DIGITAL IDENTITY AND SOCIAL PROTECTION PROGRAMS: LEAVING NO ONE BEHIND?

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Research In Progress

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Abstract

This study investigates the impact of digital exclusion among vulnerable groups in social protection programs. It argues that digital identity systems are capable of exarcerbating inequalities in societies characterised by poverty and vulnerability. We use the lens of adverse digital incorporation to draw on two social protection programs, Bolsa Familia in Brazil and the Public Distribution System in India, both of which have been augmented with digital identity systems. Our qualitative data reveal that digital identity systems can generate justice only if existing processes of adverse digital incorporation are acknowledged and digital systems are framed to tackle design, resource, relational, and institutional inequalities. Drawing from development studies and data justice literatures, we show the importance of infusing justice in digital identity systems to build fair and effective social protection programs.

Keywords: Digital Identity, Inequality, Social Protection, Digital Justice, Data Justice.

1   Introduction

Digital inequality is a major challenge for research on Information and Communication Technology for Development (ICT4D). The term *digital inequality* is operationally defined as "the disparities in knowledge and ability of using digital and information technology among individuals with different demographics, socioeconomic backgrounds, digital and information technology experience and competencies" (IGI Global, 2022). At the same time, inequality is growing stronger among vulnerable groups that do possess means of connectivity (World Bank, 2016). This makes it important to research inequality in contexts where, despite pervasive connectivity, systematic differences persist in society.

Digital identity systems, defined as systems that convert human identities into machine-readable data (Masiero & Bailur, 2021), have been relied upon to bridge inequality in digitally connected societies (Dahan & Gelb, 2015; World Bank, 2021). Over the last years such systems have been increasingly incorporated into social protection programs: these are defined as all initiatives that "provide income or consumption transfers to the poor, protect the vulnerable against livelihood risks, and enhance the social status and rights of the marginalised" (Devereux & Sabates-Wheeler, 2004: 1). While widely promoted as a route to combating inequality (Gelb & Clark, 2013; Gelb & Metz, 2018), the incorporation of digital identity systems into social protection programs has been characterised by the systematic exclusion of vulnerable groups, for whom digital identification has meant the inability to access schemes of vital importance (Iazzolino, 2021; Martin & Taylor, 2021; Schoemaker et al., 2021; Weitzberg et al., 2021). Against this backdrop we ask, *how does user exclusion occur in digital identity systems within social protection programs?*

We address this question through qualitative data from Brazil and India. Both nations are classified as low and middle-income countries (LMICs) and they run two of the largest social protection programs worldwide: Bolsa Familia in Brazil, with 74 million beneficiaries, and the Public Distribution System

(PDS) in India, with over 800 million beneficiaries. Both programs incorporate digital identity systems, which couple user identities with their entitlements in terms of food or cash. This scenario is relevant to study user consequences of incorporating digital identity in two large social protection programs.

We study Bolsa Familia and the PDS through the lens of *adverse digital incorporation*, a concept introduced by Heeks (2021). Using adverse digital incorporation as a framework, the study reveals that digital identity systems can promote digital justice only if existing processes of adverse incorporation are acknowledged and digital systems are framed to tackle design, resource, relational, and institutional inequalities, all dimensions that Heeks' (2021) framework contemplates.

The rest of this paper is organised as follows. Section 2 provides a theoretical background on the concepts of data justice and adverse digital incorporation, which are central to our theorisation. Section 3 illustrates the research method and section 4 presents the empirical setting of the work, along with an analysis of the two programmes based on the lens of adverse digital incorporation. Section 5 concludes, stating the expected contributions and next stages of the research.

2 Theoretical Background

This section introduces the two theoretical building blocks of this study: the notion of *data justice* (Taylor, 2017) and the notion of *adverse digital incorporation* (Heeks, 2021). Combined, these two concepts draw out the theoretical grounding of our ongoing research.

2.1 Data Justice and Digital Identity Systems

Data justice is conceptualised as "fairness in the way people are made visible, represented and treated as a result of their production of digital data" (Taylor, 2017: 1). Taylor (2017) proposes three pillars to understand data justice, namely (in)visibility, (dis)engagement with technology, and antidiscrimination. These pillars represent rights and freedoms, and therefore are the basis of data protection laws and digital identity systems in a reality characterised by conversion of people and processes into data.

Understanding routes to promote data justice became relevant with the rise of digital adoption, which generated unprecedented availability of data on previously invisible populations (Dencik et al., 2019). In a specular fashion with the formation of justice, data injustice, i.e. the breach of the principles of fairness on which data justice is rooted, also finds new scopes for expansion. With a focus on digital identity systems, Masiero and Das (2019) classify three forms of data injustice:

- *Legal data injustice* stems from the shift of universal entitlements, for example the right to food, shelter or protection, to entitlements that are conditional to registration in digital identity systems;

- *Informational data injustice* refers to the lacking, or incomplete information of users on how their data are handled and used by digital identity systems;

- *Design-related data injustice* refers to situations in which technology design causes harm to users, for example by denying their access to essential food provisions.

This taxonomy highlights the problematic trade-off of effectiveness versus exclusion, and the data justice debates needed to develop inclusive systems (Masiero & Das, 2019). Furthermore, exclusions of users from essential systems such as social protection programs, along with erroneous information, are instrumental in perpetuating existing inequalities. Against this backdrop, we use the notion of adverse digital incorporation as an interpretive device for our study of social protection programs.

2.2 Adverse Digital Incorporation

Heeks (2021: 1) defines adverse digital incorporation as "inclusion in a digital system that enables a more-advantaged group to extract disproportionate value from the work or resources of another, less-advantaged group". The development studies literature posits that digital systems and inequality should consider not only problems of exclusion but also problems of inclusion. In fact, nearly three billion

people globally are unable to benefit from digital solutions due to the lack of Internet connectivity. However, in a world with seven billion mobile phones, more than 5.5 billion are in LMICs (ITU, 2020).

This scenario raises concerns on the ability of digital technologies to intervene with digital systems to empower users and reach digital justice. According to Heeks (2021) adverse digital incorporation is articulated across the dimensions of exploitation, commodification, criminal exploitation, legibility, and enclosure as central patterns of unequal incorporation. These dimensions are specified as follows:

- Exploitation is considered the "extraction of value by one group from the efforts of others (e.g., in the gig economy)" (Philips, 2013);

- Commodification encompasses trading items that were previously untraded;

- Criminal exploitation is "where individuals are drawn into participation in online activities in which value and resources are illegally extracted from them (Heeks, 2021: 768);

- Legibility entails the use of less-powerful groups data captured in digital systems (e.g. in digital state surveillance systems);

- Enclosure refers to the transfer or capture of individual data (e.g., as it occurs in social media platforms).
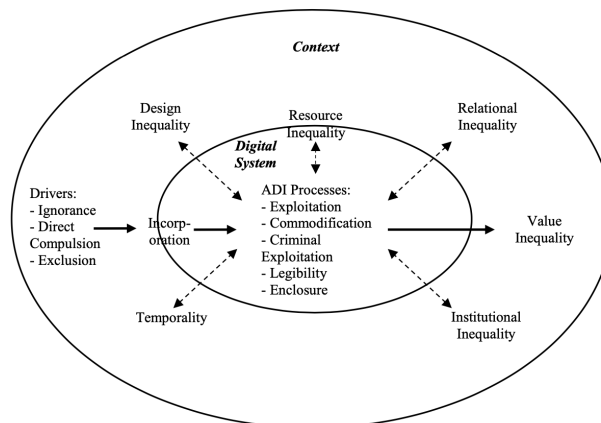

Figure 1.   Conceptual Framework of Adverse Digital Incorporation (Heeks, 2021).

This paper applies the conceptual framework of adverse digital incorporation to investigate the relation between digital identity systems incorporated in social protection programs and inequality, to understand how exclusion happens in social protection programs in Brazil and India.

3   Research Method

The case selection for this study was motivated by two main drivers. Firstly, both Brazilian and Indian social protection programs benefit from large-scale databases of anti-poverty program users. Secondly, both nations are characterised by digital identity platforms that convert human identities into data. The two coauthors are, respectively, writing a PhD thesis on Bolsa Familia in Brazil, and conducting a 12-year research programme on the PDS in India. Noting the striking commonalities of digital identity adoption within the two programs, we started up this study using adverse digital incorporation as a framework for theorising from the two cases combined.

Data collection on the two programs was conducted from the two researchers independently of each other, and at different points in time. The first author relied on secondary data sources (Creswell, 2013),

through data generated during the pandemic (2020-2021) by major government institutions and social programs. Her modus operandi relied on field notes, observation and document analysis from users, programme officials, politicians, and members of the civil society involved in the implementation, articulation, and usage of the Brazilian Emergency Aid.

The second author has conducted a total of 230 interviews on India's PDS, in a time arc spanning from early implementations of biometric recognition (2011-2012) to the present-day system of biometric authentication. Her research relies on interaction with PDS users, whom she encounters primarily in the *ration shops* where the PDS is accessed. Her research comprises interviews with users, ration shop owners, programme officials, politicians, members of the civil society, and a set of actors articulating the role of biometrics within India's largest food security system (Masiero, 2020).

Analytically, we have combined data from our two, independent research projects through the adverse digital incorporation framework devised by Heeks (2021). Through such a framework, we have been able to draw parallels across the two cases and draw relative lessons on digital exclusion, as we do in Section 5. As our analysis proceeds, we plan to continue exploring such parallels, as well as the systemic differences that the two programmes – one in-kind, one cash-based – present with respect to each other.

4 Social Protection Programs in Brazil and India

4.1 Brazilian Social Protection Program: Bolsa Familia

The Bolsa Familia Program is one of the largest income transfer programs in the world. The Brazilian Federal Government transfers cash to families in extreme poverty, aiming at eradicating poverty and reducing socioeconomic inequalities (Antonio et al., 2021). Created in the early 2000s, the single registry for social protection 'Cadastro Único para Programas Sociais do Governo Federal' (CadÚnico) is a digital identity system widely used due to three essential characteristics: broad census information (for the poor population), registry data (with identification and address data), and comprehensive identification of information about the living conditions of these families (Barros et al., 2009). The 'Cadastro Único' is the main infrastructure to deploy the social protection program. It contains data of more than 74 million citizens (CECAD, 2020) and is used by various federal programs, with Bolsa Família as the most extensive.

During the COVID-19 pandemic, the Brazilian Congress passed the Law 13,982 of 2020 that instituted the Emergency Aid operated by the Brazilian Federal Government (Cardoso, 2020). This aid targeted the most vulnerable population: informal workers, self-employed, and individual microentrepreneurs. The Emergency Aid was based on the conditional cash transfer program 'Bolsa Família', which was expanded to those enrolled in the single registry for social protection 'Cadastro Único'. This new aid aimed to fill a gap in the social protection of so-called informal workers as long as they fulfilled the conditions stipulated by law. The introduction of the Emergency Aid, according to Brazil's Caixa, supported 65 million Brazilians who received at least one installment of emergency aid through digital accounts. The Emergency Aid and the expansion of 'Bolsa Família' represented an increase in the income of the poorest by 40%. For instance, the average 'Bolsa Família' family received less than USD 37 per month, and with the Emergency Aid, they started receiving USD 110 to USD 222 monthly.

4.2 Indian Social Protection Program: Public Distribution System (PDS)

India's PDS is the largest food security scheme in the nation. Instituted in 1965 along the lines of pre-colonial food rationing (Mooij, 1998), the PDS a subsidy scheme that provides essential goods (mainly rice, wheat, sugar and kerosene) to below-poverty-line users at highly subsidised prices, through shops – known as ration shops – distributed across the whole country. Also enhanced to provide double rations during the COVID-19 pandemic, the PDS operates on the basis of internal redistribution: foodgrain-producing states, mostly located in the north of the country, provide distribution to foodgrain-consuming states, mostly located in the country's south. Ability to avail the PDS was originally based on a document called a ration card, reflecting a person's demographic details along with their poverty status.

Over the last years, however, the PDS started incorporating digital identity in the form of Aadhaar, the largest digital identity infrastructure in the world with over 1.3 billion people enrolled as of January 2023. Aadhaar enrolment involves the capture of fingerprints and iris scans, and results into a 12-digit unique number that each enrolee can use for authentication purposes. As the PDS incorporated Aadhaar in a set of Indian states, including Kerala and Karnataka where the second author conducted her research, users in ration shops authenticate through their fingerprint, which the database connects to their identity and poverty status. Similarly to Bolsa Familia, digital identity is leveraged for more accurate recognition of users: however, also similarly to the case of Brazil, it results in the aspects of adverse digital incorporation that we detail below.

5   Results and Discussion

Here we use the framework of adverse digital incorporation to study how digital identity participates in user exclusions in Bolsa Familia and the PDS. In Bolsa Familia, cash payments are made through Digital Social Savings Accounts or by a checking of savings account for those registered in the 'Cadastro Único' under operation. The target audience of Emergency Aid was based on specific criteria, namely: (1) individual micro-entrepreneurs (MEI); (2) individual social security contributors; (3) those registered in the Cadastro Único (federal cash transfer program); (4) people not included in the previous hypotheses, through self-declaration. Innovative factors have been developed, such as the remote request solutions, and the Digital Social Savings Account - providing financial services through apps and virtual cards. Many faced difficulties in receiving emergency aid due to issues with the bank application: instances include the app not working, money not being available in the bank account, or lack of efficient online customer service. Also, many citizens did not trust the app or did not know how to use it. In such a context, many went to Caixa branches generating long queues and agglomerations.

India's PDS was, instead, originally designed as a universal program, meaning that its subsidies were available to all households. The structural adjustment programme that India embarked upon in the 1990s, following a severe fiscal crisis, resulted in the current program, targeted from 1997 to below-poverty-line households and increasingly made subject to Aadhaar-based identification. The objective of the Unique Identification Authority of India (UIDAI), which manages Aadhaar, was that of associating PDS rations to their beneficiaries through biometric authentication. Research shows, however, the exclusion errors (exclusion of genuinely entitled users) made in the process: poignantly, Drèze et al. (2017) and Muralidharan et al. (2020) reveal increased exclusions from the PDS following Aadhaar's introduction. Singh (2019) reports on hunger deaths associated to Aadhaar authentication for food rations, revealing severe harm generated by user exclusion. A synthesis of each program functionality is presented in Table 2.

Country	Brazil	India
Program description	Income transfer program; 74 million beneficiaries	Rationed quotas of subsidised goods; over 800 million beneficiaries
User profile	(1) Individual micro-entrepreneurs (MEI); (2) Individual social security contributors; (3) Individuals registered in the Cadastro Único; (4) People not included in the previous hypotheses, through self-declaration.	Below-poverty-line users; initially some states left a minimum quota of subsidy for users above the poverty line
Social groups	Government, Micro Finance Institutions, Citizens	Cross-societal (subsidies based on poverty status)
Digital technologies	Mobile App, Big Data Analytics, Artificial Intelligence, Cloud Computing, Digital Social Savings Account	Aadhaar-based recognition of users into ration shops (selected states)
System description	The payment was made through Digital Social Savings Account (Poupança Social Digital) or	Biometrics (point-of-sale device in ration shops that captures users' fingerprints and matches them with poverty status, which

		corresponds to their entitlement to food rations)
	by a checking or savings account for those registered in the Cadastro Único. The citizens not registered in the Cadastro Único were identified as 'Outside of the Registry' and there was a need to provide digital requirements on the Federal Savings Bank (FSB) website or their apps designed for this purpose. For internet users, the most utilized device in any of these areas is the smartphone (99%)	

Table 1.   Comparative analysis of social protection programs.

The Brazilian context of political and economic turmoil, along with digital exclusion and huge social inequalities, exacerbated the debate around digital systems related to the social protection programs: *"The recommendations to vulnerable groups such as indigenous and homeless people are quite broad and include food and nutrition security, access to information in adequate and accessible language, territorial protection, especially for isolated and recently contacted people..." (Excerpt from Public Agent, Fiocruz, 2021).*

The Indian context, beyond the data-for-development discourse associated to Aadhaar, also reveals large-scale exclusion which problematises the narrative of digital identity as a force for good. In Table 3, we analyse both programs through the framework of adverse digital incorporation.

Country	Brazil	India
Drivers to Incorporation	**Ignorance:** Lack of digital skills and poor internet connection hinder user's empowerment to benefit from the digital system	**Ignorance**: Incomplete information on how Aadhaar-based subsidies are determined (Chaudhuri, 2021)
	Direct Compulsion: Digitally-mediated identity to access public services. This system design leaves citizens with no choice but to participate and use the apps and virtual cards;	**Direct Compulsion**: conditionality of subsidies to registration with Aadhaar, leaving the non-registered in predicament (Drèze et al., 2017)
	Exclusion: Vulnerable groups were excluded from better alternatives and direct compulsion, positing the social protection program as the only solution to access the social benefit.	**Exclusion**: increased rates of exclusions from the PDS since Aadhaar's introduction (Drèze et al., 2017; Muralidharan et al., 2020)
	Temporality and Context: The challenge is to develop a safe and reliable digital space, conducive to public services in which citizens' rights towards data privacy are respected. Tackle the main challenges such as (i) the digital and financial inclusion of citizens, (ii) and the strengthening of protest mechanisms to point out inconsistencies, difficulties and other situations which have not been previously planned for by information systems to protect the citizens.	**Temporality and Context:** Aadhaar being promoted as a technology to improve the PDS, and as a way to simplify the provision of public services and social protection to below-poverty-line people
	Excerpts: *"The country had 61.1 million people living in poverty and 19.3 million in extreme poverty. The increase in poverty expected for this year reveals the emergency aid as insufficient to restore the loss of income of the poorest population in the midst of the worst phase of the public health crisis caused by Covid-19." (Excerpt from Public Agent, Cetic.br, 2021)*	
Causes of Exploitation	**Design inequality:** App not working, money not available in the bank account, lack of efficient online customer service, outdated databases and	**Design inequality**: biometric capture designed for "readable" bodies

	registration errors, beneficiaries granted based on algorithms without human control **Resource inequality:** Many citizens did not trust the app or did not know how to use it due to lack of digital literacy **Institutional inequality:** Lack of adequate digital infrastructure, regulation, and political instability **Relational inequality:** Strong assymetrical dependencies between the social groups within the digital system (e.g., micro finance institutions operating locally offering financial service)	**Resource inequality**: low-resource people faced with the choice of being enrolled in Aadhaar, or not receiving subsidies **Institutional inequality**: access to the PDS conditional to enrollment in Aadhaar, across anti-poverty programs **Relational inequality**: being below the poverty line is associated to the need for social protection, and hence for biometric registration
Processes of Incorporation	**Exploitation:** The target audience was based on inclusive and exclusionary criteria, being largely adopted by vulnerable groups **Criminal Exploitation:** The program does not request participation to join illegal activities **Legibility:** Government and micro finance institutions used the data about the existence or characteristics of citizens captured in a digital system to enhance its power and control **Enclosure:** Data was leaked and used by financial institutions to offer credit and services to the population. Excerpt: *"When the Emergency Aid measure was approved in Congress, Caixa [Bank] operationalized the program, guided by the Ministry of Economy. The payments were made through Digital Social Savings Account or by a checking or savings account for those registered in the 'Cadastro Único' under operation"* *(Excerpt from Public Agent*, Ministry of Citizenship, *2020)*	**Exploitation:** Aadhaar-based data collection lends itself to interoperable access to data across governmental agencies, and across India's states **Criminal Exploitation**: (no evidence in the PDS case) **Legibility**: made into an essential condition to receive subsidies on the basis of biometric recognition through Aadhaar **Enclosure:** uncertainty of PDS users on how their data are managed (Masiero & Das, 2019)

Table 2.   Summary of Results.

Following Masiero and Das (2019), our analysis showcases three forms of data injustice which breach the principles of fairness and therefore promote exclusion: (i) legal data injustice, (ii) information data injustice, and (iii) design-related data injustice.

In both case studies, *legal data injustice* is framed by limiting access to food and cash-transfer to those registered in digital identity systems. These systems, however, confer different causes of exploitation, such as design (outdated databases or registration errors), resource (lack of trust in digital systems or lack of digital literacy), institutional (inadequate infrastructure and digital access) and relational (assymetrical dependencies between the social groups within the digital system) inequality. *Informational data injustice* occurs in how user's data are employed. In the Brazilian case, the system design leaves citizens with no choice but to participate and use the apps and virtual cards. Also, several data leaks led data to be used by financial institutions to offer credit and services to the population, underlining the adverse process of incorporation. Finally, *design-related data injustice* is observed in how both social protection programs can cause harm by denying access to essential provisions. Some evidences can be observed in the design inequality (e.g. digitally-mediated identity to access public services leaves citizens with no other choice, excluding elderly or illiterate users, for example).

These problematic trade-offs of effectiveness versus exclusion, suffered especially by people in conditions of structural vulnerability, indicate the need to better understand the articulation between digital identity systems, vulnerable groups, along with the political, socio-economic, educational and historical contexts to tackle the three forms of injustice data abovementioned.

6　Envisaged Contributions and Next Steps

Digital inequality is a major challenge to achieve digital development, and, it has been argued, it may become increasingly relevant with datafication of previously invisible populations (Dencik et al., 2019, 2022; Cheesman, 2022). With our two-country study, we are in the process of answering the question on how user exclusion occurs in digital identity systems within social protection programs, based on two of the largest social protection schemes worldwide. Doing so also led us to problematise the orthodoxy that associates digital identity, and its incorporation in social protection schemes, to fair and progressive outcomes for vulnerable populations (Masiero & Arvidsson, 2021). Studying our two cases through the prism of adverse digital incorporation revealed a very different picture, where digital identity – rather than simplifying people's access to essential cash in Brazil, and essential food provisions in India – intersects with pre-existing inequalities, leaving out vulnerable workers in Brazil and people in demand for food security in India.

As we approach the next phases of our project, we envisage two main contributions to research in IS and ICT4D. A theoretical contribution lies in the use of adverse digital incorporation as a device to navigate the data-induced injustice perpetrated on vulnerable users, especially when faced with no choice on whether to adhere to digital identification or not (Iazzolino, 2021; Krishna, 2021; Martin & Taylor, 2021). A term of recent coin, adverse digital incorporation has proven useful in navigating the narratives of exclusion lived by users in Brazil and India, questioning the logic – summarised, by the United Nations (2016), as "leaving no one behind" – according to which the global development agenda should guarantee positive outcomes for all people at the same time.

A second prospected contribution concerns the practical implementation of the two programs studied here. Both programs reveal forms of data injustice as in Masiero and Das (2019): increased rates of exclusion are combined with informational opacity (Chaudhuri, 2021), and with digital identity infrastructure acting as barriers for people whose body is not promptly readable by fingerprint scanners. On the more practical implications of our work, we plan to leverage Taylor's (2017) data justice lens to devise data justice principles for the implementation of anti-poverty programmes (Hoefsloot et al., 2022). Grouping together our work on the two programs separately, we aim to devise a set of data justice principles to inspire the design of social protection systems that minimises exclusion, embedding data justice in the programs' making.

The intended continuation of this research is articulated along three steps. First, we will be using the adverse digital incorporation framework to develop our two-country study in greater detail, identifying further similarities and dissonances between Bolsa Familia and the PDS. Secondly, we plan to use a data justice lens to assess the two programs in terms of fairness of visualisation, representation and treatment of users, in the light of the digital identity infrastructures to which both programmes have been subjected. Finally, we plan to move from an analytical to a normative stage of research, elaborating data justice principles for digital social protection and discussing them with implementers. We find that the richness of our study lies in the concomitance of data justice and ICT4D research, and in the mutual contribution that the two fields are capable of giving to each other.

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