies, or by maintaining separate electoral databases that are interoperable with foundational systems and can pull relevant data (e.g., deaths, change of address, individuals that have turned 18) as needed. Of the assessed countries, few have undertaken either of these options (see Table 1). Although most electoral commissions use national IDs to establish voters' identities at registration or polling stations, they typically maintain separate and non-interoperable voter databases that need frequent and expensive updating. Some (e.g., Kenya, Namibia) also involve separate biometric enrollment campaigns to de-duplicate and/or authenticate voters. Exceptions include Botswana and Rwanda, where the voter rolls are generated based on the national registration and identification systems. Although Namibia's NPRS is not integrated with the voter registry, the MHAI does provide the electoral commission with information on deceased nationals (though not on individuals who will be turning 18). Sierra Leone also plans to integrate its NRS with the voter registry.

Vertical Decentralization of Identification Services

In addition to variation in the horizontal division of responsibilities between ministries, countries have different institutional arrangements for the vertical decentralization of identification services and

TABLE 2. DECENTRALIZATION OF CIVIL REGISTRATION AND IDENTIFICATION SERVICES

		Civil Registration		*National ID*	
Country	Population (millions)	Centers	People/ Center	Centers	People/ Center
Botswana	2.0	37 + 13 hospitals	40,000	*same as CR*	40,000
Cameroon	22.7	2,724	8,400	360	63,100
Chad	14.0	1200	11,700	~20 + mobile	700,000
Côte d'Ivoire	22.6	427	53,000	150	150,700
DRC	72.5	2,207	32,900	n/a	
Ethiopia	94.1	17,000	5,600	n/a	
Guinea	11.8	341	34,700	n/a	
Kenya	44.4	9146*	4,900	600 + 290 Huduma	49,900
Liberia	4.3	14 + hospitals	306,500	n/a	
Madagascar	23.5	1693**	13,900	117	200,900
Morocco	33.3	2200	15,200	100 + 20 planned	333,000
Namibia	2.3	65+ 22 hospitals	35,400	*same as CR*	35,400
Nigeria	173.6	4,000 + hospitals, mobile	43,400	404 + mobile	429,800
Rwanda	11.7	416	28,200	416	28,200
Sierra Leone	6.1	1,212	5,100	unknown	
Tanzania	49.3	161 mainland, 11 Zanzibar	286,400	142	346,900
Zambia	15.7	105	149,600	105	149,600

Notes: *In Kenya, there are 107 civil registration centers, plus 2,427 "locations" and 6,612 "sublocations" (administrative units), where local public servants (chiefs and subchiefs) complete the birth registration process initiated by mothers with children born outside of hospitals. **There are 1693 municipalities in Madagascar, each of which should have a civil registration center, however it has not been confirmed whether all are operational. DRC, Ethiopia, Guinea, and Liberia do not yet have operational national ID programs. In Ethiopia, however, local ID cards are issued at each of the country's 17,000 *kebeles*. Population estimates are from 2013 for most countries, and from 2014 in Cameroon, Chad, Côte d'Ivoire, Madagascar, Morocco, and Zambia. *Source:* IMSA reports, WDIs for some population numbers.

infrastructure to lower levels of government. As a result, the number of locations to register a vital event or obtain a national ID varies widely by country, with implications for administrative efficiency, the extension of information and communications technology (ICT) infrastructure, and proximity to the population (see Table 3). In nearly all cases, there is some level of deconcentration of registration or identification to the provincial or (usually) district level. A partial exception is Liberia, which requires adults whose births were never registered to travel to Monrovia to complete the late registration process[10]. In general, national ID systems are less decentralized than civil registers, with fewer local offices operated primarily by staff from the national-level ministry.

For records of civil events such as birth and death, there are also some cases where registration is entirely

10 Before a 2011 decentralization measure, Liberian parents also had to travel to Monrovia to register children born anywhere in the country.

decentralized or devolved to the local level, with little central oversight outside of regulation (in general, this correlates with paper-based systems that lack central databases and is most common in former French colonies). In Côte d'Ivoire, for example, data is manually recorded and stored in paper registers at 427 local offices of the civil registrar (DGAT)—there is no centralization or aggregation of records. In Madagascar, civil registration is the responsibility of the Ministry of Interior, but is carried out by municipal officials. Chad also has completely decentralized registration, supported by the Direction des Affaires Politiques et de l'Etat Civil (DAPEC), which has eight staff in N'Djamena whose function is primarily to lobby government stakeholders and print the books used by local offices to record vital events. The situation is similar in the DRC, where over 2000 civil registration offices serve as points of contacts with citizens. However, the lack of centralized records or connectivity reduces the utility of the records for portable identification[11].

Even where identification services are more centralized, as in most national ID programs, local communities often play an important role in identification process. In Madagascar, for example, local traditional administrations (fokontany) assist with dispute resolution regarding identification and maintain local population registers used to verify the residency of national ID and voter registration applicants. Rwanda's national identity and population registry system also relies on personal knowledge of individuals—aka, "know-your-population"—at the village and cell level in order to validate identities and ensure authenticity. In Tanzania, absent widespread coverage of birth registration or the national ID, letters from the ward or village attesting to an individual's identity are used to prove residential address (e.g., for opening a bank account, applying for a loan, etc.).

Fiscal Sustainability

Countries vary in terms of the mechanisms used to fund identification systems, and the degree to which financing is sustainable. The most self-sufficient agency among the IMSA countries is Rwanda's NIDA, which is an autonomous agency that covers 100 percent of its operating costs through fees charged for identity services[12]. Most other systems appear to fund a majority of their budgets through legislative appropriations, although in some cases (e.g., Liberia) agencies are also able to solicit outside funding[13]. Many countries also receive support for both foundational and functional identification systems from development partners, in particular UNICEF, UNDP, UNHCR, and the WBG. Uniquely, Morocco's decentralized civil registration system is financed not by the central government, but by local municipalities at their discretion. This has resulted in significant regional disparities in the quality of local registration offices.

On the whole, there is a dearth of information available regarding the budgets and financing of both CRVS and national ID systems. In some cases, we may expect costs for these systems to be substantial. One estimate puts the average cost of enrollment and registration for a national ID system at approximately US$ 3-6 per person, plus an additional 15-25 percent per year for maintenance, software, and data updating. Card production and distribution may cost and additional US$ 1-5 per person (and an additional US$ 0.50 for digital certificates) depending on the card type, plus US$ 0.05-0.10 per card per

11 DRC law calls for the centralized archival storage of civil registers, but transportation challenges have prevented compliance.

12 Currently, NIDA does not charge for online identity verification services provided to other Rwandan government agencies or banks, and has no plans to do so. Instead, the majority of its revenue is based on fees charged for services such as driver's licenses and expedited applications. In the future, it will also offer an optional e-ID upgrade to the national ID card set at a higher price point for those who can afford it, and is also looking into the possibility of using its production facility to secure credentials for other agencies, such as diplomas, professional certificates, and potentially an e-passport.

13 As an autonomous ID agency, Nigeria's NIMC also has authority to raise revenue and may eventually be self-sustaining. Currently, however, it relies in part on budget allocations from the government.

year for maintenance[14]. India has achieved the benchmark for low costs, with US$ 1.16 per person for enrollment and registration, and no distribution of cards. National ID projects in Africa have thus far been higher in cost. In Nigeria, for example, the IMSA estimates a conservative rate of US$ 5 per person for the identity lifecycle of the country's current programs—including both functional and foundational identities—and an average smartcard cost of US$ 3.50. As a result, it estimates the total fiscal impact of the country's national ID program to be around US$ 4.3 billion, of which US$ 1.2 billion has already been spent and another US$ 3.1 billion will be needed[15].

Identification agencies frequently report that they are underfunded, leading to the inability to implement programs (e.g., DRC, Tanzania). In Zambia, for example, the Department of National Registration, Passport and Citizenship (DNRPC) faces a chronic lack of funds for daily civil registration operations. In addition, there is concern that a recent contract to implement a new eID has underestimated the cost of developing a quality ID project by approximately US$ 100 million[16]. In Cameroon, the costs of computerizing the civil registration system and digitizing records were also underestimated, and much of the country's budget for reform was spent on opening new civil registration offices. In Namibia, the MHAI also reports inadequate financing and yearly budget cuts as large as N$2.4 million (approximately US$ 163,396) that have at times led to insufficient funds for printing ID application forms, issuing passports, etc. In some cases, the problem is not a general lack of funding for foundational systems, but rather the fragmentation of the identification ecosystem across multiple standalone systems (particularly voter registries) that augments overall costs. An exception is Rwanda, where NIDA's self-financing model has allowed the agency to break even for several years.

In order to reduce this fiscal burden and leverage private sector innovation, some countries have engaged in public-private partnerships (PPPs), such as BOT-type concessions where a private firm provides the initial capital investment in the identification system in exchange for a portion of its revenues. To date, these have mostly been used for driver's licenses and passport systems (e.g., Côte d'Ivoire, Liberia, DRC) where profit margins are higher. However, there have been a few PPPs for national IDs and other legal identity credentials, including in Chad, Guinea and Nigeria. In Chad, the government granted a concession to a local company in 2002 to produce ID cards and passports, based on a revenue-sharing model where the firm received 90 percent of the revenues and the government received 10 percent. After a 10-year contract, the concession was renewed in 2012 but then cancelled in 2015, and the government now retains all revenues.

In other cases, PPPs have been less successful. In Nigeria, the NIMC awarded two separate concessions for its eID card project, with the goal of concentrating on back-end operations while relying on a private partner for the front end. However, the partnerships faced serious challenges, resulting in significant delays in project implementation. The concessions were cancelled in 2014. In Guinea, a BOT for a national ID has been on hold since 2010, and the IMSA report indicates that the project remains stalled due to the failure of the firm to provide all

14 Costs differ based on technology choices (e.g., card, vs. no card), providers (e.g., digital certificates issued by the private sector may cost more than US$0.50 per card), as well as the the country's size, terrain, and population density. Sources: Atick, Joseph (2015) "Digital Identity: The Essential Guide", ID4Africa, and Gelb, Alan (2015) "The Economics of ID Systems: How to Frame the Business Case?" ID4Africa, Kigali, Rwanda, 24 May 2016.

15 The figure of US$ 3.1 billion is based on an estimated cost of US$ 5 for each of the 167.9 people projected to be enrolled by NIDA and receive a national ID card, plus US$ 3.5 (the cost of a card) for each of the people who have been enrolled but still need ID cards, plus a cost of US$ 5 for each of the 385 million people projected to be enrolled in functional ID programs.

16 The Zambia mission was unable to ascertain the value of the ID contract; this figure is calculated assuming a current budget of US$ 25 million.

the information needed by the government to take ownership of the system.

Administrative Capacity

In addition to finances, the assessed countries face a variety of challenges in terms of administrative capacity. In the DRC, for example, the lingering effects of conflict, violence, and economic crisis have left most state agencies with a low capacity to plan or execute programs. Aside from one-off voter registration campaigns and smaller-scale functional identity systems (e.g., biometric registration for police and army), there is a general lack of operational experience with sustainable identity registration or management, which has delayed the creation of a national identity database or card. Currently, the temporary, laminated-paper voter card is the most widely used form of identification—the DRC has no general register of the population, no national ID card, and a non-performing civil register.

As shown in Table 3, the ratio of people-to-service-center is extremely high in many countries, which may deter users or result in slow service and a backlog of documents to be issued. In other cases, the proliferation of offices results in hiring many new staff that have not been properly trained. In Cameroon, for example, civil registry staff process fewer than one registration per day, allowing little

TABLE 3. ICT ACCESS AND INFRASTRUCTURE

Country	Access to electricity (% of population)	Internet Users (per 100 ppl)	Broadband Subscriptions (per 100 ppl)	Secure Internet Servers (per 1 million ppl)	Mobile Subscriptions (per 100 people)
Botswana	53.2	27.5	1.8	17.2	169.0
Cameroon	53.7	20.7	0.1	2.5	71.8
Chad	6.4	2.7	0.1	0.2	40.2
Côte d'Ivoire	55.8	21.0	0.5	4.1	119.3
DRC	16.4	3.8	0.0	0.3	53.0
Ethiopia	26.6	11.6	0.7	0.2	42.8
Guinea	26.2	4.7	0.0	0.5	87.2
Kenya	23.0	45.6	0.3	9.1	80.7
Liberia	9.8	5.9	0.2	3.6	81.1
Madagascar	15.4	4.2	0.1	1.7	46.0
Morocco	100.0	57.1	3.4	6.2	126.9
Namibia	47.3	22.3	1.7	28.5	102.1
Nigeria	55.6	47.4	0.0	2.6	82.2
Rwanda	18.0	18.0	0.2	4.1	70.5
Sierra Leone	14.2	2.5	*unavailable*	0.9	89.5
Tanzania	15.3	5.4	0.2	2.0	75.9
Zambia	22.1	21.0	0.1	4.3	74.5
Sub-Saharan Africa	35.3	22.4	0.5	9.8	75.7

Source: World Development Indicators; electricity data from 2012, other indicators from 2015.

opportunity to gain experience and specialization. Low administrative capacity may also be due to complex identity verification processes that rely on manual transportation and verification of documents, adding significant burdens for both staff and civilians. In Guinea, for example, births and deaths in rural areas are entered in to a paper-based rural register kept by the village chief, and then physically carried to the commune civil registry bureau. Paper-based systems that lack integration also add to the length of time needed to validate identities. In Côte d'Ivoire, it takes 2-3 months to issue a national ID because of manual checking of required documents (a person is sent to physically consult civil records in a potentially remote location). This problem is compounded by poor infrastructure (roads, etc.) and lack of sufficient staffing.

Other countries may have higher organizational capacity but still lack sufficient staff with technical knowledge. In Botswana—one of the more advanced systems in this sample—employees with specialized IT skills are scarce, forcing the country to rely on expensive contracts with international firms for systems design and maintenance. Still, some countries have made impressive efforts to improve the timeliness of their identity services. Namibia's Department of Civil Registration, for example, recently underwent a change management process that streamlined procedures and increased professionalism in the department. As a result, the time to issue an NID was reduced from 100 days in 2014 to 16 days in 2015.

ICT Limitations

Beyond technical skills, many identity providers lack the necessary ICT infrastructure, including reliable internet connections, computer equipment, and adequate power supply. This is symptomatic of broader issues with ICT coverage in the region (see Table 3) and poses a number of challenges for identification systems. Technically, it limits the options for interoperability between ministries and connectivity between central and local registration and identification offices. Without a network connection, data cannot be transmitted electronically, and must be carried in paper or hard-drive form, increasing inefficiency and security risks. In addition, a lack of connectivity means that identity verification procedures and biometric de-duplication cannot be done instantaneously, increasing the time it takes to process enrollments and issue credentials. Many IMSAs highlighted the burden of uneven power supply to offices—either due to a lack of connection to the grid or intermittent power outages—and the additional costs associated with purchasing diesel for the generators that power data centers during blackouts (see Table 4).

TABLE 4. MAJOR ICT ISSUES HIGHLIGHTED BY REPORTS

CR facilities lack computer hardware	e.g., Madagascar, Tanzania
Local CR and/or NID offices have intermittent (or no) power supply	e.g., Botswana (a few), Cameroon, Chad, Kenya, Zambia
Power is expensive, adding significant operational costs	e.g., Namibia, Nigeria
Local CR and/or NID offices lack connectivity with central office	e.g., DRC, Kenya, Morocco, Namibia
Internet connections slow, unreliable, expensive	e.g., Botswana (a few), Cameroon, Liberia, Madagascar, Namibia, Sierra Leone,
General lack of ICT infrastructure	e.g., DRC, Côte d'Ivoire, Zambia

In Kenya, for example, only 29 out of 107 civil registration offices have internet connectivity. Namibia is currently working toward last-mile connectivity of its MHAI offices to the government-wide area network to facilitate registration. However, Telekom Namibia reports that, in addition to the challenges of covering a large and sparse territory, efforts to boost internet coverage are hampered by the high cost of power and the common theft of solar panels and cables near mobile phone towers.

In Madagascar, integration is hindered by the aging interministerial network that connects different building and lacks sufficient speed and connectivity. As a result, different agencies have begun to operate their own parallel ICT systems, creating a series of isolated, independent networks. In Zambia, it was estimated that an investment of approximately US$ 22 million in ICT is required to meet the government's CRVS strategic action plan.

A lack of ICT infrastructure also creates obstacles for digital authentication, which can be used to secure remote transactions including eGovernance serives, banking, and delivery of social benefits. Kenya, for example, has built nearly 300 "Huduma" centers around the country for one-stop access to government services, including identification. Outside of Nairobi, however, many lack regular connectivity and power, reducing their utility as potential points of access for online identity services. Authentication over mobile networks or using offline smartcards is a potential solution to this problem[17], made more feasible by the fact that most African countries have high levels of mobile coverage (see Table 3). However, digital identity systems are likely to lack flexibility and functionality as long as high-speed internet coverage and power supply remain poor. A lack of power also makes digital registration and authentication more difficult in remote areas, while power outages in major cities affect the security of digital databases.

INCLUSIVITY: BARRIERS AND CONSTRAINTS TO ENROLLMENT

Universal coverage and non-discrimination are basic principles that should underlie any foundational identification system. However, despite the fact that most countries require birth and death registration and possession of a national ID, a variety of legal and practical barriers deter large segments of the population from registering and receiving credentials. This identity gap is most likely to affect those who are poor and vulnerable, and thus most in need of the legal protection and social assistance enabled by proof of identity. In addition, low coverage makes it difficult to administer government programs such as social protection, compile vital statistics necessary for development planning, and ensure security. Death registration is also important for population statistics and tracking disease, and helps ensure the robustness of identity systems—unless deaths are recorded, systems become bloated with inactive identities, increasing inefficiency and opportunities for fraud. As shown in Table 5, many of the countries that have made significant progress in coverage are small- to medium-sized, while big identity gaps remain in most of the larger ones. Until progress is made Africa's most populous countries, the overall coverage of legal identification in the region is likely to stagnate.

Of the assessed countries, most have poor rates of birth registration, with some exceptions, including Morocco (95 percent), Madagascar (83 percent), and Namibia (80 percent) (see Table 4). The countries with the lowest birth registration rates are Zambia (12 percent), Chad (16 percent), and Tanzania (16 percent). Death registration is even lower in most countries, although notable exceptions include Namibia (89 percent)[18], Morocco (60 percent) and Rwanda (51 percent). In Guinea, death registration is less than 6 percent, which has created difficulties for tracking and managing the Ebola epidemic. According to UNICEF data, there are no major gender gaps in registration for most of these countries[19]. Cameroon and Kenya, however, show slight underegistration of girl children, with registration of boys around 2 percentage points higher than that of girls.

17 For example, if a mobile phone number is linked to a national ID number, a one-time-password (OTP) can be used to authenticate the card holder.

18 This figure is from the 2011 Namibian census. However, the IMSA report notes that the true percent is lower as the number of deaths may have been underreported. Still, the percentage of deaths registered in Namibia is likely to be significantly higher than many other countries.

19 World Bank ID4D dataset.

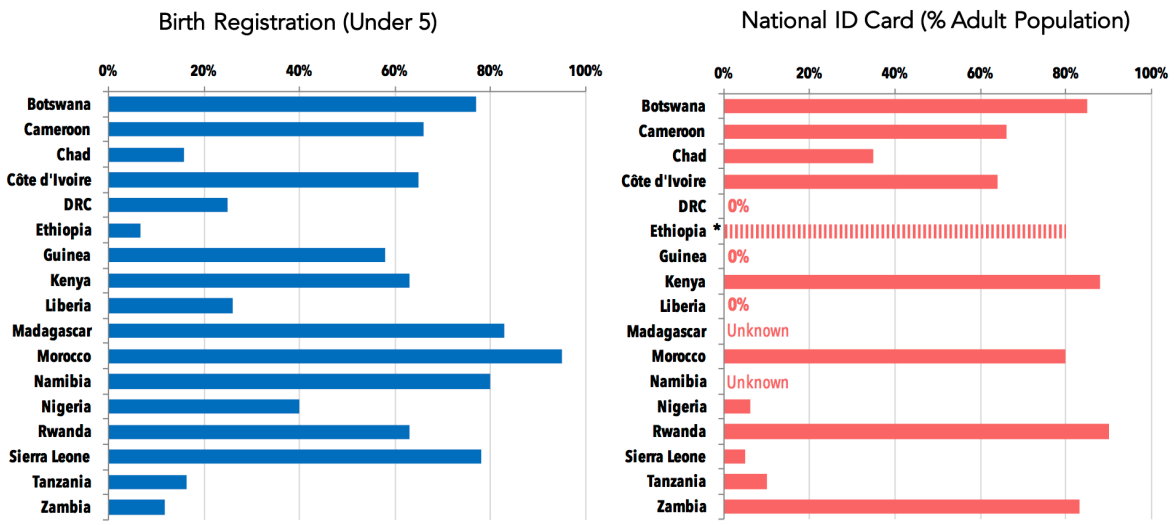
TABLE 5. REGISTRATION AND IDENTIFICATION RATES

	Population (millions)	Birth Registration (Under 5)	Death Registration	National ID Register (% Adult Pop.*)	Voter Register (% Adult Pop.)
Botswana	2.0	**76.9%	75%	80–90%	80–90%
Cameroon	22.7	66%	34%	~66%	50%
Chad	14.0	16%	unavailable	30-40%	100%
Côte d'Ivoire	22.6	65%	unavailable	64%	53%
DRC	72.5	25%	unavailable	n/a	75%
Ethiopia	94.1	7%	unavailable	n/a***	70%
Guinea	11.8	58%	< 6%	n/a	90%
Kenya	44.4	63%	45%	88%	65%
Liberia	4.3	26%	12%	n/a	82%
Madagascar	23.5	83%	< 50%	unavailable	61%
Morocco	33.3	95%	60%	75-80%	80%
Namibia	2.3	80%	89%	unavailable	91%
Nigeria	173.6	38-42%	unavailable	6%	71%
Rwanda	11.7	63%	51%	90%	96%
Sierra Leone	6.1	78%	unavailable	~5% (total pop)	79%
Tanzania	49.3	16%	lower than BR	10%	94%
Zambia	15.7	12%	10%	83%	79%

Notes: *Depending on the country, the target population for the national ID are those aged 16+ or 18+. **The reported registration rate for Botswana is for ages 0-1; the under-5 registration rate is likely to be higher. *** Although Ethiopia lacks a true national ID system, it's local system of *kebele* cards has a high level of coverage. *Source*: IMSA reports for most figures, with the exception of birth registration rates for Chad, Côte d'Ivoire (WB ID4D Dataset), and death registration rates for Botswana, Liberia, Madagascar, and Rwanda (unstats.un.org). Voter registration rates come from the IMSAs or are estimated based on the number of registers voters (obtained for Liberia from http://www.necliberia.org/pg_img/VRUREPORT_2014_Final1.pdf, and for Ethiopia, Madagascar, Morocco, and Rwanda from http://www.electionguide.org/) and then estimated based on the share of adults in the population (from the 2012 WDIs).

Coverage of national IDs is medium-to-low in all countries except Botswana, Kenya, Morocco, Rwanda, and Zambia. In some countries, birth and death registration rates have always been low; in others, rates have decreased over the past decade. In Cameroon, for example, birth registration rates have decreased to just over 66 percent in 2014 from a high of 79 percent in 2000. Furthermore, birth registration levels are not the same as the rate at which individuals possess birth certificates or other

FIGURE 6. BIRTH REGISTRATION AND NATIONAL ID COVERAGE, SCALED BY POPULATION SIZE



Note: Although Ethiopia lacks a true national ID system, it's local system of *kebele* cards has a high level of coverage.

documents that can be used as proof of identity—in many countries, the percentage of the population that possesses a birth certificate is much lower[20]. In Rwanda, for example, the under 5 birth registration rate is 63 percent, however it is estimated that only 2-5 percent of Rwandans have a birth certificate, partly due to the fact that these can only be obtained if a birth is registered within 15 days. Instead, people rely on "attestations of birth" which are issued by the registrar as needed and valid only for 90 days.

In countries where foundational systems lack coverage, functional identity systems have often filled the gap in legal identification. In the DRC and Guinea, for example, there are no national population registers or national IDs, and civil registration record are generally of poor quality. In both cases, periodically-issued voter IDs are the most widely used forms of identification. However, these registers are non-inclusive as they do not contain minors, non-citizens, or those who turned 18 after the last elections.

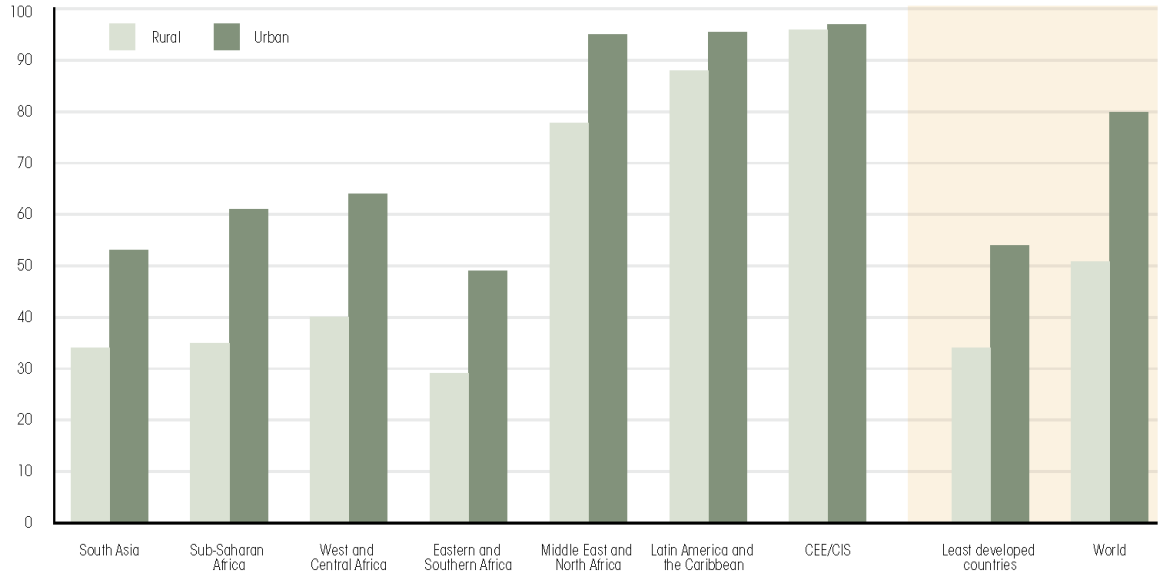
Importantly, the coverage of registration and identification systems is not distributed evenly across territories or demographic groups. Within a given country, the costs associated with registration and identification are often the highest for the most marginalized and vulnerable individuals, including the poor, rural and remote populations, the illiterate, speakers of non-dominant languages, orphans and other vulnerable children (OVCs), and refugees and stateless populations. These groups are also most likely to live in geographic areas where state capacity and connectivity are weak or non-existent. Women and girls among these groups often face constraints on their mobility, limited access to income and other gender specific constraints that compound their disadvantage. Social norms that stigmatize children born to unmarried women, as well as gender-based discrimination in registration laws, create additional barriers to birth registration. As a result, we see significant inequalities in the coverage of birth certificates and national ID cards among different

20 Among other reasons, this may related to the extra steps it may take parents to obtain a certificate, as well as the mandates of different agencies. For example, a health ministry employee can register that a birth has taken place and report details, but may not be in the position to certify other details with integrity (e.g., the citizenship of the parents) that may be required for a birth certificate.

FIGURE 7. THE URBAN-RURAL DIVIDE IN BIRTH REGISTRATION

Birth registration is higher in urban than in rural areas in almost every region

Percentage of children under age five whose births are registered, by place of residence and region



Notes: Estimates are based on a subset of 147 countries covering 72 per cent of the global population of urban children under age five and 81 per cent of the global population of rural children under age five. Regional estimates represent data from countries covering at least half of the regional population. Data coverage was insufficient to calculate regional estimates by place of residence for East Asia and the Pacific. The estimates presented in this figure cannot be compared with the regional and global estimates presented in previous figures since they are based on a subset of countries with available data. Their sole purpose is to illustrate differentials.
Sources: UNICEF global databases, 2013. Based on DHS, MICS, other national household surveys, censuses and vital registration systems, 2005-2012.

Source: UNICEF. 2013. Every Child's Birthright: Inequities and Trends in Birth Registration. Available at https://www.un.org/ruleoflaw/files/Embargoed_11_Dec_Birth_Registration_report_low_res.pdf.

populations within most countries.

Most countries in Africa and elsewhere, for example, have significant differences in accessibility rates between urban and rural communities and between rich and poor provinces (e.g., Côte d'Ivoire, Guinea, Kenya), as shown in Figure 7. This internal identity gap arises due to a number of demographic, social, and political factors, including historical patterns of development and identity management. Tanzania provides a stark example. The overall birth registration rate is around 16 percent, but it is 42 percent in urban areas and 8 percent in rural areas. In Zanzibar, which has its own well-developed registration agency, rates are 90 percent. In Cameroon, the decrease in birth registration since 2000 has disproportionately affected the poorest regions, including the provinces of Adamaoua, Nord, and Extrême Nord.

In addition to the lack of capacity and inadequate infrastructure described in the previous section, the IMSAs highlight a number of other persistent barriers to universal coverage of identification systems. These include high costs associated with registration and obtaining supporting documents, the destruction of paper-based records due to violence or disaster, complex legal and administrative requirements to obtain identification, geographic conditions, and a lack of demand from citizens. As is evident in the following summaries of each issue, these problems often interact to compound the exclusion of poor and marginalized groups from identification services.

High Costs for Users

Costs to the user are the most consistently observed barrier to civil registration and identification in the assessed countries. Though these costs may be

direct—e.g., fees for late birth registration and some national IDs—they are more often indirect, due to missed work, transportation costs to various government offices, and facilitation fees by local brokers[21]. In most countries, on-time birth and death registration is free, although copies of certificates may cost small sums (e.g., 50 shillings or US$ 0.50 for a birth certificate in Kenya). However, even where registration and certificates are free, indirect costs may be prohibitive, particularly when government offices are sparse and travel costs are high. In Namibia, for example, a 2000 Demographic and Health Survey found that the main reason for not registering births was the distance to the nearest registration office, and that this factor alone accounted for approximately one-third of unregistered births. In Cameroon, high expenses are the most frequently cited reason for late registration. There, the burden of transportation costs and sometimes unofficial payments to intermediaries can be a heavy burden for poor families, especially in the months after birth when parents have already spent their limited resources on hospital care, supplies, and birth celebrations.

Although birth registration may at times be done on location (e.g., in a hospital or using mobile technology), parents must nearly always visit a government office in order to obtain a birth certificate, potentially requiring travel and missed work[22]. Costs to obtain birth certificates increase substantially when registration is late and procedures to verify an identity require multiple visits to government offices and additional fees. In the DRC, individuals spend approximately US$ 31 fulfilling the requirements of late registration, although informal fees can add to this amount substantially. In order to obtain a copy of a lost birth certificate in Guinea, an individual first needs to obtain a supplementary judgment from a court, which is a paper record that requires the testimony of two witnesses with ID cards and a residence certificate. Once this judgment is obtained, the individual then needs to travel separately to their place of birth to request a new birth certificate—a process that many people skip and simply rely on the supplementary judgment for proof of identity. A similar process occurs in Cameroon, where registration after 60 days requires a separate trip to get a written demand from a Procureur de la Républic. After six months, parents must obtain a supplementary judgment from a court, paying fees of approximately FCFA 4,500 (USD 7.65)—however, due to bribes and other fees, the true cost ranges from US$ 20 to 200.

For national IDs, some countries offer the first card free of charge, while others charge various sums. Rwanda has purposefully kept the fee for its basic national ID card low (500 Rwf, or US$ 0.72) and offers waivers for poor individuals in order to ensure coverage and accessibility. In contrast, the first CNIE card in Morocco costs approximately US$ 7, which is relatively high and may deter poor applicants[23]. In addition, many individuals face additional costs due to transportation and missed work: because the CNIE has only 100 enrollment centers that serve approximately 330,000 people each, those in rural areas must travel long distances to obtain a national ID card. In Côte d'Ivoire, an ID card costs

21 Fees for functional ID systems like passports and driver's licenses are often higher than for foundational IDs. While these fees may serve as a channel for revenue generation to cross-subsidize foundational services, they also present opportunities for rent-seeking by driving up prices, and may therefore create extra barriers for inclusion. In DRC, for example, the new biometric passport is one of the most expensive in the world at a cost of US$ 185 dollars (Le Monde 2017). Given an estimated GDP per capita of US$ 456 in 2015 (World Bank Databank), this fee is likely to be unaffordable for a majority of individuals.

22 Botswana is an exception to this, where an online system allows health workers to register the birth with the DCNR and then deliver certificates to the mother before she leaves the hospital. The same process exists for death certificates when death occurs at a hospital.

23 Charging fees for IDs may not always be a significant barrier to inclusion where IDs are valued and demand is significant. In Chad, for example, the fee for an NID is 4000 FCFA (US$ 6.6, the equivalent of 3-day income for the average person). While this cost is relatively high, the IMSA reports that it does not appear to deter many people from registering, as IDs are seen as essential for everyday life. In parallel, where demand for birth registration is low, a majority of people seem content to pay the late birth registration fee of 2000-5000 FCFA rather that register their child on time for free. Still, given that ID coverage in Chad is approximately 30-40 percent of the adult population, it is likely that these costs are too high for some.

approximately 5000 FCFA (US$ 8.60), but individuals must spend an additional 10000-13000 FCFA (US$ 17-22) on transportation and supporting documentation in order to obtain it. This high cost—which amounts to over a month's earnings for a poor person—is due to the fact that the national ID application requires a copy of the birth registration act (birth certificate) and a certificate of nationality. The latter is issued and kept by decentralized courts, necessitating multiple trips to administrative offices and additional supporting documentation (which may itself require separate office visits and fees). A similar procedure exists in Madagascar, where the fee for replacement ID cards is low (AR 500 or US$ 0.16), but individuals must obtain numerous supporting document that each require travel and potential additional fees, including a copy of the original application from the local issuer, a declaration of lost ID from the policy, a certificate of existence and conduct from the local government, and potentially two witnesses to verify the person's identity.

Although high transportation costs and multiple trips to government offices create barriers to registration and identification, it is important to note that a proliferation of offices in the countryside is not sufficient to ensure high levels of coverage. Before Zambia rationalized its civil registration offices and procedures, for example, a large decentralized network of civil registry offices was within reach of the majority of the population. However, birth registration rates remained low due to the protracted process of registering a birth (visiting the office multiple times), and the need to travel to Lusaka to actually obtain a birth certificate. The situation in Cameroon is similar, where over 2,700 registration points serve a population of 22.7 million, and process less than one registration per day. The proliferation of offices has actually coincided with a decrease in birth registration rates. And, as noted in the previous section, opening new offices requires additional infrastructure, staff, and training that may stretch an identity agency's resources and capacity too thin.

Complex Legal and Administrative Requirements

The administrative procedure described above is not unique to Côte d'Ivoire and Cameroon; many countries have similarly complicated legal and administrative procedures that significantly increase the burden of registration and identification and may prove insurmountable for marginalized groups. More often than not, applying for one identity document requires the presentation of other documents—often called "breeder documents"—each of which may have direct or indirect costs. The identity gap may then be compounded to the extent that barriers that prevent and individual from obtaining one type identity document affect their ability to obtain subsequent identification. For example, individuals without birth certificates may face difficulties in obtaining ID cards that require proof of birth, unless alternative documents or vetting procedures are accepted.

This problem is particularly acute with regard to identification systems that require proof of nationality (e.g., many NID cards, such as in Madagascar). Many of the assessed countries have stringent and complex citizenship laws based on the principle of jus sanguinis, which extends citizenship based on lineage, instead of (or in addition to) location of birth.[24] In order to obtain documentation that certifies citizenship, individuals therefore must prove the identity and nationality of their parents in addition to their own. In Tanzania, for example, complicated nationality laws are based on paternal line of decent (or maternal if the father is unknown) and presence in the country at time of independence. For many people whose legal status is unclear or undocumented, this creates a risk of exclusion. In countries such as

24 An exception is Chad, which grants citizenship based on jus soli—birth on Chadian soil—and as a result, individuals only need to produce their own birth certificate to be registered in the national ID system.

Kenya, the challenge of documenting nationality is exacerbated by the fact that birth registration is often the lowest in border areas and regions with high refugee populations. Other countries assessed here, including Chad and Côte d'Ivoire, also have large numbers of stateless or refugee populations that are similarly vulnerable to exclusion from identity systems.

Furthermore, a lack of identification for parents is likely to propagate to their children. In Kenya, for example, a 2008 law requires parents' national ID numbers to be included in birth registration[25]. While this helps to increase the robustness of the birth certificate and the IDs that use it as a breeder document, it may deter parents without ID cards from registering their children[26]. In Namibia, where birth certificates are relied upon to prove nationality, there is reluctance among some to issue these certificates to the children of undocumented parents, even those that have been continuously resident on Namibian territory for many decades. Additionally, there is reportedly some reluctance among the undocumented population to register their children for fear of retribution. This under-documentation has serious implications for the ability to access services. One report estimates that approximately 10,000 orphans and vulnerable children in Namibia are not receiving the social grants to which they are entitled due to lack of birth certificates.

Loss of Paper-Based Records

Many people also lack identification because government registers or their own copies of credentials have been lost or destroyed. In the DRC, for example, a significant portion of civil records were systematically vandalized, destroyed, or falsified by rebel groups during the conflict, and natural disasters such as a volcanic eruption in 2002 further destroyed government records. Following the 2010 elections in Côte d'Ivoire, the fact that a quarter of those on the voter register lacked proof of nationality fueled violence over who had the legitimate right to vote. The ensuing conflict led to the destruction of ID records, massive displacement, and weakening of institutions (especially in rural areas). Civil records were similarly destroyed in Guinea during the violence of 2007, and in Rwanda during the conflict in the 1990s.

In each case, records were particularly vulnerable to tampering or destruction because they were paper-based and not aggregated into a centralized repository or database. However, as shown in the following section in Table 5, many countries continue to rely on decentralized, paper-based registers. These systems can be problematic for accessibility because they are easily damaged, less likely to be stored in secured facilities, and lack robust backup systems. Once documents are lost or destroyed, the cost and procedural barriers discussed above may prevent individuals from obtaining a replacement. This is a challenge for individuals to obtain proof of identity, and for countries attempting to modernize their systems. In Cameroon, for example, studies have estimated that approximately 40 percent of civil registration records are in such poor condition that they cannot be scanned.

Geographic Constraints

Geography poses ongoing challenges for many countries attempting to increase the coverage of their identification systems (e.g., Chad, DRC, Namibia, and Zambia). First, certain territory (e.g., dense forests or mountainous terrain) can be difficult for enrollment agents to reach, particularly when combined with a lack of infrastructure. Second, where populations are

25 The same has been required in Cameroon since 2011.

26 Because parents' ID numbers have only been included in birth registration since 2008, for the next 11 years even applicants for ID cards who can produce birth certificates will need a "vetting" process to verify that they are citizens. However, after 2026, anyone turning 18 who was registered at birth will have a birth certificate that proves nationality.

sparse, the per-person effort and cost of enrollment may be much higher than in small, dense countries[27]. Third, extensive borders—particularly in remote areas—pose challenges for migration control and the identification of nationals.

The DRC, for example, faces significant geographic challenges, including a vast territory with many areas that are inaccessible due to ongoing conflict, lack of roads, dense forests, and isolated ethnic groups such as the Pygmies. Large borders and significant groups of refugees and internally-displaced people make it particularly difficult to determine who is a citizen. This challenge can partly be overcome by concerted efforts to engage local communities and decentralize registration to the village level, as Botswana has successfully done. In Chad, the security challenges posed by a long (6406 km²) and porous border have notably increased demand for a strong identification system to combat terrorist and insurgent activity. The speed with which voter IDs have been rolled out in many countries also suggests some ability to overcome geographic challenges quickly if there due diligence or documentary requirements are low. At the same time, rapid roll-out may compromise the quality of the biographic and biometric data collected.

Lack of Demand

Finally, some people may choose not to register vital events or obtain an identity card because they do not find it immediately useful or because it conflicts with their beliefs or cultural practices. For some, particularly those who live "off the grid" (e.g., nomadic groups) or in areas where informal practices allow access to services without identification, enrollment may have little apparent value. In general, uptake is likely to remain low without clear and well advertised benefits to registration or identification. In Tanzania, only 10 percent of the adult population has enrolled in the national eID system during the five years it has been active. Despite initially high demand for the project, delays in wide coverage have led to the voter ID becoming the most widely used identity credential. However, NIDA expects to complete full enrollment in 2017, primarily using data from the electoral roll.

Similarly, there is a chronic lack of demand for birth certificates in countries where these documents are perceived to have little value. In Cameroon, studies have found that low birth registration is due in part to a perceived lack of benefits. Birth registration rates increase with age as children reach school age and 18 years old, when national IDs become mandatory. The same is true in Côte d'Ivoire, where 86.7 percent of 15-17 year olds are estimated to be registered, compared with only 65.5 percent for those ages 0-4[28]. In Chad, birth registration remains quite low, despite a national ID system with moderate coverage. Although the birth certificate is technically required for school enrollment, there is lax enforcement in primary schools and as a result most parents have no incentive to register their children until they turn 12 and enter secondary school, where the requirement is enforced. This exemplifies a cycle found in many countries: lack of coverage leads to weak enforcement to avoid exclusion, which then decreases demand, leading to potentially lower coverage.

Traditional practices and social norms may also depress demand for registration. One example of this is in Namibia, where customary naming practices have prevented timely birth registration in some communities—many parents leave the hospital before giving the child a legal name (and thus do not register the birth) in order to name the child with their family or community. Additionally, Namibian

27 Rwanda, for example, was able to enroll 9.2 million people (76 percent of the population) in its NPR in the course of a three-day weekend. Although this campaign required additional time for advanced preparation and coordination, the ability to physically reach and enroll this many people in such a short period of time is due in part to the country's dense population and small size (12 million people over 26,000km²).

28 Source: DHS Survey, available at http://dhsprogram.com/pubs/pdf/FR272/FR272.pdf.

TABLE 6.DATABASE TECHNOLOGY FOR LEGAL IDENTIFICATION SYSTEMS

Civil Registration Records \ National ID Records	Paper	Electronic
Paper	Madagascar	Cameroon, Chad, Côte d'Ivoire, Morocco, Rwanda, Sierra Leone, Tanzania
Electronic	Zambia	Botswana, Kenya, Namibia, Nigeria

Notes: Zambia is currently in the process of digitizing its national ID records, and has a contract for a pilot digital ID card. DRC, Ethiopia, Guinea, and Liberia do not appear in this table, as they do not have operational NID programs; however, each have paper-based civil registers. *Source:* IMSA reports.

law requires that if parents are unwed, both must be present in order to include their names on the certificate and have the option of giving the child the father's surname. Where the father is unwilling or unable to be present, the stigma associated with giving the child the mother's surname often deters registration among unmarried mothers. This exemplifies how a combination of administrative regulations may interact with social norms to disincentivize registration.

TECHNOLOGY: USE AND MANAGEMENT

Technology use and management for civil registration and identification varies widely by country. A key distinguishing factor is the degree to which identification systems are digital or paper-based. Although most countries have made strides towards digital identity in the last decade, many still rely on paper records with manual verification and authentication for some components of the identification system. Specifically, just over half of the surveyed countries still have paper-based civil registration systems that have not been digitized (see Table 5). A majority of these—including Cameroon, Chad, Côte d'Ivoire, Guinea, Madagascar, and Morocco—do not have any central repository of civil registration records. Instead, records exist only at local registration offices.

Many of these countries have planned projects to digitize civil registration records, which have achieved varying levels of success. Before elections in 2010, for example, Côte d'Ivoire embarked on a modernization project to try and migrate its civil register to an electronic database and digitize paper records. However, this project was put on hold in 2011 during the post-election crisis, and has not been restarted due to a lack of financing and capacity[29]. Guinea, Tanzania, and Sierra Leone have also begun projects to modernize their registries, which are in various stages of proposal and procurement. Zambia and Madagascar are the only countries where national ID records are kept only in paper form with no digital database[30]. However, the Zambian government is working to digitize these records and create an integrated civil registration and NID system (INRIS) for a future eID.

Beyond the level of digitalization, the assessed identification systems vary in the technology used for enrollment and system maintenance, the nature of credentials issued, and protocols for verifying and authenticating identities. These variations dictate a system's level of robustness—i.e., its ability to establish unique identities and resist identity fraud and theft—throughout the identity lifecycle. In order to evaluate the robustness of identity management systems, the IMSA looks at the degree to which uniqueness of identities can be established at enrollment, whether credentials can be duplicated or tampered with, whether or not the system is embedded in a trust framework to verify or authenticate identities once

29 A plan to reconstitute and modernize the civil register in Côte d'Ivoire was one element of the 2007 Ouagadougou Peace Accords. However, since the project stalled during the 2010-2011 crisis, there have been no credible plans to migrate the civil register to electronic form.

30 Currently, records of Zambia's National Registration Cards (NRCs) are analog, with one copy of the application form kept at the district office, and a second sent to DNRPC headquarters. However, with support from the UNDP election fund, approximately 8.2 million of the duplicate forms at headquarters are being scanned and entered into a database.

they are issued, and the degree to which data are securely stored and protected.

Enrollment

Enrollment is the process of capturing an individual's personal attributes—such as biographic information, biometrics, and/or supporting documentation—and then verifying the authenticity and/or uniqueness of these attributes before the identity is created and recorded.

Data capture and transfer

For paper-based civil registries, data capture is normally done by completing birth and death registration forms by hand. For digital civil registers, data capture may be manual (in which case forms are digitized at a later date) or electronic. In nearly all cases—including those countries with digital registers—civil registration is completed at the local level and any transmission of records to the central agency are done manually, either in paper copy or via hard drive. The exceptions are Botswana and Liberia (and Zambia in the future), which have online data transfer between local civil registry offices and their central databases; a feature which increases security and efficiency. In Liberia, parents fill out a paper birth notification form that is sent to the district office, where the birth is recorded and transmitted to the central database. The central registrar then issues a birth certificate to the facility where the child was born, that the parent can claim upon presentation of proof of ID. In addition, a number of countries—including Nigeria, Guinea, and Kenya—have piloted the use of mobile devices to capture and send birth registration data via SMS to central servers, however this technology is not ubiquitous.

In contrast to civil registration, all of the surveyed countries with existing national identification programs manage these systems using centralized, digital databases, with the exception of Zambia and Madagascar. Still, few have digitized the data capture processes or have online data transfers from local ID offices to the center (Botswana is an exception). In Kenya, for example, paper applications for IDs are made locally and then physically sent to Nairobi. The physical transfer of personal information and documents creates significant inefficiencies and poses security risks. During the DRC's 2006 voter registration campaign (which produced one of the country's de facto ID cards[31]), for example, 1.27 million voter records were lost in transit and never recovered. This created problems, as these people had been issued with voter cards during registration, but did not appear on the voter lists on election day.

Verification

Once identity information is captured, it is then normally verified using a variety of technological and administrative procedures. The goals of this process are generally to verify the veracity of the personal information collected, establish that the person exists (i.e., is alive) and is unique, and link their identity with existing records or databases. For civil registration, verification procedures are generally simple and may include verifying the authenticity of a birth notification form presented by the parents, and perhaps examining parents' ID cards or other credentials.

For national IDs, verification processes are much more complex, and normally begin with a process to establish that the applicant is unique in the database (i.e., deduplication). With the exceptions of Zambia, Madagascar, and Sierra Leone, all countries with national IDs deduplicate applicants using biometrics (fingerprints), as shown in Table 6. The technology employed for this, however, varies in terms of how the fingerprints are captured, what technology is used for deduplication, and how the biometric data is stored. In Kenya, for example, 10 inked fingerprints are taken

31 In addition to the voter ID, people in the DRC prove their identity using work IDs, driver's licenses, certificates of lost IDs, and other records.

TABLE 7. FINGERPRINT TECHNOLOGY USED FOR NATIONAL IDS

	Type	Number /Capture	Deduplication
Botswana	ink	2 thumbs	AFIS
Cameroon	ink	10	AFIS
Chad	digital	4 (individually)	ABIS
Côte d'Ivoire	digital	10 (individually)	AFIS
DRC	*n/a*	*n/a*	*n/a*
Ethiopia	*n/a*	*n/a*	*n/a*
Guinea	*n/a*	*n/a*	*n/a*
Kenya	ink	10	AFIS
Liberia	n/a	n/a	n/a
Madagascar	ink	10	none
Morocco	ink/digital	4 digital (indiv.), 10 inked	AFIS, *planned:* ABIS
Namibia	ink	10	AFIS
Nigeria	digital	10	ABIS
Rwanda	digital	2 thumbs (individually)	AFIS
Sierra Leone	ink, *planned:* digital	6	none, *planned:* AFIS
Tanzania	digital	10 (4:4:2)	*AFIS*
Zambia	ink	1 thumb	none

Notes: The DRC, Ethiopia, Guinea, and Liberia do not currently have operational national ID programs; however, biometric-based IDs are planned in Guinea and Liberia. Ethiopia's local *kebele* ID cards do not involve centralized de-duplication of identities. *Source:* IMSA reports.

and stored as JPEG images to be de-duplicated with an AFIS system after the application has been completed. The country is attempting to move towards digital prints, first by converting ink records to electronic format. This is in contrast to Nigeria's NIMC, which collects 10 digital fingerprints and deduplicates using more advanced ABIS technology that matches the biometric templates in real-time while the applicant remains in the office. Morocco uses a hybrid system, where four fingerprints are captured digitally (one at a time) in addition to 10 inked fingerprints that are later scanned.

In Nigeria, the ability to deduplicate an identity on the spot—using digital fingerprint readers networked to a central database—has significantly improved the processing time associated with an ID application and increased the security of the system. In contrast, countries that de-duplicate data all at once following a mass-registration exercise have faced significant challenges. In the DRC, the 2006 voter registration exercise only deduplicated voters after all enrollments were complete. This was problematic because the system could not process the enormous number of matches necessary to compare all 25 million fingerprint records against each other, and this function was eventually outsourced to a foreign firm. In addition, because laminated paper cards were issued during enrollment, the AFIS process revealed a number of duplicate individuals who had already received multiple cards. This was not a problem for voter authentication as voters needed to be on a list that had been updated to remove duplicates. However, it created confusion and the potential for

fraud with excess IDs in circulation[32].

In addition to deduplication via biometrics, many countries have extensive vetting processes in order to verify identity information, and in particular, nationality. This process is complicated by the lack of interoperability between national ID databases, civil registries, and other agencies that maintain supporting documents often required to prove citizenship. In Côte d'Ivoire, for example, the ONI has to manually check the documents presented by an applicant (a copy of the birth registration act and a certificate of nationality) against the records of the court and of the local civil registration bureau by sending a person to physically consult the records. As a result, the time from application to the issuing of a national ID is between 2-3 months. In Madagascar, national IDs (CINs) are issued at the district (or sometimes municipal) level, where officials process the application and assign a temporary, non-random ID number coded for district, municipality, sex, and chronological number. The application is then sent to the Ministry of Justice for central filing (there is no electronic database) and to verify the uniqueness of the number, while the police check the person's criminal record. Once the CIN has been approved and issued, it must then be registered with the local community (fokontany). In Tanzania, applications for an NID are thoroughly vetted both centrally and at the local level. First, a list of individuals with photos is posted in the community, and members are asked to correct information. Applications are then vetted by "village and district security committees", which includes NIDA officials and representatives of other agencies including the immigration department, intelligence, military, police, and local government. The due diligence process can involve interviewing the applicant and sending them back to collect additional supporting information. A similarly stringent manual vetting process in Chad requires independent approval of three commissioners before an NID application can be processed.

Credentials

Countries issue a variety of credentials following enrollment in civil or national ID registries, with varying degrees of security and functionality. In terms of birth certificates—the primary document issued by civil registrars—all are paper-based, most are handwritten, and few have advanced security features (e.g., watermarks or seals[33]). As a result, most of these certificates may be easily counterfeited in the absence of stringent procedures to control their quality and distribution[34]. In Sierra Leone, for example, it is apparently easy to fraudulently obtain a birth certificate under any name. With the exception of Botswana, which has laminated birth certificates in remote areas since 2015, all paper-based certificates are also highly vulnerable to damage.

National ID credentials range widely in form and level of security. As shown in Table 7, cards in the Madagascar, Sierra Leone, and Zambia are paper-based, and may be easily damaged and forged. In addition, the DRC and Guinea have paper-based voter card that serve as the de facto identity document, while Ethiopia's kebele cards are also paper-based. As voter IDs, where the identity of the cardholder is checked against a printed voter list at the polls, the security risks are reduced. However, these cards are insufficiently robust to serve as national IDs. In Zambia, for example, the current National Registration Cards (NRCs) are reportedly

32 In Tanzania, voter ID cards were also issued before the deduplication of electoral lists, resulting in the proliferation of invalid cards. This problem was compounded because the voter database is shut down after the election, making it impossible to check whether a presented card is linked to a unique identity.

33 e.g., Namibia is planning to add security features to its certificates to increase trust.

34 Morocco is an example of a country with a decentralized, paper-based register system with stringent controls on the ledgers that record civil events. The ledger books have numbered pages and are sealed each year to prevent future tampering and revisions. Instead of permanent birth certificates, local registrars issue certified copies of the birth act upon request, which are only valid for three months and cost approximately US$ 0.25. However, while this system provides for relatively robust registers, it cannot control the forgery of the birth acts themselves.

TABLE 8. NATIONAL ID CREDENTIALS AND AUTHENTICATION

	NID Card Type	Digital Credential Verification	Digital Authentication of Individuals
Botswana	plastic, barcode [*planned smartcard*]	yes	*planned*
Cameroon	plastic [*planned smartcard*]	no	no
Chad	plastic, 2D barcode	no	no
Côte d'Ivoire	smartcard, 8k contactless, proprietary encryption	no	no
DRC	n/a	n/a	n/a
Ethiopia	n/a	n/a	n/a
Guinea	n/a [*planned 80k smartcard*]	n/a	n/a
Kenya	plastic, machine readable	yes	no
Liberia	n/a	n/a	n/a
Madagascar	paper, laminated	no	no
Morocco	smartcard, contactless, signed by identity provider	*yes (limited)*	no
Namibia	plastic	*yes (limited)*	no
Nigeria	smartcard, 13 applets, payment card, ePKI encryption	*yes (limited)*	*planned*
Rwanda	plastic, 2D barcode [*planned smartcard*]	yes	*planned*
Sierra Leone	paper [*planned smartcard*]	no	no
Tanzania	smartcard, 80k contactless (NFC)	*planned*	*planned*
Zambia	paper	no	no

Note: DRC, Ethiopia, Guinea, and Liberia do not currently have operational national ID programs. Digital credential verification is the capacity for third parties (e.g., service providers, banks, other government agencies, etc.) to verify the authenticity of a credential (e.g., card or ID number) against the identity provider's database. Digital authentication is the capacity to securely verify a person against their credential to ensure that they are who they claim to be. This includes, for example, matching an individual's fingerprints against a smartcard or identity database via the cloud. *Source: IMSA reports.*

prone to forgery through the substitution of photos and text alteration.

Just under a third of countries, including Botswana, Chad, Kenya, Namibia, and Rwanda, have machine-readable plastic cards that provide much higher levels of robustness due to the medium and embedded security features. Chad's second generation ID, for example, is protected by nine security features (e.g., a multispectral hologram) that make counterfeiting or tampering difficult. In some cases (e.g., Botswana), barcodes contain fingerprints and photos that can potentially be used for authentication of the individual against the card. Cost figures for many of these cards are not provided, however it is notable that Botswana's card costs approximately US$ 15 to produce.

A final group of countries, including Côte d'Ivoire, Morocco, Nigeria, and Tanzania, have issued robust smartcards with a range of features. In Morocco, for example, a state-of-the-art card

includes an electronic credential on the chip signed by the issuing agency. Nigeria's card includes 13 applets for different functionality (5 of which have been activated), and also functions as a prepaid debit card[35]. Tanzania's card—a 80kb near-field communication (NFC) smartcard that in the future can serve as a mobile wallet—is one of three with contactless technology (the others are Côte d'Ivoire and Morocco). Other countries, including Botswana, Cameroon, Kenya, Guinea, Sierra Leone, Rwanda, and Zambia, are all planning to introduce smartcards in the near future. The cost of these cards can be high (e.g., US$ 4 in Tanzania to US$ 7 per card in Morocco), and production time may be longer than for plastic cards (e.g., in Nigeria, card issuance takes over a month).

Moving from paper to a plastic card or smartcard, however, does not guarantee security or utility. In Côte d'Ivoire, for example, the card itself is relatively secure, but fraud continues to exist as there is no way to deactivate the card, and people can buy cards with similar-looking pictures on the black market. Kenya's NID has no expiration date, which means that old cards stay in circulation, and pictures may no longer resemble their owners, hampering their use for authentication. In addition, the security level of many cards (e.g., Cameroon, Chad, Tanzania) may be undermined by the insecurity of the breeder documents (e.g., birth certificates) on which they are based[36].

Authentication

In general, there are two potential types of authentication: that of credentials and that of individuals. Authenticating credentials involves checking the validity of identity documents or numbers to confirm that they are genuine and match information provided by an individual (e.g., on an application). This can be done by examining security features of the document itself or by checking against a central database (e.g., confirming the existence of a particular NIN). Authenticating individuals involves establishing whether or not a person is who she claims to be, using biometrics and/or other knowledge (e.g., a PIN) and checking these either against a credential or a central database. In general, only more advanced identity ecosystems (e.g., Pakistan, Peru, India) are able to authenticate individuals directly in addition to verifying credentials.

For the most part, authentication of civil registry credentials (e.g., birth certificates) and national IDs is done manually in the surveyed countries. This means that in most cases, identity documents (including paper-based certificates and cards, as well as plastic and smart cards) are visually inspected when presented as proof of identity, potentially in combination with other forms of ID. However, a few countries have enabled service providers (including government ministries and private sector firms) to authenticate the validity of national ID cards themselves against the central database. In Kenya, for example, the IPRS system can be accessed by financial institutions, mobile operators, tax authorities, etc., to verify information on the national ID card. It reports responding to 1.5 million identity queries per day, mostly from the financial sector. Botswana and Rwanda similarly provide a number of government agencies with an interface to their identity databases to authenticate card information. Finally, three countries have links with a single agency—Morocco and Namibia (passports) and Nigeria (Department of State Security)—while Tanzania is in the process of establishing links with government agencies and banks to the NIDA data center for authentication of

35 Nigeria's card is currently co-branded with the MasterCard logo, and future plans include co-branding with Visa and Verve.

36 The black market for credentials is function of incentives faced by officials and residents. Local civil registrars are often paid paltry sums for their work and therefor have an incentive to make money on the side. Individuals who face high fees for obtaining documents may find it more cost effective to buy a forgery. In Cameroon, for example, a counterfeit birth certificate reportedly costs between FCFA 3,000 (US$ 6) and FCFC 10,000, (US$ 21), which may be less than the fees and transaction costs associated with registering a late birth, which can reach approximately US$ 200.

its eID.

Direct authentication of individuals is even less common. As described above, a number of countries currently have smartcards or machine readable cards that digitally store identity attributes including biometrics (i.e., Chad, Côte d'Ivoire, Morocco, Nigeria, Rwanda, and Tanzania). In principle, these cards can be used in combination with fingerprints or PINs to securely and digitally authenticate a person against their ID card. Currently however, none appear to be using this technology widely, as shown in Table 7. In large part, this is because these countries have not yet developed networks of connected or offline point-of-sale (POS) devices that will allow for individual authentication. Another limitation is that some countries (e.g., Kenya, Namibia) have only included images of inked fingerprints on the card, which cannot be compared against biometric templates that are digitally captured during the authentication process. As a result, identity checks at the point of services are done manually (i.e., via visual inspection or photocopying of credentials). Thus, even with the most advanced card technology, impersonation of identity holders is still possible in these countries.

In order to make up for the lack of digital authentication with the national ID, some countries have developed functional systems with sophisticated credentials and individual authentication procedures. For example, the Botswana Post (a service provider for the Department of Social Protection) issues a programmatic smartcard based on information in the NID database. It then captures additional biometric data that is stored on the card and used to authenticate transfers for a variety of social safety net programs.

Data Storage and Security

As discussed above, many countries maintain paper-based civil registries that store records locally, and in some cases send copies of the files to the central registers. These files are often kept in in subpar conditions that risk deterioration or destruction due to humidity, fires, flooding or other natural disasters, or conflict. Where there are no duplicate files—e.g., in countries with complete registry decentralization and no duplicate copies (e.g., Cameroon, Guinea) or in capital cities where local registration takes place at the central agency—there is no backup and lost or destroyed records are unrecoverable. Of the countries with digitized civil registries, the quality and security of storage is uneven. In Namibia, the NPRS system is backed-up by the Office of the Prime Minister, while no form of digital back-up exists yet in Zambia. Kenya keeps scanned birth and death records backed-up using onsite tape storage, but there is no offsite disaster recovery facility.

The robustness of national ID and population registry storage is also mixed. Namibia, for example, lacks a back-up facility for its national ID system, though one is currently being created. Although Kenya has a mirror offsite backup for its IPRS database, biometric data from inked fingerprints are stored in JPEG format and not encrypted. In Botswana, digitally captured biometrics are also stored in JPEG form rather than templates, and are not encrypted. Although there have been no publicized security breaches in the country to date, this system poses risks for the security and confidentiality of personal data.

Exemplary cases include Nigeria, where the NIMC has received ISO certification for its data storage and disaster recovery facilities and procedures. The agency has a strong emphasis on security, and has designed its system to mitigate risks from physical and cyber attacks, including a database security system, PKI encryption, a disaster recovery site with backup servers, and continuous power from diesel generators. In Rwanda, NIDA has a state-of-the-art data center with strong built-in security mechanisms, built-in redundancies, backup, and disaster recovery. Morocco similarly stores and protects its CNIE data using internationally recognized best practices, and Tanzania's data center is also supported by backup

power system (using generators and batteries) and a data recovery center.

INTEGRATION: INTEROPERABILITY AND INTERCONNECTIVITY

Interoperability is the ability of different IT systems and software applications—e.g., the civil register and civil identity systems—to communicate, mutually authenticate, and/or exchange data. An interoperable or harmonized architecture increases the efficiency of the identity system by avoiding multiple redundant and costly identification programs, and can help detect and eliminate fraud. The use of a robust common identifier, such as a unique ID number (UIN) or national ID, can also simplify identification for the user by allowing them to carry fewer credentials and enroll in fewer systems. Where systems are highly linked or integrated, however, there is the potential danger that overly-concentrated data may be vulnerable to security breaches or misuse.

In most of the surveyed countries, each foundational and functional program owns and operates its own databases (or paper registers), technology, and processes. Very few have effectively integrated disparate systems and databases, and links between these systems are often sporadic and manual. Although many countries have national ID numbers (NINs) created and maintained by government agencies, few play the role of a true UIN—one that uniquely identifies an individual for their lifetime and links records across databases (Botswana is an exception, as described below).

In countries where the national ID program is strong and has wide coverage, other agencies frequently record the national ID number during their own enrollment processes, and in some cases validate the identity with the ID register. In Morocco, for example, the CNIE card is robust and used for almost all official or financial transactions. With the exception of online verification with the passport agency, however, verification is manual and service providers wishing to authenticate an identity simply request and store a photocopy of the CNIE card. This process is similar for many other systems. For example, when Liberia's public pension office wishes to cross-check its beneficiaries with the Civil Service Authority's (CSA) database of personnel, the pension offices uses a printed list of active civil servants from the CSA.

Similarly, despite a mandate to harmonize the identification ecosystem, Nigeria's NIMC has made slow progress in integrating its National Identity Database with the many fragmented identity programs that exist in the country. To date, it has only one link to the Department of State Security, although it has planned future linkages with 14 other agencies via government-wide and fiber-optic networks. In addition, NIMC began a pilot to use its data to help deduplicate beneficiaries in a Registry of Farmers used for a support scheme. The NIMC has developed a robust NIN—an 11-digit random number—that has the potential to serve as a UIN, however it is not yet used to link databases or connected to birth registration.

Notable exceptions to the lack of progress with integration are Botswana, Kenya, Namibia, and Rwanda, which have each made important advances in harmonizing their identification systems. In Botswana, both the National Identification System (NIS) and Birth and Death Registry are linked by a UIN (called the "UID") for real-time integration. As of 2011, this number is issued at birth registration and used at age 16 when a person obtains their first identity card[37]. The national ID card (Omang Card) issued by DCNR is used as the foundational document to verify identity used by the electoral system, the Social Benefit Registration System (SOBERS), government

37 In 2011, presentation of a birth certificate became a requirement to complete national registration and obtain a national identity card in Botswana.

payroll, driver's license, passports, and many other services. As described above, these agencies can pull or verify core data—e.g., name, date of birth, sex, and address—from the NIS database online in real-time. This data can be used to validate a user's Omang Card details, or as the foundation when creating a new functional identity. The country has plans to integrate the currently unlinked database for non-citizens (Immigration and Citizenship System) to the NIS, developing a full NPR or "People Hub".

Kenya has also made significant progress towards interoperability within an ecosystem of many well-developed but fractured functional registries. Traditionally, civil registration, identification and immigration services (which registers non-citizens) have functioned in silos, each maintained by different departments in paper databases within the Ministry of the Interior. Recently, however, the country has moved to near-full digitization of records[38] (with the exception of immigration services), and created its IPRS database to aggregate key information from each of these sources in order to offer online authentication services to other government agencies and the private sector. In principle, data will be pulled from the source databases several times a day, for almost real-time updating. However, there is not yet automatic transmission of data on deaths to other parts of this system, which—combined with the low rates of death registration—means that it is impossible to know whether many ID card holders are still alive. In addition, other important registries, such as the pension registry, are not yet set up to check against the IPRS. As a result, it is more difficult to detect fraud, and there have been known instances of pension payments being made to the wrong person because of errors in identification. In addition, although the NIN associated with the ID card is widely used for authentication, it is not universal across databases, and has no hash or control digits to prevent error or fraud.

In Namibia, a UIN is used to link child and family records within NPRS, which includes records of birth, death, ID, marriage and divorce. However, the UIN is not used for birth registration, passports or the legacy South West African (SWA) ID card from the colonial period[39]. In addition, there are limited linkages with other ministries, with the exception that the Department of Civil Registration provides the electoral commission with information on deceased residents in order to clean the voter list. However, in the absence of a networked connection, these data are physically transferred in paper format or via flash drive. Given this inefficiency, the agencies are currently developing a more permanent link, and the Office of the Prime Minister (OPM) is designing a government-wide are network to connect all ministries and agencies in the capital, regions, and districts.

Rwanda has also made significant strides in the integration of its civil register with its NPR and NID system, and has created a social register to unify benefits delivery. Currently, Rwanda's civil register is paper-based and decentralized, requiring extensive manual work to keep the NPR updated. Each time a new record is entered in the various paper registers maintained by local officials (e.g., for birth, death, marriage, adoption, residence, etc.), a separate paper notification form is generated for NIDA. These forms are collected by NIDA and brought to Kigali on an ongoing basis, where some 30 staff members manually enter the data into the NPR. Although this is not a perfect system, it has worked as stop-gap measure and helped Rwanda make a rapid transition from a country with devastated identity records in the 1990s to one of the more advanced systems

38 Birth registrations have only been scanned into and are still being put in relational database. Immigration records are still paper files, and there is not yet automatic transfer of death records.

39 The SWA card has yet to be phased out and is still accepted as proof of ID, and is particularly common among war veterans. However, its continued use has complicated the ID system in Namibia by creating an additional layers of complexity in the identity verification process, and presenting security risks given the poorer quality of the SWA cards.

on the continent. In addition, NIDA has created a biometrically-based ID number (called the NIN) that is unique to each individual for their lifetime. Although it is not yet incorporated into birth registration, it is quickly becoming the foundational identifier for a variety of agencies and services, including the electoral commission, police, notaries, and banks.

Many other countries have plans to improve interoperability as they roll out new foundational ID programs (see Appendix 2). In some cases, this will involve a centralized system built around a core national ID or population register (e.g., Sierra Leone, Guinea, Liberia). In countries with more developed functional registers, it may involve a federated ID system, such as Kenya's current system or Nigeria's planned system. In the mean time, however, these countries differ substantially in the level to which foundational identity documents—including birth certificates and NIDs—are the central means of proving one's identity, with functional systems largely dependent upon them as breeder documents. Some of these relationships are documented in Figures 3-5 at the beginning of this section. In Madagascar, for example, there is no digital integration or interoperability between the NID and functional registers; however, the ID card and NIN are used for most public transactions and administrative functions. In Sierra Leone, in contrast, the national ID is not widely held, and most core functional programs (e.g., electoral commission, social security administration, etc.) operate their own ID systems, often requiring a birth certificate as a breeder document. In Chad, the national ID is more common (it is held by some 30-40 percent of the adult population), however people also commonly use voter IDs and passports as a means of establishing their identities.

LEGAL AND REGULATORY FRAMEWORK

Two aspects of a country's legal framework are essential for identity management: (1) laws that govern mandates and institutional arrangements for identity actors, and (2) laws that relate to privacy and data protection, protecting individual rights and the security and integrity of networks and databases. In order to be effective, privacy and data protection laws must endow government agencies with the authority to monitor and enforce these laws. As countries increasingly adopt digital identity systems, legal frameworks must also be updated in order to cover the capture, use, and storage of personal data in electronic format.

With a few exceptions, the majority of the IMSA countries lack adequate legal frameworks to support and regulate modern identification systems. As shown in Table 8, eight countries (Cameroon, Chad, DRC, Guinea, Liberia, Rwanda, Sierra Leone, and Zambia) have no viable data protection law or authority endowed to regulate the use of personally identifying information (PII). An additional six countries (Botswana, Kenya, Madagascar, Namibia, Nigeria, and Tanzania) have draft laws on data protection that are currently not in force. Only Côte d'Ivoire and Morocco have well-institutionalized legal frameworks and authorities to protect PII.

In some cases, issues of data protection and privacy appear to be low priorities for identity providers. In Chad and Tanzania, for example, the IMSAs report that a greater awareness of the privacy-related implications of collecting and storing personal data is needed. As a result, there may be individuals enrolling in these national identity systems who are uninformed about what the data will be used for, by whom, or for how long. Although Tanzania has drafted a data privacy law, the legislation may need revision—for example, it currently gives NIDA officials immunity in the case that data are mishandled or their security is compromised. Other countries, including DRC and Guinea, currently have no data protection or privacy laws, no laws on digital identity management, and overlapping mandates for various identity stakeholders. In addition, many countries'

laws give overlapping or unclear mandates to identity agencies, and are ill-adapted to the digital era.

A number of countries have made progress on developing coherent and comprehensive legal frameworks, although many issues remain addressed or unresolved. In Kenya, for example, the government has drafted a National Registration and Identification Bill (currently under discussion in parliament) that would support the integration efforts of the IPRS by combining the separate processes and institutions responsible for birth and death registration, immigration, and national ID issuance. In addition, the constitution guarantees the right to privacy, and the government has drafted a data protection bill. However, the bill has not yet passed, which is a problem given that the IPRS is already in the process of integrating lots of personal information without clear policies on its privacy or protection of this data.

In Liberia, the National Identification Registry Act of 2011 created the National Identification Registry (NIR) and endowed it with the authority to issue biometric ID cards to all citizens and residents. Although the NIR act requires the collection and use of data to conform to freedom of information laws and the right to privacy guaranteed by constitution, the country has no specific law on data protection. In addition, law does not define digital identity as a legally recognized category, or specific how digital identity will be used or asserted. In Sierra Leone, the current identity system is covered by a number of overlapping laws, causing confusion and duplication of roles. At present, the country is drafting a reform bill to harmonize the identity landscape, define digital identity as a legally recognized category, and add provisions for privacy and data protection.

Nigeria also has a relatively positive policy and legal environment, including the passage of a cybercrime act to define penalties for breaches of data security. The NIMC act of 2007 gives clear authority for identity management to the NIMC. The agency also conducted a privacy assessment 2013 and a set of policies on privacy have been adopted by the government. However, although a draft bill on data protection is currently being reviewed by Parliament, there are currently insufficient legal safeguards for privacy and data protection. Although Rwanda has a comprehensive law regulating NIDA and all aspects of population registration and the national ID, its civil registration laws are out of data, and it lack adequate data protection and privacy legislation.

Two exemplary cases stand out. The first is Côte d'Ivoire, which passed a law on the Protection of Personally Identifying Information in 2013. The law is a codification of the 2008 Economic Community of West Africa States (ECOWAS) treaty and supplementary 2010 act on privacy. It is highly developed in a number of regards, including the establishment of a comprehensive legal system for processing and circulating PII for government and private entities irrespective of context, a prohibition against the transfer of personal data to third countries that do not offer adequate protection, recognition of the right to be forgotten, the right to personal data portability, and the right to refuse personal profiling. In addition, the government has demonstrated a clear commitment to implementing these provisions. As of 2014, the oversight responsibility for data protection has been given to the telecommunication regulatory body (ARTCI), which is considered to be competent and has the capacity and political backing to effectively enforce the law.

Morocco also has a well developed legal framework related to privacy and data protection. It has an omnibus data protection law (Law 08-09) that covers all data that can be considered personal or private regardless of the application. The law explicitly incorporates internationally recognized principles for the protection of PII, including the establishment of a national privacy commission (CNDP), individual consent to data collection, requirements regarding

data quality and accuracy, proportionality of data collection, limited storage duration, and the rights to access, review, and dispute personal data. However, the IMSA mission was unable to determine if DGSN officials are bound by this framework, as there is an ambiguous provision in the law which provides for a national security exemption, and the DGSN is also the body in charge of national security.

Conclusions

MANY OF THE ASSESSED COUNTRIES HAVE MADE SIGNIFICANT IMPROVEMENTS IN THEIR IDENTIFICATION SYSTEMS OVER THE PAST FIVE YEARS.

Notably, we have seen a strong commitment to the right to identity in most countries and concerted efforts by governments to build more effective, robust, and accessible civil registration and identification systems and services. A recognition of the importance of identification has led countries and their development partners to invest significant resources in technology and registration campaigns. As a result, many countries have been able to improve the coverage of birth registration and national identification systems. Finally, some agencies have found innovative ways to improve registration and identification rates and facilitate access to government services.

Along with these successes, however, we have also seen a number of persistent challenges and weaknesses that have undermined the development of robust, accessible identity systems in many countries. Despite a general commitment to identity, many countries are still struggling to coordinate diverse stakeholders and develop national mandates for identification. Efforts at institutional coordination and rationalization are further hampered by a lack of capacity due to histories of conflict and a lack of resources and infrastructure. As a result—and despite some progress on improving coverage—a majority of these countries are still unable to meet the demands for identity services expressed by citizens, government service providers, and private firms. Huge gaps in identification still remain, and the underserved are often members of marginalized groups, including the poor, women, rural populations, and the large number of refugees and stateless people who reside in these countries.

Despite the adoption of advanced digital identity systems in a number of countries, most have not yet been able to leverage this technology in a way that allows them to reap the full benefits of digital ID for increasing efficiency, interoperability, and access to services. This is due in part to a lack of enabling ICT infrastructure or scarce resources. However, the utility and integrity of a number of identification systems have also been compromised by poor procurement practices and problems with vendor lock-in that hamper system growth and adaptation. Where the potential of digital technology to integrate disparate registers has not yet been realized, identification systems remain fractured. As a result, billions of dollars are wasted in developing various overlapping identity programs to serve single-purpose needs. Finally, few countries have established the requisite legal frameworks for identification, and most currently lack adequate measure for privacy and the protection of personal data, as well as clear mandates for identity providers and regulatory authorities. The following sections briefly summarize each of these strengths and weaknesses.

STRENGTHS

Strong Commitment to Identity

There is growing demand for and commitment to ID systems in a majority of the surveyed countries. Drivers include development plans that require greater knowledge of and contact with the population (including social transfers, etc.), a desire to move to e-government services, and frustration with costly and redundant identity systems. In addition, many countries have recognized identity as a right and are motivated by its inclusion among the SDGs.

In Botswana, for example, creating a robust identification system is part of its Tenth and Eleventh National Development Plans, and the government sees civil identification and registration as critical for good governance, development, and the extension of rights. Political commitment and leadership is visible at both the national and local levels. In Namibia, civil registration is an important instrument to achieving the Fourth National Development Plan's goal of improving service delivery. In addition, the country's planned switch to an eID is part of an e-government strategic action plan for public service through the use of ICT. The situation is similar in Zambia, where the Revised Sixth National Development Plan includes programs for e-government and public service transformation that will require investments in identity management. Sierra Leone also has high levels of cooperation among identity stakeholders, and a detailed operational plan for the launch of its Integrated National Civil Registration System (INCRS).

Efforts to Improve Coverage

In addition, many countries have undertaken serious efforts to increase the coverage of IDs, particularly with regard to birth registration. Botswana, for example, has taken significant steps over the past five years to improve its registration rates. In 2012, the country launched a campaign to register vulnerable people, and in 2015 began a second campaign to achieve universal birth registration among vulnerable groups, including remote populations and OVCs. During the campaigns, stringent documentation requirements were relaxed, making verification of identity reliant on community-level vetting and witnesses. A high level of decentralization and engagement with community leadership and NGOs has helped boost coverage in rural and sparsely populated areas, as have on-site registration offices at hospitals. Mothers who give birth in a hospital (94 percent of births) now leave the facility with birth certificate, eliminating the cost of traveling to a district office to retrieve it later. To boost inclusion, 30 officers have been trained in sign language, and registration forms have been translated into braille. In addition, a grievance redressal process was put in place in 2015 that includes a customer feedback system to analyze complaints and a monthly call-in program with the Minister.

Namibia—the most sparsely populated country in Sub-Saharan Africa with many difficult to reach groups—has also made great strides in improving the coverage of its national population register, including outreach campaigns to inform citizens of the importance of birth registration, mobile registration in remote areas, and a formal partnership with the Ministry of Health and Social Services (MOHSS) to increase registration capacity at hospitals. Other countries (e.g., Liberia, Nigeria) have also improved birth registration rates by integrating registration into hospital or clinic services at the time of birth or establishing electronic transfers of birth notification from hospitals (e.g., Zambia). Some (e.g., Kenya and Tanzania) have also begun linking registration with immunization. Where immunization rates are high (e.g., 96 percent in Kenya), this has the potential to substantially increase residents' access to registration services. In Tanzania, births recorded during immunization are uploaded to the central system via SMS, and initial tests indicate that this has increased registration by 50 percent.

As in Namibia and Botswana, other countries have also begun innovative mobile registration campaigns in order to reach remote groups. In Kenya, the Monitoring Vital Events through Technology ("MOVE-IT") program pays a modest allowance to community health workers to report geo-coded births to local subchiefs (who are responsible for registration) and the central database via mobile phones. The project was developed in partnership with the Ministry of Health, and is intended to incentivize chiefs to file registration reports[40]. Guinea has also implemented

40 To date, progress has been modest. Of the 3,000 births reported in the first month of the program, for example, only 120 were understood to

mobile birth registration by village chiefs using mobile phone networks.

Notably, Nigeria has made a concerted effort to increase the coverage of both birth registration and national identification for young students. A 2012 campaign supported by UNICEF helped register some 7-10 million school children and reduce the backlog of birth registrations, and the country has also implemented SMS-enabled mobile birth registration with support from the UN. In addition, the NIMC also registers children in the national identity system, issuing them with an NIN that is linked to their parents. Biometrics are taken (though not used for deduplication), and the child is expected to have their records updated every two years, until they receive an eID at age 16. Sierra Leone similarly plans to enroll children as young as 6 years old as part of its INCRS.

Innovations in Governance

In addition to leveraging technology to improve coverage, a number of countries have found innovative ways to improve the delivery of identity services and better connect citizens to government. Kenya is a prime example. The country has adopted a government-wide e-Governance strategy, including shifting services to an "e-citizen" web portal that requires the NID number and name to log-on. As of the IMSA report, there were 295,000 registered e-citizen users, and the government received some KSH 8 million in fees and payments daily (e.g., renewing licenses and passports, etc.). Kenya's ability to uniquely identify the holders of bank and mobile accounts[41] has also facilitated the integration of financial information, including the creation of a Credit Reference Bureau, which has led to a substantial decline in the share of non-performing loans.

In addition, the Kenyan government has created county-level "Huduma" centers, which are one-stop shops for a variety of services, including access to the e-citizen portal and applications for the National ID. One Nairobi Huduma center receives 6 to 12 thousand visitors daily—however, many other centers lack the internet connectivity and reliable power supply to function at their full potential. Although not yet operational, the Côte d'Ivoire Ministry of Telecom is also creating 5,000 community cyber centers to bring more people online. In the future, these could be key access points for e-government services and identity registration.

As described above, mobile technology—including SMS services—can be leveraged to remotely and digitally register births in areas with low broadband coverage. Countries have also begun incorporating SMS notifications into their national ID verification and credentialing processes. In Nigeria and Namibia, citizens can receive a text message when their identity document is ready for pickup, increasing transparency and convenience for the user. In Nigeria this service is free, whereas in Namibia it costs N$ 3.50. In Tanzania, NIDA will use a mobile-phone-based USSD gateway to update applicants on the status of their ID cards.

Finally, a few countries have been able to improve the efficiency and accessibility of their registration and identification services through more traditional organizational reforms and restructuring. As described previously, Namibia's Department of Civil Registration underwent a change management process that, thorough streamlined procedures and increased professionalism, reduced the time to issue an ID from 100 days in 2014 to 16 days in 2015. In 2013, Zambia received support from USAID, the CDC, UNICEF, the EU and other partners for an institutional reform program (the Zambia Institutional Reform Program, or ZIRP) intended to improve birth and

have been officially registered as of the IMSA report date.

41 The NID is required to open a bank or mobile money account and when activating a SIM card.

death registration. The project primarily consisted of changes to administrative procedures and organization, the implementation of a client charter, staff training and support, and a new document management system. As a result of these reforms, the DNRPC was able to reduce the time it takes to issue birth certificates from an average of 41 to 13 days countrywide (and between 1-5 days in Lusaka). In addition, customers reported paying fewer bribes in 2013 (0.4 percent of customers) than in 2011 (6 percent). Due to these success, the DNRPC received a national award for most improved public service department.

WEAKNESSES

Lack of Stakeholder Coordination and Integration

Despite these notable political commitments and tangible improvements, there is a persistent lack of coordination and planned integration among identity stakeholders in a number of countries. Where identification efforts have been uncoordinated or rivalrous, the quality and coverage of legal identification systems have suffered.

In Cameroon, for example, a 2013 law created a new National Civil Status Bureau (BUNEC) with the goal of modernizing the civil registry and creating a population register. However, its functions overlap with the Ministry of Territorial Administration and Decentralization (MINATD), which currently oversees the civil register, with no clarity in roles. In Guinea, the Ministry of Security and Civil Protection (MSPC) is planning a project to create a national ID system (none currently exists) and issue smartcards to citizens. The contract for a build-own-transfer (BOT) concession was awarded to a firm in 2010, but the project stalled and was only reinitiated in 2010. Once source of the delay has been discord and a lack of coordination and communication between the MSPC and other agencies involved in identity management, including the civil registration authority (DNEC), the agency in charge of electronic governance (A.N.GE.IE), and the Ministry of Economy and Finance. As described previously, the DRC's identification plans are not progressing, despite the creation of a national identity agency (ONIP). However, it has overlapping mandates with other identity agencies that and relatively little political capital, hampering its ability to function or begin any new identity initiatives.

Even in countries with advanced identification technology—e.g., Tanzania or Nigeria—we still see a high level of fragmentation and duplication in government ID programs. In large part, this is due to the fact that many past identification projects have had limited success or expanded too slowly, and government service providers and private firms have had to develop their own identity systems in order to fill this gap. In Nigeria, for example, there are at least 13 government agencies that operate identity systems in the country. Many of these—including the voter registry, driver's license registry, SIM card registry, and banking registry—all collect separate biometric data to ensure uniqueness. Even projects that are currently in the planning stage (including a biometric census, pension registry, and social registry for the poor) intend to collect their own biometrics and have minimal plans for integration with NIMC. These parallel identity systems are inconvenient to users (who must enroll many times and carry

TABLE 9. DATA PROTECTION LAWS AND AUTHORITIES IN AFRICA

Law and authority	Benin, Burkina Faso, Côte d'Ivoire, Senegal, Gabon, Ghana, Mauritius, Morocco, South Africa, Tunisia
Law, no authority	Angola, Cape Verde, Mali
Draft law only	Botswana, Ethiopia, Kenya, Madagascar, Namibia, Nigeria, Tanzania, Uganda
No law or authority	*Rest of Africa, including:* Cameroon, Chad, DRC, Guinea, Liberia, Rwanda, Sierra Leone, Zambia

Source: Côte d'Ivoire IMSA (2015), updated with information from other IMSAs.

multiple ID cards in order to access services), and represent inefficient use of public resources by the government.

Such challenges are not unique to Nigeria. In addition to their civil registration and identification systems, most countries maintain separate voter rolls that are not linked to other existing databases. Furthermore, most conduct costly mass enrollment campaigns for each election, rather than establishing a continuous register[42]. In Zambia, for example, the cost of elections in 2016 is estimated to be approximately US$ 90 million, or US$ 9 per registered voter. This is 60 percent above the average cost for the 23 elections held in Sub-Saharan Africa held since 2000[43]. In Chad, a one-time biometric census of the population to establish a voter roll (completed in January 2016) cost US$ 6-7 per adult. In the DRC, producing the voter list and cards for elections in 2006 and 2011 cost US$300 million. These exercises are thus inefficient and costly—particularly because they require a large investment in registration kits to cover the country in a short amount of time—and waste an opportunity to build lasting identification systems[44]. In Côte d'Ivoire, for example, the first computerized voter roll was created in 2010 following mass biometric enrollment for the national ID. However, what began as the same database has now become two distinct systems, as the NID records have been updated continuously since then, while the voter register remains static.

Limited Administrative, Fiscal, and Technical Capacity

Related to the problem of coordination and integration is the persistent lack of capacity—administrative, fiscal, and technological—in some countries. This is particularly evident in those areas that have recently faced violent conflict or economic crisis, such as the DRC and Guinea. In addition to the intentional destruction of identity infrastructure in these countries, the general administrative capacity to plan and execute projects has been weakened. Furthermore, in regions where violence and insurgence remains endemic, enrollment campaigns may be hampered. In the DRC, for example, a biometric census of civil servants was unable to reach some 66,000 workers in the eastern provinces due to security concerns, although the government was able to identify police across the entire country. Where areas of insecurity continue to exist within countries, this has serious implications for the coverage of identity systems and the accessibility of identity services by the population.

The capacity of governments to effectively operate or reform identity systems is hampered by high costs and a chronic lack of funding, or by the division of resources for identification among many programs and schemes (e.g., foundational identity systems, voter registration, etc.). Most countries appear to be beholden to the legislative process or development partners for the majority of their budgets. The exception are those cases (e.g., Rwanda), where identity agencies are autonomous and self-financing. In addition, even those countries that have substantial government capacity (e.g., Botswana and Kenya) still face crucial deficits in ICT infrastructure, including a lack of digitized databases, broadband connectivity and reliable power supply.

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42 Botswana is an exception, where the voter list is based on the NIS. In Namibia, the MHAI provides information (via paper records) to the electoral commission on the deceased, but does not supply information on cohorts that are turning 18. The agencies are currently discussing how to automate this link.

43 According to the Zambia report, pre-2000 elections in African countries were a little lower in cost per capita than world average. Since then, they have become more than two times as expensive as the world average, despite the significantly lower purchasing power for the average African citizen.

44 For more, see Gelb & Diofasi. 2016. "Biometrics and Elections in Poor Countries: Wasteful or a Worthwhile Investment?". Center for Global Development Working Paper. https://www.cgdev.org/publication/biometric-elections-poor-countries-wasteful-or-worthwhile-investment

Inaccessibility and Unmet Demand

A number of countries have significant barriers to enrollment. In general, the high indirect costs of fulfilling requirements of civil registration and national identification—in particular, proof of citizenship—are primarily due to complex administrative procedures and inadequate or inconvenient points of contact with the population. These barriers disproportionately affect marginalized or vulnerable groups, particularly poor people, rural dwellers, children, women, and refugees and stateless groups. The latter group deserves special mention, as the surveyed countries are ones with significant numbers of internal and external migrants and displaced peoples, including many of whom are undocumented. In Côte d'Ivoire, for example, there are some 750,000 people without a recognized nationality; in Chad, there are approximately 200-400 thousand refugees.

Some countries have made progress in dealing with the identification of refugees and stateless populations through cooperation with UNHCR. However, few have fully incorporated these groups into their national identity management systems. In Kenya, for example, UNHCR maintains a separate biometric database (PROGRES) that is checked against the national AFIS for deduplication. Refugees are issued two separate identity documents—one by the Kenyan Department of Refugee Affairs and one by UNHCR, which they can use to access rights and benefits. Under this system, some 620,000 refugees (mostly from neighboring Somalia) have been registered. However, many of these people were born in Kenya or have lived in the country for over 20 years, and authorities often have difficultly distinguishing between refugees, migrants, and Kenyan nationals of Somali ethnicity.

In addition to persistent barriers to enrollment, the fact that demand for birth certificates and national IDs appears to be low in some countries has made it difficult to extend coverage. However, individuals' lack of motivation to acquire particular credentials does not necessarily mean that the overall demand for identification services is low. Rather, it often indicates that existing credentials are perceived to be of little value to many citizens. In the absence of strong foundational identification systems, the popularity of certain functional programs demonstrates that there is an unmet demand for identity services among citizens and government agencies. In the DRC, for example, the government has implemented a relatively successful program to register police and other civil servants. In these cases, the prospect of an immediate benefit created significant enthusiasm among the target population. Police officers were motivated to register as they saw this process as a legitimization of their authority, with the potential to improve the timeliness of wages. The Zambia report also highlights a pent-up institutional demand for digital identity systems by public sector agencies (who want to offer e-government services) and private firms (who want to authenticate the identities of their customers).

Unrealized Technology Potential

Although all countries have moved toward digital identity for national ID systems, many civil registers remain paper-based. And with a few exceptions, processes and transactions based on national IDs—including enrollment, data transfer, verification, and authentication—remain manual. Although a number of countries have developed state-of-the-art systems within agency headquarters, a lack of countrywide ICT infrastructure means that many civil registry and identification offices remain unconnected. Most countries, including those with advanced smartcards, lack the infrastructure to authenticate individuals remotely. This is a potential waste of resources on a card that is not being used to its full potential, and a missed opportunity for service delivery and driving demand for identification. In addition, manual identification is not reliable and decreases the robustness of the system.

Problems with Vendors and Procurement

In some cases, problems with procurement and vendor lock-in have contributed to poorly functioning technology, stalled projects, and difficulties bringing identification systems to scale. A number of countries, including Botswana, Cameroon, Côte d'Ivoire, and Morocco, have invested in proprietary technology that limits future expansion. In Botswana, the choice of a proprietary system has made it difficult to change vendors, and prevented the DCNR from developing in-house capacity to manage its identity infrastructure. Instead, it must rely on ongoing maintenance contracts with a foreign firm, at a price of US$ 3 million above its yearly operational budget of US$ 5.6 million. In Côte d'Ivoire, data on smartcards are signed with a proprietary encryption mechanism rather than by a national certificate authority, reducing interoperability. Morocco has similarly experienced vendor lock-in on the biometric templates stored on its smartcards. As a result, third parties would be required to license this technology in order to read these templates, driving up the cost of developing an extensive POS network for authentication.

Other issues with procurement and opaque contracts have hampered identification projects in a number of countries. In the DRC, the government signed a US$ 479 million contract in 2011 with a Chinese company to conduct a biometric census. However, the project stalled due to financing and contractual issues. Guinea has also had protracted challenges with the BOT concession it awarded to a foreign firm create a national ID system. The project has been stalled since 2010, and no documentation on the contract is available. In addition to issues with the national ID, the country has also faced difficulties developing a driver's license. In 2009, it awarded contract for licenses to a different firm, which was paid upon delivery of the materials. However, the system was never made operational due to a lack of premises for housing it.

Finally, Nigeria has had limited success in partnerships to build its national ID system. For example, a US$ 236 million contract was awarded to a foreign company in 2001 to enroll the population and issue cards. The program ran for five years, registering 52.6 out of planned 60 million people and issuing 37.3 million NIDs. However, the project was discontinued in 2006 due to allegations of impropriety over the contract award. Addressing the legacy of this failed project initially hampered the NIMC's implementation of a new ID card. In Cameroon, difficulties with the international supplier responsible for providing a 2008 version of the national ID card resulted in a termination of its contract and replacement with a new supplier in 2014. The short lifespan of this system and the need to migrate to a new database may add significant costs and delays to the rollout of a new identity card.

Missing legal and regulatory foundation

A majority of the surveyed countries lack adequate legal frameworks to support and regulate modern identity management systems. Many have overlapping mandates with duplicative or unclear jurisdiction over registration and identification processes, and few have laws that account for the increasingly digital nature of personal data. And although a number of countries are in the process of drafting laws on data protection and privacy, many of these laws are inadequate. Only two countries—Côte d'Ivoire and Morocco—have well-institutionalized legal frameworks and authorities that conform to international best practices.

RECOMMENDATIONS

THE IMSA IS AN ADAPTABLE TOOL THAT PROVIDES COUNTRY-SPECIFIC RECOMMENDATIONS FOR IMPROVING IDENTIFICATION SYSTEMS.

In some cases, these recommendations are applicable only to the country in question. However, the reports also offer a number of suggestions that are nearly universal for the assessed countries, and are likely to apply in other developing-country contexts. This includes harmonizing existing databases and registers, modernizing the civil registry, planning for fiscal sustainability, extending coverage in an inclusive manner, following best practices for technology acquisition and use, building infrastructure for user authentication, and reforming legal frameworks. In addition, the analyses indicate a number of areas where World Bank engagement can continue to support the development of robust and inclusive identification systems, including through future IMSAs, additional feasibility assessments, technical assistance, and support for both functional and foundational identity systems.

COUNTRY RECOMMENDATIONS

Harmonize and Modernize Identity Systems

In order to provide efficient, effective identification systems capable of uniquely identifying individuals from birth to death, countries must work to coordinate various identity stakeholders and ensure that disparate systems are interoperable and modernized. Specifically, countries should:

- **Empower a national identity coordinator or authority (NIA).** Efforts to build an identity ecosystem should be led by single entity, with input from relevant government, private sector, and citizen stakeholders. The institutional arrangements for an NIA can vary dramatically from country to country. They can be autonomous bodies created for the purpose of identity management that report directly to the executive or a board of directors, or agencies/directorates of an existing ministry. They can be a small agency whose main function is coordinating existing identity stakeholders, or a large agency that itself manages one or multiple identity systems. Importantly, however, NIAs must be high-capacity agencies that represent all stakeholders (e.g., via a steering committee), embody good governance practices, and are resilient to political change.
- **Adopt a unified approach to identity management.** Each country should adopt a harmonization approach suitable to its context. One option is a minimalist or federated system, where identity databases are "loosely coupled" and a UIN is used as a common reference among databases. In India, for example, the government used a loosely coupled model to harmonize different identity platforms throughout the country. Other options include a "tightly coupled approach," with live integration of all ID databases, or a single warehouse, such as in Pakistan, where all information is held in a single system. Countries should carefully weight the costs and benefits of each configuration, and any approach must be endorsed by (and include the cooperation of) a variety of stakeholders.
- **Establish a UIN.** Unique identifying numbers that represent citizens from birth to death can be used to streamline identity management (in a tightly coupled system) or integrate a fractured

identity landscape (in a federated system). This will help reduce the fragmentation of identification, improve administrative efficiency, eliminate leakages, and increase the portability of identities. A UIN can also be an important tool to help accelerate electronic service delivery (e-Governance). In order to be a true UIN, the number should be established at birth via the registration process and be used to create and/or link identity records created later in life[45].

- **Modernize civil registries.** Digitizing and centralizing civil registry systems—particularly birth and death registration—and linking them with national identification and population registry systems via a UIN will improve the accessibility, utility, and robustness of these systems. In some cases, the cost of digitizing old records can be significant (e.g., between US$ 0.25-0.3 per record based on recent experiences in Africa). However, there are ways to mitigate these costs, including digitization in stages, beginning with those records that are less than 1-2 decades old. Another option is to index records rather than digitizing them. This involves taking digital photos of each page and then transcribing limited basic information into a database of searchable text—a faster and cheaper process that full digitization. The potential returns to this investment are large given the foundational role that civil registry records play.[46] In Zambia, for example, the mission estimates that an investment in civil registration of US$ 50-60 million would save between US$ 140-330 million in other identification costs (e.g., the national ID and elections) over 10 years.

- **Consider international interoperability.** Countries should take into account plans for potential integration and interoperability across national borders. In 2016, for example, ECOWAS began implementation of a regional biometric ID card that will gradually be extended within its member states. The development of digital identity systems that comply with regional requirements and standards such as ECOWAS can help facilitate border crossing, improve regional integration, and facilitate electronic services and digital commerce between countries.

Plan for Fiscal Sustainability

Advanced identification systems require sufficient and reliable financing in order to ensure operational stability and growth, and the ability to subsidize free or low-cost identification services to promote inclusion. In order to design fiscally sustainable systems, countries should:

- **Consider various options for financing identity systems.** There are a variety of potential financing models that can be used in isolation or combined in order to ensure the sustainability of civil registration and identification systems. This includes funding from the national budget, PPPs, and self-financing from revenues generated by user fees (i.e., "corporate financing", as in Rwanda). In Pakistan, for example, NADRA operates without budgetary allocations, and instead relies on fees levied for providing identity services to a variety of service providers including banks and border security, as well as from contracts with foreign entities to provide identity services and systems. PPPs such as BOTs and concessions can also help reduce upfront costs to the government. However, they should be used with care; before engaging with a private firm, governments should prepare detailed technical specifications with adequate

45 See the WB Digital Identity Toolkit for guidelines on the structure of a UIN.

46 For example, improving the quality and security of birth certificates will boost the robustness of national ID systems that rely on these certificates as breeder documents. Similarly, improving death registration can help reduce the amount of ghosts in the system, eliminating common sources of leakage and fraud.

provisions for scalability, reliability, affordability.

- **Ensure that cost is not a barrier to identification.** It may be desirable to create an identity system that is self-sustaining by charging fees for credentials. However, the first issue of foundational identity documents—including the first copies of birth certificates and national IDs—should be free of charge to ensure that cost is not a barrier to access. Other sources of revenue may be used to cross-subsidize the issuance of these foundational identity credentials, including fees for passports and driver's licenses, charges for expedited service, applications for digital certificates, verification and authentication services for third parties, etc. Another option is to have a have multi-tiered system of cards priced according to sophistication, e.g., higher fees for cards with online authentication capabilities (e.g., as done in Ghana and planned in Rwanda).

- **Bridge the investment gap by prioritizing high-return areas.** Countries can also help bridge the cost gap by rolling out systems according to priority uses where savings are expected to be large. This could include enrolling civil servants where identity can be linked to payrolls and pensions, or low-income groups where identity can be used to facilitate social benefits delivery.

- **Plan for potential long-term savings.** Getting rid of redundant identity systems (e.g., periodic mass voter registration campaigns) will save significant funds in the medium to long-run. Strengthening identity management and linking it to benefits programs, public payroll, and tax registries also has the potential to reduce program leakages and improve tax collection and revenue. These savings can be used to underwrite the development of more robust foundational systems. In Argentina, for example, linking 13 registers at cost of $10 million yielded a savings of $104 million. Kenya, biometric registration for a cash transfer program saved the World Food Program US$ 1.5 million.

Extend Coverage in an Inclusive Manner

Identification systems are only as useful as their level of coverage. In order to achieve the goal of universal coverage, countries should work to reduce barriers to access, address specific barriers faced by women, and increase incentives for enrollment:

- **Increase points of contact with citizens.** Coverage is likely to be low where people have limited contact with government agents and offices are difficult to reach. Where it is not feasible or cost-effective to open additional registration and identification facilities, there are a number of alternative ways that governments can give citizens more opportunities to enroll in identity systems and keep their information up-to-date. For example:

  > Partnering with health ministries to train and equip health workers to assist with birth registration (e.g., using mobile technology), install links to the central register in major hospitals, and potentially link registration with vaccination campaigns and schedules (as in Côte d'Ivoire).

  > Engaging schools to register children (like the MASSAR database of school children in Morocco), which not only increases coverage but helps ensure the robustness of the identity system by establishing identities at an early age.

  > Creating special provisions for low-coverage areas, such as extended office hours or mobile registration units (as in Chad, which was able to enroll 6 million remote people in the voter register in 45 days using mobile units).

  - Ensuring that social, economic, and legal barriers for women to register are addressed (e.g., in Pakistan, NADRA created women-only enrollment stations staffed by women).
  - Translating registration forms into local languages, and/or ensuring that registration agents are fluent in local languages (as in Namibia).

- **Align supply and demand.** In addition to reducing the cost of enrollment, increase the benefits of obtaining identification. Citizen demand for useful ID is high, and will likely grow with increased digitization of transactions. For citizens, demand for identification may be direct (when ID is generally useful as proof of identity), or indirect (when the ID is a requirement to obtain other credentials or enroll in functional programs). One option to boost demand is thus to make birth certificates and/or national IDs mandatory for access to services. In Tanzania, for example, the government mandated that students receiving educational loans must register with NIDA and present their NID when applying. Student registration was given priority by NIDA, and appears to have successfully covered some 80,000 students. However, where ID coverage is low or documents are hard to obtain, this type of policy risks increasing the exclusion of marginalized groups from key services. This is particularly the case if an ID that requires citizenship status is mandated for programs intended to be accessible for all residents (e.g., social protection and healthcare). It may be possible to reduce the risk of exclusion by making identity credentials mandatory only for new users of a service (e.g., new applicants for bank accounts), rather than post hoc requiring all existing beneficiaries to re-enroll. Any changes to enforce mandatory ID must be accompanied by strong information campaigns and efforts to reach undocumented segments of the population.
- **Extend systems rapidly.** Demand and utility are likely to increase as identity systems reach critical mass, and governments should attempt to scale systems as rapidly as possible without compromising quality. One option is to seed underpopulated identity registers with existing databases that have high coverage, and then begin campaigns to register those individuals who are not yet covered by either system (e.g., Tanzania is populating its NID database with data from the voter roll). This type of "reverse-engineering" is not always easy, however, as existing databases may not be interoperable or of suitable quality. Another option is to decrease the age at which individuals can apply for identity cards in order to reduce the interval between birth registration and obtaining other forms of identification such as a national ID. Fingerprints become stable around 12 years old, and children between 12 and 16 or 18 could be issued with lower-cost cards in order to bring them into the system before they receive identification at the age of majority (e.g., in Nigeria). Iris prints can be captured at a far younger age, and India's Aadhaar program is registering children as young as 5 years old.

Follow Best Practices for Technology

In order to ensure that identification systems are robust, scalable, and affordable, countries should follow international best practices and standards when adopting and procuring identification systems technology:

- **Use open-source and off-the-shelf (OTS) technology.** The hardware and IT platform—including servers, storage equipment, and all communication (ICT) components—should be based on OTS modules in order to reduce cost and avoid vendor lock-in. Software should be based on open-source standards. Ensuring that

system components are not proprietary and can be obtained through multiple suppliers will allow countries to take advantage of market-based competition. This has the potential to improve system performance and reduce the cost of scaling the system (e.g., adding new authentication capabilities such as POS devices).[47]

- **Adopt international standards for biometrics.** Biometrics should be captured digitally. Inking and then scanning fingerprints does not produce the same quality as live-scan capture, and makes fingerprint use for authentication more difficult. Capturing multiple fingerprints at once using the 4:4:2 standard is recommended, as scanning fingers one at a time increases the time and cost to enrollment and can potentially introduce sequence errors (or fraud) if captured out of order. Biometric equipment should be certified for quality and have a standard interface to ensure plug-and-play interchangeability. Though not always necessary or appropriate, countries may want to consider using iris scan technology, which has a lower failure-to-capture rate than fingerprints (e.g., among manual laborers) and can be used with younger children. The technology will become cheaper as iris scanning capabilities are increasingly integrated into mobile devices.

- **Encrypt data and transactions.** Countries should follow internationally accepted standards for data storage and exchange. This includes encrypting databases, storing (encrypted) biometric templates separately from captured images, ensuring that transfers of data are encrypted (e.g., on a USB key or https network transmission), and using public key infrastructure for credentials and certificates.

- **Choose a credential wisely.** When choosing a credential, countries must balance the potential utility and integration capacity of a multi-purpose identity card with its cost—both in terms of the card itself and the extension or creation of infrastructure needed to support its function (internet or mobile networks, power, etc.)—as well as potential privacy concerns. It is possible to stagger the rollout of smartcards (e.g., as in Pakistan), or opt for a credentialless cloud-based ID (e.g., in India), although the latter requires robust ICT infrastructure. It is also possible to produce multiple tiers or types of credentials, such as in Ghana, where the government offers a simple card free of charge, and a smartcard for a fee.

- **Collect minimum data.** Although it is tempting to collect personal information beyond basic identifiers—e.g., demographics, profession, family information, income status etc.—more data fields take longer to fill out and are likely to become out of date faster, requiring more frequent updates to maintain their accuracy and utility. In addition, indiscriminate data collection without purpose specification may violate fair information practices and pose risks to individual privacy.

- **Consider alternative technologies.** Where internet coverage and electricity supply are unreliable, consider the use of portable and handheld devices (e.g., mobiles, tablets, etc.) to improve access, coverage, and authentication.

Build Authentication Infrastructure

In order to boost demand and take full advantage of digital identity systems for administration, service delivery, and user-friendliness, countries should work to rapidly build authentication infrastructure for credentials as well as individual identities:

47 See the World Bank's Digital Identity Toolkit for a more detailed discussion of technical choices, including avoiding vendor lock-in, which biometric features to use, and tradeoffs for different credential media.

- **Increase linkages with service providers to authenticate credentials.** As a part of harmonization, identity systems should ensure interoperability with a variety of identity providers, including public and private sector entities, in order to enable the secure online verification of identity credentials. There is a huge demand for this service from banks and mobile operators in most countries, and establishing these linkages will likely increase demand and uptake of identification, in addition to increasing the robustness of the system.
- **Introduce the capacity to authenticate individuals.** The most secure protocols for authentication involve validating an identity digitally using multiple factors. With a smartcard, this authentication can be done offline using POS devices that match data stored on the card to information input by the user at the point of service (e.g., a fingerprint and/or PIN). Where network connectivity is available, users can also be authenticated directly against a central database, as is the case with India's Aadhaar system. Both of these protocols require investment in technology and infrastructure (i.e., POS terminals or mobile devices, broadband networks, power sources), which can be costly. This costs can be brought down by using OTS devices with open standards that promote competition between vendors.

Reform the Legal and Administrative Framework

Modern identity systems require clear and comprehensive legal frameworks to empower identification providers, protect personal information, guarantee sufficient oversight, and address the unique challenges of data in digital form. In order to meet these demands, countries should:

- **Implement international guidelines for privacy and data protection.** There are two main sources of international standards on data protection and privacy that can be adapted to any country context: the ECOWAS framework (e.g., used as a basis for reforms in Côte d'Ivoire) and the OECD Updated Guidelines. Among other provisions, countries should ensure that any identification law:
  - > Governs the use of digital data, including NIN, civil and vital records, biometric, records of use/access
  - > Specifies the context in which data can be used and by whom, and asserts penalty for a violation
  - > Provides for safety measures against loss of data
  - > Enables citizens to know all data attached to their identity and see who has accessed it
  - > Specifies how long each type of data can be kept in the system
  - > Provides for the management of undeclared persons
  - > Defines cybercrime and specifies punishments
- **Create clear lines of authority for identification.** Countries should ensure that agencies empowered to manage digital identity systems have a clear and unambiguous mandate and business model, and that the roles and responsibilities of other identity stakeholders are well-defined. When possible, it is recommended that countries reform existing legal measures to unify disparate regulations on identification into a single instrument.
- **Update administrative procedures and legal requirements to reduce barriers to enrollment.**

Countries are sovereign entities with citizenship and nationality laws based on historical development and cultural norms. While a wholesale revision of the criteria for citizenship may not be desirable or feasible, there are a number of cases where countries might revise legislation and administrative procedures to reduce the cost and complexity of requirements to obtain credentials, including reducing the number of times applicants must visit disparate offices and registers in order to substantiate their identity. In Tanzania, for example, NIDA has been able to secure a change in the nationality law that gives its officials more control over the process of determining legal status, although complex nationality criteria remain unchanged. Furthermore, identification systems should be underpinned by the principle that all persons living in the country—whether citizens, migrants, refugees, or stateless peoples—are entitled to some form of identification. For individuals who cannot prove citizenship but are not yet declared stateless, countries should assign a temporary ID until permanent status is confirmed.

FUTURE ENGAGEMENT BY THE WORLD BANK GROUP

The reports identified a number of areas where WBG engagement can continue to support these and other countries in building robust, inclusive identification systems:

- **Additional IMSAs and feasibility assessments.** In general, the IMSA missions to date have been successful in facilitating collaboration between the WBG and identity stakeholders, and have catalyzed a number of plans and projects to improve identity systems in client countries. Continued use and development of this tool in new countries will provide a solid and productive foundation for future partnerships. Following an IMSA, the WBG should also assist countries in completing feasibility studies before finalizing identity plans and (especially) before beginning procurement. These studies can provide more detailed recommendations than the IMSAs (including cost-benefit analyses) and help countries avoid common pitfalls as they upgrade to digital identity systems.

- **Technical assistance.** Following IMSAs and feasibility assessments, there appears to be substantial demand from client governments for deep technical assistance to adopt international standards for identity technology and legal frameworks. Many countries need vendor-neutral experts to consult on context-appropriate systems that are technically and fiscally sustainable. The ID4D group can help by preparing a roster of international experts and advisors, and by working with a variety of public and private sector stakeholders to adopt the common Principles for legal identification that protect against vendor lock-in. The WBG can also leverage its existing relationships with global identity leaders (e.g., Peru, India, Pakistan, Thailand) to foster more South-South cooperation and assistance. Additionally, the Bank should work to increase its ability to provide expert consultation for countries developing their legal frameworks. This could include engaging international and local specialists to review relevant laws and developing additional guidelines on legal best practices.

- **Programmatic support for functional identity systems.** Many of the WBG's existing and planned projects in these countries involve the creation or use of identity systems for functional programs, including for social protection programs, pension and civil service reforms, and financial inclusion. Indeed, a number of the IMSAs (e.g., Morocco, Chad, and Côte d'Ivoire) were undertaken in order to support the development of social registers in harmony with other

identification systems. As the WBG continues to engage in these programs, it can play an important role in creating functional identity systems that reinforce or lay the groundwork for foundational identity systems and build the capacity of functional agencies to manage data and take advantage of central identity system—rather than building stand-alone, duplicative systems for program administration. In addition, linking foundational identity systems with benefits programs supported by the Bank may also increase demand for identity services.

- **Investment in foundational identity systems.** The WBG can continue to play a direct role in supporting the development of robust and inclusive foundational identification systems. This may involve investment in modernizing and integrating data systems, including digitization of records, ICT equipment and infrastructure, staffing and training, setting up enabling agencies such as Data Ombudsman offices, etc.

Bibliography

Atick, Joseph. 2015. "Digital Identity: The Essential Guide", *ID4Africa*, Kigali, Rwanda, 24 May 2016.

Atick, Joseph J; Gelb, Alan Harold; Pahlavooni, Seda; Gasol Ramos, Elena; Safdar, Zaid. 2014. *Digital identity toolkit: a guide for stakeholders in Africa*. Washington, DC : World Bank Group. http://documents.worldbank.org/curated/en/2014/06/20272197/digital-identity-toolkit-guide-stakeholders-africa.

Election Guide Website. http://www.electionguide.org/.

Gelb, Alan. 2015. "The Economics of ID Systems: How to Frame the Business Case?" *ID4Africa*, Kigali, Rwanda, 24 May 2016.

Gelb & Diofasi. 2016. "Biometrics and Elections in Poor Countries: Wasteful or a Worthwhile Investment?". *Center for Global Development Working Paper*. https://www.cgdev.org/publication/biometric-elections-poor-countries-wasteful-or-worthwhile-investment

Le Monde. 2017. "RDC: la piste du scandale des passeports biométriques mène au clan Kabila." Le Monde Online. Accessed 19 April 2017 at http://www.lemonde.fr/afrique/article/2017/04/13/rdc-la-piste-du-scandale-des-passeports-biometriques-mene-au-clan-kabila_5110933_3212.html#l0jvCdjDFgKAfBJ4.99

National Elections Commission of Liberia. 2014. Voter Registration Update Statistics: Final Report June 30, 2014. http://www.necliberia.org/pg_img/VRUREPORT_2014_Final1.pdf.

UNICEF. 2013. *Every Child's Birthright: Inequities and Trends in Birth Registration.* Available at https://www.un.org/ruleoflaw/files/Embargoed_11_Dec_Birth_Registration_report_low_res.pdf.

World Development Indicators. 2012, 2015, 2016. Washington, DC: World Bank.

World Bank. 2015. Identity Management Systems Analysis: Guidelines and Questionnaire. Washing-ton, DC: World Bank.

—2016. *ID4D Strategic Framework.* http://pubdocs.worldbank.org/en/179901454620206363/Jan-2016-ID4D-Strategic-Roadmap.pdf.

—2016. *ID4D Global Dataset.* http://data.worldbank.org/data-catalog/id4d-dataset.

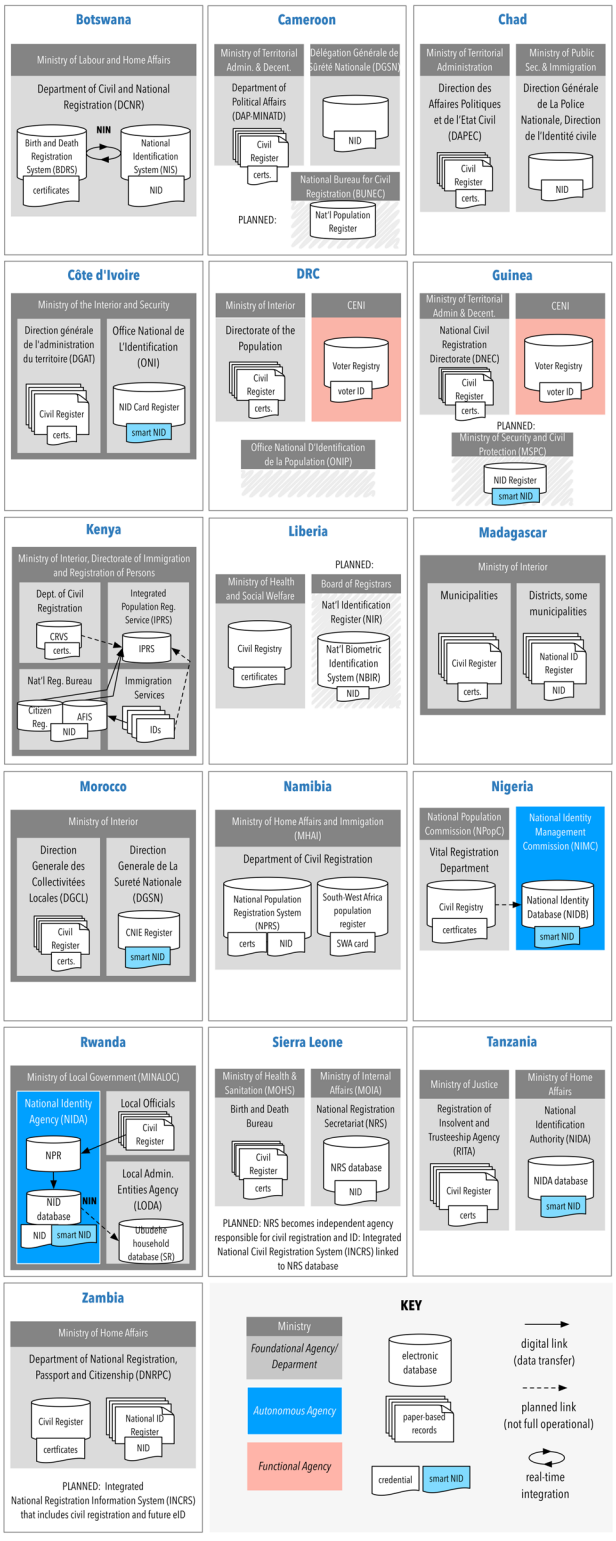
—2016. *Digital identity: towards shared principles for public and private sector cooperation*. Washington, DC: World Bank Group. http://documents.worldbank.org/curated/en/600821469220400272/Digital-identity-towards-shared-principles-for-public-and-private-sector-cooperation.

—2017. *Principles on identification for sustainable development: toward the digital age.* Washington, DC: World Bank Group. http://documents.worldbank.org/curated/en/213581486378184357/Principles-on-identification-for-sustainable-development-toward-the-digital-age.

Appendix 1: IMSA Reports in Africa

Botswana	*Identification for Development (ID4D) Identification Systems Analysis. Country Assessment: Botswana*	Sep-15	http://documents.worldbank.org/curated/en/864651486101539760/pdf/112501-WP-P156810-PUBLIC-Botswana-ID4D-Web.pdf
Cameroon	*Identity Management Systems Analysis Cameroon*	Jun-16	
Chad	*Developing an Identity Management Framework in Support of Social Protection in Chad*	Feb-16	
Côte d'Ivoire	*Identification for Development (ID4D) Identification Systems Analysis. Country Assessment: Côte d'Ivoire*	Jun-15	http://documents.worldbank.org/curated/en/220221473398778343/pdf/108189-WP-P156810-PUBLIC.pdf
Democratic Republic of Congo	*Identification in the Democratic Republic of Congo: Challenges & Strategic Options for Addressing Them*	Jan-16	
Ethiopia	To be finalized		
Guinea	*Identification for Development (ID4D) Identification Systems Analysis. Country Assessment: Guinea*	May-15	http://documents.worldbank.org/curated/en/220221473398778343/pdf/108189-WP-P156810-PUBLIC.pdf
Kenya	*Identification for Development (ID4D) Identification Systems Analysis. Country Assessment: Kenya.*	Jun-15	http://documents.worldbank.org/curated/en/575001469771718036/pdf/107277-WP-P156810-PUBLIC.pdf
Liberia	*Identification for Development (ID4D) Identification Systems Analysis. Country Assessment: Liberia.*	Jun-15	http://documents.worldbank.org/curated/en/281811489660798714/pdf/113549-WP-P156810-PUBLIC-Liberia-ID4D-Web.pdf
Madagascar	*Identity Management System Analysis: Madagascar*	Oct-16	
Morocco	*Identification for Development (ID4D) Identification Systems Analysis. Country Assessment: Morocco.*	Jul-14	http://documents.worldbank.org/curated/en/363901472492458796/pdf/107931-WP-P156810-OUO-9.pdf
Namibia	*Namibia Identity Management System Analysis Report*	Apr-16	http://pubdocs.worldbank.org/en/184451466711154296/1617304-Namibia-ID4D-Web.pdf
Nigeria	*Identification for Development (ID4D) Identification Systems Analysis. Country Assessment: Nigeria.*	Jun-15	http://documents.worldbank.org/curated/en/136541489666581589/pdf/113567-WP-P156810-PUBLIC-1618628-Nigeria-ID4D-Web.pdf
Rwanda	*The Identity Ecosystem of Rwanda: A Case Study of a Performant ID System in an African*	May-16	http://www.id4africa.com/prev/img/ID4Africa2016_The_Identity_Ecosystem_of_Rwanda_eBooklet.pdf

Appendix 2: Institutional Structure of Foundational Identity Systems



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