Inequality of Opportunity in Asia and the Pacific: Financial Inclusion
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COUNTRY ABBREVIATIONS

AF Afghanistan MN Mongolia
AM Armenia MM Myanmar
BD Bangladesh NP Nepal
BT Bhutan PK Pakistan
KH Cambodia PG Papua New Guinea
IN India TJ Tajikistan
ID Indonesia TH Thailand
KZ Kazakhstan TL Timor-Leste
KG Kyrgyzstan TM Turkmenistan
LA Lao PDR VN Viet Nam
MV Maldives
About the Inequality of Opportunity papers

The ESCAP *Inequality of Opportunity* papers place men and women at the heart of sustainable and inclusive development. They do so by identifying seven areas where inequality jeopardizes a person’s prospects, namely: education; women’s access to sexual and reproductive health care; children’s nutrition; decent work; basic water and sanitation; access to clean energy; and financial inclusion. Each of these opportunities is covered by specific commitments outlined in the 2030 Agenda for Sustainable Development and addressed in separate thematic reports covering 23 countries throughout Asia and the Pacific.¹

ESCAP first discussed inequality of opportunity in its 2015 report *Time for Equality*,² establishing the distinction between inequality of outcome and inequality of opportunity. While the former depicts the consequences of unequally distributed income and wealth, the latter is concerned with access to key services necessary to fulfil one’s basic rights.

The *Inequality of Opportunity* papers apply a novel approach to analysing household surveys with the aim of identifying the groups of individuals with the lowest access to the above-referenced opportunities. These groups are defined by common circumstances over which the individual has no direct control, such as wealth, place of residence and education level, amongst others.

In addition to identifying the furthest behind, the *Inequality of Opportunity* papers also explore the gaps between groups in accessing these key opportunities, as well as the extent to which these have narrowed or widened over time. They also review overall inequality trends in these opportunities.

Ultimately, these findings are of direct use for generating discussion on transformations needed to reach the “furthest behind first” as pledged in the 2030 Agenda.

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¹ All policy papers follow the same methodology using the latest publicly available DHS and MICS data, except for decent work, where slight modifications are due to the use of a different dataset.
1. Introduction and scope

Access to financial services underpins inclusive development and empowerment. Financial inclusion enables individuals to start saving, obtain loans, start a business, receive remittances from abroad or cash transfers from their governments and therefore improve their lives. It also allows small businesses to expand their commercial activities, by simplifying payments and allowing access to credit. Lack of access to savings, loans, and insurance products, on the other hand, leaves people vulnerable to unemployment, failed harvests, and other financial shocks.

1.1 Igniting SDG progress through access to financial services

Over the past decades, financial inclusion has emerged not only as an important development goal, but also as an enabler for realizing broader development objectives. Following the 2002 Monterrey Consensus and the 2008 Doha Declaration, governments renewed their commitment to work towards full and equal access to formal financial services for all in the Addis Ababa Action Agenda, the outcome of the 2015 Third International Conference on Financing for Development.

The importance of financial inclusion is also emphasized in the 2030 Agenda for Sustainable Development. Increased savings and the availability of credit, insurance and payment services contribute to socioeconomic improvements and create conditions that bring several of the Sustainable Development Goals (SDGs) within reach.

Through SDG 8, all Member States have pledged to strengthen the capacity of domestic financial institutions to expand access to banking, insurance and financial services for all (Target 8.10). The aim is to allow individuals to better manage incomes, accumulate assets and make productive investments; as well as to encourage the formalization and growth of micro-, small and medium-sized enterprises (Target 8.3). Besides formalization, access to credit for small enterprises increases investments and spurs integration of small businesses in the value chain (Target 9.3).

Financial inclusion is also embedded in SDG 1, whereby countries have committed to ensuring that all men and women, in particular the poor and the vulnerable, have access to financial services, including microfinance (Target 1.4). The potential development benefits of financial inclusion are similarly recognized in SDG 2, referring to secure and equal access to financial services as a means to double agricultural productivity and income of small-scale producers by 2030 (Target 2.3). Access to financial services, including financial risk protection, is also paramount to ensuring good health and well-being (Target 3.8) as well as to implementing gender equality policies (Target 5A). Along with these commitments, several countries in Asia and the Pacific have also adopted financial inclusion strategies, both independently and through regional cooperation.

1.2 How is the Asia-Pacific region faring?

Financial inclusion has accelerated over the past few years, spurred by higher incomes and innovation in the provision of financial services. In 2017, the global share of adults that owned a bank account stood at 69 per cent, almost 20 percentage points higher than in 2011. In Asia
and the Pacific’s developing countries, almost half of the households have a bank account. The same share of individuals over 15 years of age also have a bank account: approximately half, although there is no direct correspondence to households: a household may have only one member with a bank account or each member may have their own bank account.  

The rates of bank account ownership vary significantly across countries. In China, Malaysia and Thailand, for example, more than 80 per cent of all adults either have a bank account at a traditional financial institution or make digital payments. In Cambodia and Nepal, on the other hand, where only 40 per cent own a bank account, most people still borrow from informal sources, such as family, friends or money lenders. In Indonesia, even though the rate of bank account ownership has doubled since 2011, it still stands at 49 per cent. Financial inclusion has also been slow in North and Central Asia, partly due to the disruptions and instabilities following the breakup of the Soviet Union and repeated financial crises. Pacific Island states similarly record low financial inclusion, mainly because of infrastructure challenges for delivering traditional financial services.

Wide disparity in financial inclusion also exists within countries. Differences in access to financial services often reflects gaps in households’ wealth or income levels. As expected, poorer households are less likely to have a bank account compared to wealthier ones. This pattern can be seen in countries with both high and low average account ownership.

Overall, women also tend to have lower access to financial services than men. In South Asia, for example, the gap in ownership of a bank account between women and men stands at 15 percentage points. In Bangladesh and Pakistan, the gap reaches 30 percentage points. Other countries in the region fare better in terms of gender parity. In fact, women in Indonesia and in the Philippines report higher bank account ownership than men, while no gender gaps are found in Cambodia, Myanmar, Sri Lanka and Viet Nam.

1.3 Why do people remain unbanked?

If financial inclusion contributes to the fulfillment of the 2030 Agenda for Sustainable Development and ranks high in the policy agenda of countries in Asia and the Pacific, why do people remain unbanked? Barriers to financial inclusion are diverse, intertwined and can be grouped into demand-side, supply-side and institutional.

Globally, 30 percent of adults without an account at a financial institution do not see the need for opening one. People often cite lack of income and knowledge as the main reasons for being unbanked. Low awareness of the benefits of owning a bank account, in turn, is associated with low financial illiteracy, a common barrier in the Asia-Pacific region and particularly in Armenia, Azerbaijan, Georgia and Kazakhstan. Distrust in financial institutions can similarly reduce the demand for financial services. Distrust is particularly common in North and Central Asia. In Kyrgyzstan, for instance, state institutions regulating the financial sector record low levels of trust, due to the loss of households’ bank savings in the aftermath of the collapse of the Soviet Union. Personal beliefs and religious concerns can also pose a barrier, mostly in countries with
a predominantly Muslim population. For example, in Pakistan and Turkey, 13 and 19 per cent of unbanked individuals, respectively, had not opened a bank account for religious reasons.\textsuperscript{20}

On the supply-side, high maintenance costs associated with small deposits can act as a barrier to financial inclusion, particularly in rural areas.\textsuperscript{21} Distance from financial institutions represents a barrier for 22 per cent of all adults worldwide.\textsuperscript{22} In China, for example, it is estimated around 200 million rural adults remain outside the formal financial system.\textsuperscript{23} Lack of credit data and reliable financial records of potential bank account owners, as well as lack of adequate documentation also pose barriers, affecting 20 per cent of unbanked adults at the global level, and up to 45 per cent in the Philippines.\textsuperscript{24}

Regulatory factors and institutional aspects, such as capital adequacy, supervisory rules, ATM availability, but also good governance, bankruptcy laws, credit assessment systems and collateral requirements may also discourage financial institutions from expanding their financial services. Similarly, the quality of institutions, information availability and the lack of physical and digital infrastructure create obstacles for financial inclusion and financial development.\textsuperscript{25}

\textit{1.4 The scope of this report}

Financial inclusion is achieved when all individuals and businesses have access to and can effectively use a broad range of financial services that are provided responsibly, and at a reasonable cost, by sustainable institutions in a well-regulated environment.\textsuperscript{26} This report aims to understand the shared characteristics and circumstances of those population groups that are left behind in accessing financial services in Asia and the Pacific.

As the range of possible financial services is broad – including, among others, deposit and savings accounts, payment services, loans, and insurance – several indicators are available to measure financial inclusion. The analysis in this report uses ownership of a bank account as a marker of financial inclusion. Ownership of a bank account is particularly relevant as it provides an entry point into the formal financial system, thereby allowing individuals, households and firms to deposit money and access credit. Bank accounts also enable to pay bills, receive payments, send or receive remittances. Bank account ownership is covered by SDG indicator 8.10.2, reported through the Global Findex Database. Many household surveys also collect data on bank account ownership.\textsuperscript{iii}

For a consistent, over time comparison across countries, this report uses household data from the Demographic and Health Survey (DHS) and the Multiple Indicator Cluster Survey (MICS) for 21 countries in Asia and the Pacific. The analysis is conducted at the household level and records the household as financially included if one household member has a bank account. The paper focuses on new ways of exploring the observed gaps in bank account ownership, as

\textsuperscript{iii} Global Findex is a database that provides in-depth data on how individuals save, borrow, make payments, and manage risks. It is collected by the World Bank in partnership with the Gallup World Poll and funded by the Bill & Melinda Gates Foundation.
shaped by the shared circumstances of groups of households (Annex Table A1). These shared circumstances reflect a mix of demand and supply side barriers: living in a rural area, having low education or being poorer. The report does not analyze institutional factors underpinning inequalities in financial services, nor does it analyze inequalities within households in depth.

Ultimately, the aim of this report is to: i) outline the key implications of inequality in access to financial services across countries in Asia and the Pacific, specifically in relation to the achievement of the relevant SDGs; and ii) to introduce an innovative methodological approach of analyzing survey data by identifying the shared circumstances of the “furthest behind” in access to financial services.
2. Why does inequality in access to financial services matter?

Inequality in access to formal financial services amplifies existing divisions in communities and societies, between richer and poorer households, between educated and non-educated individuals and between those who can take advantage of life’s opportunities, and those who cannot.

Ensuring everyone has access to a bank account can have multiplier effects for economies and societies. Owning a bank account encourages saving, enables people to obtain loans and provides a secure channel for payments in the form of remittances, government cash transfer and salaries. The aggregate effect of widespread use of financial services on the economy can be significant, boosting national savings rates and creating space for entrepreneurs to borrow and build or expand businesses.

2.1 Financial inclusion as a step out of poverty

Globally, twice as many unbanked adults live in the poorest households as in the richest ones. Owning a bank account encourages people to improve management of their income and expenses, no matter how small. Research suggests that those who own bank accounts are more likely to accumulate savings or access other financial services. Availability of savings smoothenes consumption over time. Combined with access to insurance products, it also potentially allows households to address shocks, such as a job loss or sudden illness. Access to insurance also helps farmers mitigate agricultural risks and develop resilience to climate variability and natural disasters. Expanding access to financial services to rural communities, therefore, becomes critical for promoting food security.

Availability of savings in a bank account also opens the door to credit for investment in education, health care, durable goods or businesses. Without a bank account, poorer households either do not make these investments, or they resort to informal financing mechanisms, such as family, friends, rotating savings schemes, pawnbrokers, and moneylenders. The first scenario, not investing, traps people in poverty. The second, informal finance, carries risks, uncertainty, inefficiency and often higher costs. It therefore potentially pushes people back into poverty.

Households with a bank account also minimize the cost of cash transfers, including salaries, remittances and government transfers, as well as the vulnerability to fraud or theft, thus better preserving their financial resources.
2.2 Financial inclusion bolsters broader social and economic development

Ensuring everyone has access to savings instruments, such as bank accounts, can also have economy-wide impacts, including on aggregate health and education outcomes. When poorer households develop saving habits, they take up medical insurance and can better cope with health emergencies without being forced into poverty. Even if they are unable to work, they can more easily afford medical expenses and sustain themselves and their families.32

Greater financial inclusion also fosters equality in educational attainment. Access to a bank account and other financial services empowers individuals to plan for and invest in educational opportunities. Among Nepali households, daughters of female account holders with access to savings reported improved education levels and higher professional aspirations.33

Equitable access to savings instruments can also increase a country’s net savings, leading to an increase in productive investment and consumption, as banks are able to diversify their loan portfolios and give out more loans.34 Overall, a thriving financial sector improves capital allocation. It also strengthens monetary policies, especially the use of interest rate as a primary policy tool, supporting economic activity and economic growth.35

By decreasing transaction costs associated to international remittances, financial services further benefit economic growth and income equality. In Asia, a 1 per cent increase in international remittances as a percentage of GDP could lead to a 22.6 per cent decline in the poverty gap.36 At the global level, reducing the costs of remittances by 5 percentage points through financial services would benefit recipients in emerging economies about $20 billion more each year.37

2.3 Financial inclusion contributes to gender equality

Women represent a disproportionately high share of the world’s unbanked population. With the exception of Georgia, Lao People’s Democratic Republic, Indonesia and the Philippines, there are more male than female bank account holders in all countries with available data in the Asia-Pacific region. In Afghanistan, Bangladesh, Pakistan and Turkey, five times more men than women own bank accounts.38 There are many possible reasons behind these gaps. Longstanding cultural and social attitudes, including gender norms, often lead to institutional discrimination.39 For example, countries with strict laws on women’s work, management of the household and inheritance tend to show a large gender gap in access to finance.40 Lower financial literacy among women also partly explain why women have lower access to the formal financial system.41

More equality in bank account ownership leads to greater gender equality. Women with savings accounts are found to invest more in their businesses and less likely to sell off assets in an emergency, since they have a buffer to rely upon.42 Access to financial services also facilitates women’s entrepreneurship by reducing administrative costs.
Greater financial inclusion of women benefits their families too. When women have financial accounts, they tend to spend more than men on food, education, and health care, increasing the welfare and productivity of their family. For example, Nepalese women who gained access to savings accounts increased household investments in health and education, with their monetary assets increasing by more than 50% over one year.

2.4. *Equality gains from a rise in digital finance*

There is a vast potential to further tackle inequality through digital finance. Within the next decade, digital finance could enable 1.6 billion unbanked people to gain access to financial services; 45 percent of whom would be in the bottom two quintiles of the income pyramid. Evidence from India, for example, suggests that access to a digital bank account in rural communities increased household savings by 131 per cent in three months, with long-lasting effects. The digitalization of government subsidies also reduces corruption. For example, bribe demands fell by 47 per cent by digitizing government transfers in the Smartcards programs in India.

Digitalization of financial services, however, no longer requires a bank account. Amidst a fast-changing digital landscape, mobile phones have started to fill up some of the gaps in bank account ownership. In China, for example, payment systems now predominantly rely on digital wallets and QR codes. Until the region’s developing countries, however, catch up to this emerging reality, ownership of a bank account remains not only a strong indicator, but also a secure path towards financial inclusion.
3. A new approach to identifying the furthest behind

The 2030 Agenda calls on Member States to produce high-quality, timely, reliable and disaggregated data to ensure that no one is being left behind (SDG 17.8). Governments and other stakeholders need to move beyond measurement of average progress in access to financial services towards more disaggregated analysis that sheds light on the gaps in access between different groups. An innovative methodological approach, the classification tree analysis, is used in this study precisely to help policymakers respond to the call of the 2030 Agenda for leaving no one behind.

To explore gaps between population groups and identify who is being left behind in bank account ownership, this study uses household level data from available Demographic Health Surveys (DHS) and the Multiple Indicator Cluster Surveys (MICS) for 21 countries in Asia and the Pacific.

The classification tree approach is used to determine the circumstances that shape the households most likely to be left behind. Through this approach, an algorithm splits the sample into groups with significantly different rates of bank account ownership, based on the following circumstances: household wealth (bottom 40 and top 60 of the wealth distribution); residence (urban and rural); and highest level of educational attainment in the household (no education, primary, secondary, or higher education). In each iteration, the algorithm ascertains significantly different households with common circumstances and identifies those most and least advantaged in terms of bank account ownership, e.g. households belonging to the bottom 40 of the wealth distribution in rural areas.

Measuring bank account ownership through household surveys requires the use of the household as unit of analysis. The exercise, therefore, does not lend itself to age or sex-disaggregation within the household, nor does it consider other individual-level circumstances that could potentially shape access to financial services.

To illustrate how different circumstances may interact to produce a disadvantage (or advantage) in bank account ownership, the example of Indonesia is used below. The classification tree for Indonesia indicates that half of all households own a bank account (Figure 1). The first level of significant split comes from wealth: households belonging to the bottom 40 of the wealth distribution have an ownership rate of 23 per cent, compared to 73 per cent among households belonging to the top 60 of the wealth distribution. The second split within both poorer (bottom 40) and richer (top 60) households comes from the highest level of educational attainment in the household: those with lower education are always worse off

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iv A detailed illustration of the classification tree approach is included in the methodological annex.

v The analysis was repeated using the sex of the household sex as an additional circumstance. The main findings are presented in Box 2.

vi Poorer households are defined as households coming from two lowest quintiles of the wealth distribution, hence “bottom 40” (see annex for the bottom 40 – top 60 wealth split).
when compared to their counterpart with higher education. The third split is associated with residence (urban or rural), although the gap is significant only for richer (top 60) households with lower or secondary education, and very small for poorer (bottom 40) households with secondary or higher education.

The tree shows that the poorer (bottom 40) households with at most primary education are the furthest behind in bank account ownership. In this group, only 1 out of 10 households owns a bank account. On the contrary, the most advantaged group are richer (top 60) households with higher education, where 93 per cent of households own a bank account.

**Figure 1: Classification tree of bank account ownership in Indonesia, 2017**

Source: ESCAP calculations using DHS Indonesia, 2017.

The same classification tree analysis is produced for all 21 countries, at two points in time, for which comparable data are available. These trees are used as the basis for the various types of data analysis presented in the following sections of this study. As they present a snapshot of the situation in each country at a specific point in time, it should be acknowledged that the trees may hide in them stories of progress but also of gaps in a range of unobserved areas. Using more granular national data sources may produce more nuanced stories and could improve the

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vii Classification trees for all countries are available upon request.
analysis further. The following section presents key findings from the most recent publicly available DHS and MICS surveys at the time of writing.

**Box 1: Household-level or individual-level analysis?**

A discussion of circumstances that affect ownership of a bank account would be incomplete without considering differences in access to financial services within the household.

DHS and MICS surveys have traditionally collected data of bank account ownership at the household level. Recently this has changed, helping to unpack inequality driven by individual characteristics within each household. In Armenia, India, Indonesia, Maldives, Nepal, Pakistan, Papua New Guinea, Philippines, Tajikistan, Timor-Leste, new data from DHS-7 allow to further disaggregate bank account ownership by personal characteristics, as women and men are asked individually whether or not they have an account in a bank or other financial institution. The new data shed light on differences in ownership assets within the household, advancing the understanding of inequality in access to financial services.

In Indonesia, gaps between the furthest behind and other groups are mostly driven by the household’s place in the wealth distributions (bottom 40 and top 60) and it residence (urban and rural). However, data from Indonesia’s DHS-7 also point to gaps driven by the sex and the age of the respondent. For example, women are less likely to own a bank account when compared to men (37 and 45 per cent respectively), and those over 45 years old have a lower ownership rate compared with the rest of the population.

Individual-level characteristics also interact with wealth, residence, and education as ownership rates increase with higher education and wealth. Only 6 per cent of women with no education, for example, own a bank account, compared with 81 per cent of women with more than secondary education. Similarly, 13 per cent of women in the poorest wealth quintile own a bank account, compared with 65 per cent those at the highest quintile.

In some countries, if a family member, usually the head of a household, has a bank account, others household members will not open their own. Among unbanked individuals in Turkey, for example, 72 per cent of women and 51 per cent of men cite the existence of a household account as the reason why they do not have one. In China, one third of unbanked women and more than a quarter of unbanked men cite the same reason for not having a bank account.

This report uses household-level data in order to provide an overview of the situation in the largest number of countries possible. However, data at the individual level are necessary to form a complete picture of population groups that are most likely to be the “furthest behind” and to inform policies to address these multiple layers of disadvantage.

Source: The Demographic and Health Surveys (DHS) Programme for DHS-VII.
Available at: https://dhsprogram.com/Data/
Indonesia Demographic and Health Survey (DHS) 2017.
Available at: https://dhsprogram.com/pubs/pdf/FR342/FR342.pdf
The Global Findex Database 2017. Available at: https://globalfindex.worldbank.org/
4. Who are those left behind?

Lack of access to financial services particularly affects poorer households and traditionally disadvantaged social groups across all countries. To ensure no one is left behind, policymakers need to understand the size of the gaps between groups and identify the shared circumstances of these excluded groups so as to make them the focus of their efforts.

4.1 How large are the gaps?

Bank account ownership rates among households are generally low among the 21 countries analyzed, but particularly low among the furthest behind groups (Figure 2). The tree analysis described in section 3 allows for comparison of gaps within and across countries. In Figure 2, the upper line of each bar represents the bank account ownership rate of the most advantaged group (those with highest rate) for each country. The bottom line represents the bank account ownership rate of the furthest behind group (those with lowest rate). The actual composition of the furthest behind group is discussed later in this section and shown in Table 1. The middle line across each bar is the average rate by which countries are sorted.

Figure 2: Gaps in bank account ownership, latest year

Source: ESCAP calculations based on latest DHS and MICS surveys.

Only in India, Maldives, Mongolia, and Thailand does the furthest behind group have an ownership rate above 60 per cent. In Bangladesh, Bhutan, Cambodia, Indonesia, Lao People’s Democratic Republic, Pakistan, Papua New Guinea, and Viet Nam, the gaps between the advantaged and the furthest behind groups are the highest, with differences over 55 percentage points.
In Afghanistan, Bangladesh, Bhutan, Cambodia, Lao People’s Democratic Republic, Myanmar, Pakistan, Papua New Guinea, Tajikistan, and Viet Nam, fewer than 10 per cent of households belonging to the furthest behind group own a bank account. Most notable is the case of Tajikistan, where, even on average, less than 2 per cent of the households have a bank account. These results, which reflect Tajikistan’s 2017 Demographic and Health Survey, point to underdevelopment of financial services and widespread distrust in banking institutions.  

Online payments are, however, more common than elsewhere in North and Central Asia.  

Figure 3: Average bank account ownership and ownership gaps, latest year

Source: ESCAP calculations based on latest DHS and MICS surveys.

The relationship between average rates and ownership gaps is captured by using a binomial equation (Figure 3). An inverted U-shaped pattern is expected: when countries have very low or high average ownership rates, the gaps tend to be smaller, as most people either do not own a bank account (low average rates) or they do (high average rates). On the other hand, the gaps are likely to be higher when roughly half of the population has access to a basic service or opportunity. This pattern is observed across the region, although Bhutan, Indonesia, Lao People’s Democratic Republic, Papua New Guinea, and Viet Nam stand out as ‘negative outliers’ with higher gaps than those predicted by their average ownership rate. India, Maldives, Mongolia and Thailand exemplify how gaps move towards zero when countries progress towards universal access.
4.2 Identifying those left behind

To address the causes of inequality in ownership of bank accounts, it is essential to identify those who are most excluded. This section narrows the focus on the furthest behind groups in each country and identifies the circumstances they share. Although these circumstances might not be the same across the 21 countries analyzed, several commonalities are found.

Table 1 lists the circumstances of the households with the lowest bank account ownership rate, as well as the size of the population they represent and the gap between the groups with the highest and lowest rate. Households belonging to the bottom 40 of the wealth distribution and those with lower educational attainment levels are the most disadvantaged in bank account ownership.

Living in a rural area may create barriers for bank account ownership, although it does not seem to matter in the composition of the furthest behind in the studied countries (Table 1). Residence is an important factor only in Thailand – and affects urban populations, rather than rural ones. On average, urban dwellers have higher ownership rate than households living in rural areas in Thailand. However, when considering households in the bottom 40 of the wealth distribution and with lower education levels, urban residence adds a further level of disadvantage. These furthest behind households have a bank account ownership rate of 70 per cent.

Table 1: The impact of household circumstances on bank account ownership

<table>
<thead>
<tr>
<th>Country/Circumstances</th>
<th>Wealth</th>
<th>Residence</th>
<th>Education</th>
<th>Ownership rate of the most disadvantage group</th>
<th>Size of the most disadvantage group</th>
<th>Rate gap from most advantage group (pp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>840</td>
<td>No education or primary education</td>
<td>No education or primary education</td>
<td>2%</td>
<td>22%</td>
<td>40 pp</td>
</tr>
<tr>
<td>Armenia</td>
<td>840</td>
<td>Primary or secondary education</td>
<td>No education or primary education</td>
<td>17%</td>
<td>22%</td>
<td>35 pp</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>840</td>
<td>No education or primary education</td>
<td>No education or primary education</td>
<td>5%</td>
<td>19%</td>
<td>62 pp</td>
</tr>
<tr>
<td>Bhutan</td>
<td>840</td>
<td>No education or primary education</td>
<td>No education or primary education</td>
<td>8%</td>
<td>38%</td>
<td>78 pp</td>
</tr>
<tr>
<td>Cambodia</td>
<td>840</td>
<td>No education or primary education</td>
<td>No education or primary education</td>
<td>1%</td>
<td>24%</td>
<td>57 pp</td>
</tr>
<tr>
<td>India</td>
<td>840</td>
<td>No education or primary education</td>
<td>No education or primary education</td>
<td>72%</td>
<td>13%</td>
<td>59 pp</td>
</tr>
<tr>
<td>Indonesia</td>
<td>840</td>
<td>No education or primary education</td>
<td>No education or primary education</td>
<td>10%</td>
<td>15%</td>
<td>35 pp</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>840</td>
<td>Primary or secondary education</td>
<td>No education or primary education</td>
<td>59%</td>
<td>25%</td>
<td>34 pp</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>840</td>
<td>Primary or secondary education</td>
<td>No education or primary education</td>
<td>27%</td>
<td>27%</td>
<td>40 pp</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>840</td>
<td>Primary education</td>
<td>No education or primary education</td>
<td>5%</td>
<td>33%</td>
<td>73 pp</td>
</tr>
<tr>
<td>Maldives</td>
<td>840</td>
<td>No education or primary education</td>
<td>Primary education</td>
<td>87%</td>
<td>13%</td>
<td>73 pp</td>
</tr>
<tr>
<td>Mongolia</td>
<td>840</td>
<td>No education or primary education</td>
<td>Primary education</td>
<td>78%</td>
<td>19%</td>
<td>59 pp</td>
</tr>
<tr>
<td>Myanmar</td>
<td>840</td>
<td>No education or primary education</td>
<td>No education or primary education</td>
<td>2%</td>
<td>22%</td>
<td>37 pp</td>
</tr>
<tr>
<td>Nepal</td>
<td>840</td>
<td>No education or primary education</td>
<td>No education or primary education</td>
<td>36%</td>
<td>17%</td>
<td>49 pp</td>
</tr>
<tr>
<td>Pakistan</td>
<td>840</td>
<td>No education or primary education</td>
<td>No education or primary education</td>
<td>6%</td>
<td>23%</td>
<td>63 pp</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>840</td>
<td>No education, primary or secondary education</td>
<td>No education, primary or secondary education</td>
<td>8%</td>
<td>42%</td>
<td>88 pp</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>840</td>
<td>No education, primary or secondary education</td>
<td>No education, primary or secondary education</td>
<td>0%</td>
<td>22%</td>
<td>4 pp</td>
</tr>
<tr>
<td>Thailand</td>
<td>840</td>
<td>Urban</td>
<td>No education or primary education</td>
<td>70%</td>
<td>10%</td>
<td>30 pp</td>
</tr>
<tr>
<td>Timor-Leste</td>
<td>840</td>
<td>Primary education</td>
<td>No education or primary education</td>
<td>32%</td>
<td>13%</td>
<td>44 pp</td>
</tr>
<tr>
<td>Turkmenistan</td>
<td>840</td>
<td>Primary or secondary education</td>
<td>Primary or secondary education</td>
<td>13%</td>
<td>26%</td>
<td>45 pp</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>840</td>
<td>Primary or secondary education</td>
<td>Primary or secondary education</td>
<td>6%</td>
<td>38%</td>
<td>73 pp</td>
</tr>
</tbody>
</table>

Source: ESCAP estimations based on latest DHS and MICS surveys.

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viii These tables do not show the composition of the most privileged group (with the access rate) but this information will be made available shortly on ESCAP website.
In addition to wealth and residence, other circumstances may also matter in ownership of bank accounts. For example, the sex of the household head has an impact on the levels of ownership of a bank account in some countries in the region. When interacting with other advantageous circumstances (e.g. higher education), male-headed households have an edge over female-headed ones in owning bank accounts in many countries (see Box 2).

**Box 2: Male-headed households ahead**

Even when using households as the unit of analysis, it is possible to also explore whether gender norms matter for shaping gaps. Adding the sex of the household head as a circumstance to the classification tree analysis reveals that the furthest ahead households in bank-account ownership are also male-headed in Armenia, Bangladesh, Kazakhstan, Mongolia and Turkmenistan. Among 21 countries reviewed, only in Tajikistan households led by a woman are those with the highest access to financial services. As seen in Box 1, the number of female bank account holders’ lags behind their male counterparts across most countries in Asia and the Pacific. Many women face sociocultural barriers to accessing financial services, even as heads of households.

Source: Findex (2017), ESCAP elaboration of DHS and MICS.

The results of this section can also be confirmed through alternative econometric methods (see Annex Table A3). Ultimately, countries have their own specificities that shape the distribution of opportunities among population groups. Studying this distribution aims to unearth how groups experience advantage or disadvantage, so that barriers can be more effectively removed.

4.3 *Are the gaps in access to financial services falling over time?*

Socioeconomic circumstances, such as low wealth and education, continue to undermine financial inclusion in most countries in the region. If socioeconomic progress in the Asia-Pacific region has boosted average ownership of a bank account, has it also contributed to reducing the gaps? This section reviews progress over time. It tests if average ownership rate has increased over time and whether the distance between the furthest behind groups and the average has fallen.\(^9\)

Outstanding average progress is recorded in India, Kyrgyzstan, Maldives and Timor-Leste (Figure 4). India’s Aadhaar biometric identification system is an example of how efforts from the government could empower individuals on a mass scale. Under the Jan Dhan, Aadhaar, Mobile (JAM)\(^x\) scheme, the government has relied on biometric data to include most of the population into financial services and make digital money more accessible across the country.\(^53\)

In particular, Aadhaar speeds up the “Know Your Customer” process, resulting in 3.8 million bank accounts having been opened between 2011 and 2014.\(^54\) The spread of mobile money

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\(^9\) It is important to note that the furthest behind group, which has the lowest ownership rate, always represents at least 10 per cent of the sample population since this is a requirement set in the classification tree analysis (see Annex 1).

\(^x\) Jan Dhan, Aadhaar, Mobile are the three modes of identification to deliver direct benefits to India’s poor population.
accounts also created new opportunities to better serve women and people in rural communities.\footnote{Outside of India and the Maldives, however, average progress did not help in closing the gaps for the furthest behind. In all other countries, the average ownership rate increased at a higher pace than the one of the furthest behind groups, as shown by the rising percentage point difference between surveys. Only in Armenia did the gap stay constant.

It is important to note that progress across countries is not always fully comparable because the time lag between two surveys may span from 3 years in Thailand, to 10 years in India. The findings should therefore be viewed in this light. Furthermore, the composition of the furthest behind group may vary between the two surveys.\footnote{Results show most countries in the region have been able to increase bank account ownership, while the furthest behind groups have largely remained excluded from progress.}

\textbf{Figure 4: Distance of the worst-off group from the average in bank account ownership, earliest - 2010s}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure4}
\caption{Distance of the worst-off group from the average in bank account ownership, earliest - 2010s}
\end{figure}

Source: ESCAP calculations based on latest DHS and MICS surveys

\footnote{A full list of the classification trees that reveals the composition of all groups is available upon request and will be posted on the ESCAP website soon.}
5. Does ethnicity matter for determining the furthest behind?

In many countries, the furthest behind groups are also defined by a minority ethnic, caste, linguistic or religious identity. However, there is a general lack of survey data detailing how these characteristics shape inequality and contribute to marginalization within countries.

In nine countries, Multiple Indicator Cluster surveys (MICS) included questions on ethnicity, caste, language or religion, thereby opening a small, but unique window to understanding how these identities interact with other circumstances to create groups that are left behind.

5.1 How does a minority identity add to the disadvantage?

Ethnicity, language, and religion play a significant role in shaping inequality in bank account ownership in 5 out of 9 countries with available information.

Replicating the classification tree analysis to include ethnicity, language, and religion as circumstance variables alters the composition of the furthest behind groups in bank account ownership in Kyrgyzstan, Lao People’s Democratic Republic, Mongolia, Thailand, and Viet Nam (Table 2).

In Thailand, poorer households whose main language is not Thai have a lower ownership rate when compared with Thai-speaking poorer families (column (1) and column (2)). The 26-percentage point difference underlies patterns of discrimination derived from the ethnolinguistic composition of these groups. Results are similar in Kyrgyzstan, as households speaking Russian or Uzbek, or those belonging to an ethnic minority, report lower bank account ownership rates than the Kyrgyz majority.

In Mongolia, a country with one of the highest average levels of bank account ownership, belonging to a religious minority or having no religion interacts with very low education to form the furthest behind group. In Lao People’s Democratic Republic, only 4 per cent of poorer households with primary education practicing animism or belonging to a religious minority own a bank account (column (1)). The comparable group that practices Buddhism has marginally higher bank account ownership rate at only 6 per cent (column (2)). Similarly, in Viet Nam, being of Kinh or non-Kinh ethnicity makes only a small difference among the poorer, low-educated households.
Table 2: Ownership of a bank account for different groups

<table>
<thead>
<tr>
<th>Country/Multilateral</th>
<th>Furthest Behind Linguistic, Ethnic, Religious Minority (1)</th>
<th>Better-Off Linguistic, Ethnic, Or Religious Minority (2)</th>
<th>Overall Best-Off: Circumstances and Access Rate of the Most Advantaged Group (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyrgyzstan (2018)</td>
<td>Russian, Uzbek or belonging to an ethnic minority, poor household with primary or secondary education: 20%</td>
<td>Kyrgyz, poor household with primary or secondary education: 30%</td>
<td>Rich and urban household with higher education: 68%</td>
</tr>
<tr>
<td>Lao People's Democratic Republic (2017)</td>
<td>Animist or belonging to a religious minority, poor households with primary education: 4%</td>
<td>Buddhist, poor household with primary education: 6%</td>
<td>Urban households with higher education: 84%</td>
</tr>
<tr>
<td>Mongolia (2013)</td>
<td>Household belonging to a religious minority or having no religion with at most primary education: 73%</td>
<td>Buddhist household with at most primary education: 83%</td>
<td>Rich and rural household with higher education: 98%</td>
</tr>
<tr>
<td>Thailand (2015)</td>
<td>Poor household belonging to a linguistic minority: 56%</td>
<td>Poor household with Thai as main language: 82%</td>
<td>Rich household with secondary or higher education: 99%</td>
</tr>
<tr>
<td>Viet Nam (2013)</td>
<td>Poor household belonging to an ethnic minority with at most primary education: 2%</td>
<td>Kinh and poor household with at most primary education: 6%</td>
<td>Urban households with higher education: 78%</td>
</tr>
</tbody>
</table>

Source: ESCAP calculations based on latest MICS surveys.
Note: These results are based on classification tree analysis that sets the minimum population size of the furthest behind group at approximately 5 per cent of the total population (lower than 10 per cent used in earlier sections of the report), so that the smaller minorities are captured.

This brief assessment implies that belonging to a minority may add a disadvantage — or sometimes an advantage — for households seeking access to financial services. It also confirms the general lack of comparable, reliable and consistently collected data on minority groups and the need to include their circumstances into future research. The same consideration applies to other marginalized groups such as migrants, refugees, slum dwellers, persons with disabilities, and other hard to reach groups for which data are limited or non-existent.
6. Understanding inequality in access to financial services

Understanding inequality in ownership of a bank account is helpful for directing policies and programmes. The previous section found large gaps between those furthest behind and those furthest ahead, while also determining the shared circumstances of these groups. This section measures inequality in ownership of a bank account across the entire population using the dissimilarity index (D-Index).

6.1 Measuring overall inequality

The first step to measure overall inequality in access to a specific service or opportunity is to identify all possible population groups and their access levels. The D-index is then determined by the weighted distance in ownership rate for each of these groups from the average level (see Box 3). The calculated D-index represents the overall inequality in ownership of a bank account.

Box 3: Calculating the Dissimilarity Index

The dissimilarity index, or D-index, measures how all different population groups fare in terms of bank account ownership. For example, two countries with identical ownership rate may have a very different D-index if the distribution in one country excludes certain groups. The following equation is used:

\[ D = \frac{1}{2\bar{p}} \sum_{i=1}^{n} \beta_i | p_i - \bar{p} | , \]

where \( \beta_i \) is the weighted sampling proportion of group \( i \), (sum of \( \beta_i \) equals 1), \( \bar{p} \) is the average access rate in the country and \( p_i \) is the ownership rate of population group \( i \), and takes values from 0 to 1. There are \( n \) number of groups defined by using the interactions of the circumstances selected for the analysis.

Three circumstances are used to determine the number and composition of the population groups: wealth (2 groups); residence (2 groups); and education (4 groups). This produces \( n=16 \) groups (2x2x4), covering the entire sample population. Further details can be found in the Annex.

6.2 Where is overall inequality highest?

Households in Afghanistan, Cambodia, Kazakhstan, Myanmar, and Tajikistan have high inequality as measured by their D-Index. In India, Maldives, Mongolia and Thailand inequality is relatively low.
Figure 5: Inequality in ownership of a bank account, latest year

Source: ESCAP calculations based on latest DHS and MICS surveys

Overall inequality in bank account ownership also tends to be the highest in countries with the lowest average ownership rate (Figure 6, upper left quadrant). For example, even though the gap between the furthest behind and the furthest ahead is very low in Tajikistan, its D-index is among the highest, because the calculation of the D-index “penalizes” countries with lower average access (see the formula in Box 2). Countries with highest average access also have the lowest D-indices.
Figure 6: D-Indices and average ownership rate to bank account, latest year

Source: ESCAP calculations based on latest DHS and MICS surveys.
Note: the blue lines represent the average rates of the axis indicator among all countries with available surveys.
7. Recommendations for closing the gaps

This report has shed light on the layers of circumstances shared by the furthest behind share in financial inclusion, as measured by ownership of a bank account. The findings indicate that two core circumstances separate households who own bank accounts from those who don’t: wealth and education level. Other factors like the sex of the household and ethnicity also play a role in certain countries. Although overall ownership of bank accounts has increased, a sizeable portion of the population remains excluded.

To achieve all SDGs but particularly those underpinned by financial inclusion, such as Target 8.10 on financial inclusion, Target 1.4 on equal rights to economic resources, governments and the private sector should challenge the limitations faced by those who are still unbanked. As a policy objective, financial inclusion entails policies to facilitate usage of financial services, regulate the financial system, promote financial literacy, and support financial development, driven, among others, by mobile money and fintech.

The following are general considerations based on the findings of the data analysis and the review of the trends in the Asia-Pacific region. These recommendations aim to support policymakers in designing regulatory and other applicable policies to promote financial inclusion:

1. Develop a regulatory framework that welcomes poorer households

An enabling regulatory environment is critical for improving financial inclusion. This report has found that households without bank accounts almost always belong to the bottom 40 of the wealth distribution. Current regulatory obstacles to increased financial inclusion include transaction and balance limits, onerous customer identification requirements and restrictions on international remittances. An enabling regulatory framework reduces requirements for banks to provide basic or low-fee accounts, and encourages the development of new technologies such as mobile money.

2. Promote financial literacy, especially among marginalized populations

Financial literacy enables consumers to better understand, access and utilize financial products and services. Often due to imperfect information, the benefits of financial services are underestimated, leading to a lack of demand. An expansion of financial literacy to lower income and disadvantaged populations will thus help stimulate their demand of financial products and services. Given the proliferation of financial products and their increased complexity, a national financial literacy strategy, supported by campaigns, may be needed to reach those furthest behind. There is also much scope to provide financial education through schools. Educating the children on financial literacy could also engage their parents.
3. **Enact reliable consumer protection policies**

Financial consumer protection policies help consumers gain trust in the financial system or regain it, where it is corroded. Marginalized populations with limited experience dealing with formal financial institutions need to understand their rights as consumers of financial products. Government efforts to protect those rights and to boost trust would thus generate demand for financial services.

4. **Strengthen administrative data management systems**

India’s remarkable success in enhancing ownership of bank accounts among households in just a few years underscores the importance of data for financial inclusion. Governments across the region need to improve national identification systems, so that they can be more easily linked to credit information. Biometric systems, like India’s Aadhaar, allow even those with low education and no papers to establish a unique digital identity that a financial institution can use.

5. **Improve accessibility of financial services**

The availability of expanded diversified banking channels, such as agent banking, banking outlets in remote areas, and mobile banking can lower the costs of using financial services for those furthest behind. In particular, mobile payment platforms and digitalized payments have much potential, given the expanding penetration of mobile technology in the Asia-Pacific region. Governments can encourage the growth of mobile banking through regulation, including the development of a licensing authorization framework for non-bank financial institutions.

6. **Identify the shared common circumstances shaping household inequalities and inequalities among individuals**

Unequal ownership of bank accounts is strongly linked to unequal long-term outcomes in other development objectives. Understanding the factors preventing some households from opening a bank account is paramount to a more equitable future that leaves no one behind. As more granular data at the individual level become available, policymakers, regulators and financial services providers will also be better placed to understand and help overturn the specific barriers that women, persons with disabilities and minority populations face in accessing financial services.
Annex: Methodology for identifying gaps in access to opportunities

Inequality of Opportunity

To measure inequality of opportunity, the ESCAP policy papers on Inequality of Opportunity identify a set of opportunities and measure the gaps among different population groups in access to these opportunities. To do so, a set of circumstances is selected from available variables in the DHS and MICS datasets to define the groups. The circumstances are a set of conditions over which the individuals or households have no control.

Those circumstances are used in the classification tree analysis to identify the groups that are most disadvantaged in each country; in this case, these are those who have the least ownership rate to financial services. The composition of those groups varies from country to country, as does the size of the sample population represented.

This approach differs from the use of “inequality of opportunity” in other recent literature, which instead uses regression analysis to explain the share of inequality of outcome (income inequality or consumption inequality) that can be attributed to circumstances over which individuals have no control, such as race and sex.

Given that the DHS and MICS datasets do not include information on income or consumption (both classified as outcomes), these thematic policy papers do not include such regressions. However, future analysis might use the wealth index of the DHS and MICS as a proxy “outcome” and regress it against the set of circumstances used in this analysis.

The Data Sources

The analysis exploring inequality in ownership rate uses the Demographic and Health Surveys (DHS) and the Multiple Indicator Cluster Surveys (MICS). DHS and MICS are publicly available for 23 Asian-Pacific countries as shown in Table A1. The DHS and MICS datasets are selected because of the: a) comparability across countries; b) accessibility of the data; and c) extensive questions on health, demographic and basic socioeconomic data referencing both the household (e.g., water and sanitation, financial inclusion, electricity and clean fuels, ownership of mobile phones) and individuals (e.g., level of education, nutrition status).

The Countries

Based on available surveys, 21 out of 23 countries are included in this policy paper on financial inclusion. In total, 11 countries have surveys representing two different points in time. Table A1 provides the full list of 21 countries and their survey years (latest and earliest).
Table A1: List of countries and survey years

<table>
<thead>
<tr>
<th>Country</th>
<th>Earliest Year</th>
<th>Earliest Survey</th>
<th>Latest Year</th>
<th>Latest Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>2010</td>
<td>MICS</td>
<td>2015</td>
<td>DHS</td>
</tr>
<tr>
<td>Armenia</td>
<td>2010</td>
<td>DHS</td>
<td>2016</td>
<td>DHS</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>n/a</td>
<td>n/a</td>
<td>2014</td>
<td>DHS</td>
</tr>
<tr>
<td>Bhutan</td>
<td>n/a</td>
<td>n/a</td>
<td>2010</td>
<td>MICS</td>
</tr>
<tr>
<td>Cambodia</td>
<td>n/a</td>
<td>n/a</td>
<td>2014</td>
<td>DHS</td>
</tr>
<tr>
<td>India</td>
<td>2006</td>
<td>DHS</td>
<td>2016</td>
<td>DHS</td>
</tr>
<tr>
<td>Indonesia</td>
<td>2012</td>
<td>DHS</td>
<td>2017</td>
<td>DHS</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>n/a</td>
<td>n/a</td>
<td>2015</td>
<td>MICS</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>2012</td>
<td>DHS</td>
<td>2018</td>
<td>MICS</td>
</tr>
<tr>
<td>Lao People’s Democratic Republic</td>
<td>2011</td>
<td>MICS</td>
<td>2017</td>
<td>MICS</td>
</tr>
<tr>
<td>Maldives</td>
<td>2009</td>
<td>DHS</td>
<td>2016</td>
<td>DHS</td>
</tr>
<tr>
<td>Mongolia</td>
<td>n/a</td>
<td>n/a</td>
<td>2013</td>
<td>MICS</td>
</tr>
<tr>
<td>Myanmar</td>
<td>n/a</td>
<td>n/a</td>
<td>2016</td>
<td>DHS</td>
</tr>
<tr>
<td>Nepal</td>
<td>n/a</td>
<td>n/a</td>
<td>2016</td>
<td>DHS</td>
</tr>
<tr>
<td>Pakistan</td>
<td>2013</td>
<td>DHS</td>
<td>2017</td>
<td>DHS</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>n/a</td>
<td>n/a</td>
<td>2018</td>
<td>DHS</td>
</tr>
<tr>
<td>Thailand</td>
<td>2012</td>
<td>MICS</td>
<td>2015</td>
<td>MICS</td>
</tr>
<tr>
<td>Turkmenistan</td>
<td>n/a</td>
<td>n/a</td>
<td>2015</td>
<td>MICS</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>2012</td>
<td>DHS</td>
<td>2017</td>
<td>DHS</td>
</tr>
<tr>
<td>Timor-Leste</td>
<td>2010</td>
<td>DHS</td>
<td>2016</td>
<td>DHS</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>n/a</td>
<td>n/a</td>
<td>2013</td>
<td>MICS</td>
</tr>
</tbody>
</table>
The Indicators and Circumstances

The indicator used to uncover inequality in access to financial services is bank account ownership at the household level. The Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development propose, among others, indicator 8.10.2 (proportion of adults, 15 years and older, with an account at a bank or other financial institution or with a mobile-money-service provider) to measure the expansion of access to banking, insurance and financial services for all (Target 8.10). The selected indicator bank account ownership at the household level is a close proxy of indicators 8.10.2. The circumstances used are wealth (belonging to the bottom 40 or top 60 per cent of a wealth distribution), residence (living in a rural or urban areas), and highest education level in the household (no education, primary, secondary or higher education). Minority identity and sex of the household head were also considered in section 4 (Box 2) and in section 5.

The Classification Tree Analysis

The primary goal of the survey analysis is identifying the groups with the lowest and highest access to financial services, by using ownership of a bank account as indicator. The indicator can be viewed as “response variable”, while the factors characterizing these groups are defined as “circumstances”.

The analysis then uses a classification tree model to identify the groups with highest or lowest access. A classification tree is an analytical structure representing groups of the sample population with different response values, or different levels of access to a certain opportunity.

Consider the following example:

**Opportunity**: Access to financial services

**Indicator (“response variable”)**: “Ownership of a bank account”

**Factors (“circumstances”)**: The circumstances being considered are the following:

1. Household wealth (Bottom 40 or Top 60),
2. Residence (urban vs. rural),
3. Highest education level in the household (no education, primary, secondary, or higher education).

To identify the groups with the highest or lowest bank account ownership rate, a classification tree is constructed for each country, using R, an open source statistical software. The root node of the tree is the entire reference population. The tree method algorithm starts by searching for the first split (or branch) of the tree. It does so by looking at each circumstance and separating the sample in two groups, so that it achieves the most “information gain”. This information metric can be defined in a few ways, while the most common one, and the one used in this analysis is the “entropy”.

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**The Tree Representation**

A tree method is an algorithm that estimates ownership of a bank account by partitioning the household’s respondents into different groups based on the circumstances chosen:

\[
p(Y_i = 1 \mid X_{i1}, X_{i2}, \ldots, X_{il}) = \sum_{j=1}^{m} p_j \times I((X_{i1}, X_{i2}, \ldots, X_{il}) \in A_j)
\]

Where \( Y_i \) is the observed opportunity (indicator) for the \( i \)-th household in the sample, \( X_{i1}, \ldots, X_{il} \) are the circumstances for the household. In the example of access to financial services, \( Y_i \) is the ownership rate of a bank account, \( X_1, X_2, X_3 \) (where \( l = 3 \)) are household wealth level, residence, and highest education level of a household member. \( A_1, A_2, \ldots, A_m \) are the different partitions of the sample, also called end nodes, where:

\[
A_i \cap A_j = \emptyset
\]

and

\[
\bigcup_{i=1}^{m} A_i = \Omega.
\]

This means the end nodes are mutually exclusive and complementary, and every household belongs to one and only one of the end nodes. \( I() \) only takes value 1 when the \( i \)-th household belongs to \( j \)-th end node, otherwise, \( I() \) takes value 0. The tree algorithm generates the end nodes, according to metrics that measure the effectiveness of the partition that gives to different levels of ownership of a bank account.

Information theory and entropy is a very common choice for the metrics. Entropy for \( j \)-th end node can be calculated according to the definition:

\[
I_E(p_j) = -(p_j \times \log_2 p_j + (1 - p_j) \times \log_2 (1 - p_j))
\]
The aggregated entropy for the tree is calculated by:

\[ H(T) = \sum_{j=1}^{m} q_{ij} \times I_{E}(p_j) \]

Where \( q_{ij} \) is the sample proportion of \( A_i \). The actual algorithm that generates the end-nodes is step-by-step, starting from the entire sample. Each time the sample is partitioned, new end-nodes are generated, and the entropy is calculated and compared to the entropy before the new partition. Each partition (and hence the new endnodes) is kept when the addition of the new circumstance decreases the entropy when compared to the entropy of a pre-set threshold. The algorithm stops when no more “information gain” can be made by a new partition, or a set of pre-set conditions can’t be satisfied.

In addition to finding groups that have significant differences in ownership of a bank account, the classification tree algorithm also operates under the limitation that each group should have enough group members. To avoid a too small sub-sample size, the analysis has set the tree nodes to have a minimum size of at least 10 per cent of the total population and the split of tree is only made when an “information gain” criterion is satisfied.

In section 5, which introduces ethnicity, language, and religion as circumstances, the minimum size of the population group criterion is reduced to 5 per cent of the population to fully capture minority religions and ethnicities.

**Choice of Circumstances**

Out of the many variables available in the DHS and MICS surveys, several determinant factors are considered to help identify the most excluded groups. The selection of variables is consistent across all surveys to maintain comparability across countries.

The classification tree includes these factors in the tree as branches only if they are found to reduce “entropy”. Ultimately, these circumstances (determinant factors) define the composition of the groups. However, circumstances should not be interpreted as “causes” of inequality. The association found does not imply causality. Furthermore, there are many other factors that these models cannot consider, given the limitations of the datasets.

Ideally, it would have been preferred to include only circumstances over which a household member has little control, such as the dominant religion in the respondent’s household, ethnicity, existence of a disability, education of the mother or father of the respondent. The majority of the DHS surveys did not include these questions. Some MICS, however, do record questions related to ethnicity, language, and religion and the results are presented in section 5.
In the cases where these questions were included, the analysis is repeated using these additional determinant factors. Additional factors of interest for study are geographical variables, such as province or city in a given country, but inclusion would have affected comparability across countries. Geographic variables can be analyzed in future work focusing on one country only.

**Gaps and Limitations**

The available datasets limit the scope of this analysis somewhat. First, several relevant circumstances cannot be captured. For example, distance from a financial institution or an ATM might shape households’ access to financial services.

Furthermore, and consistent with similar studies on inequalities among groups, this analysis does not consider inequality within groups. Even within homogenous groups, additional unobserved circumstances may affect outcomes. This analysis only calculates observable average access to opportunity for each group, and thus draws conclusions on gaps and inequality based on these average observations.

Finally, recent literature also links inequality of outcome with inequality of opportunity, by calculating the share of income inequality (inequality of outcome) that can be explained by the circumstances of each group. This analysis in this series of policy papers does not follow the same approach because the datasets do not include an income proxy besides the wealth index.

**The wealth index and the bottom 40 – top 60 wealth split**

Wealth, as used in this policy paper, is a composite index reflecting a household’s cumulative living standard that is developed by the DHS and MICS researchers and combines a range of household circumstances including: a) ownership of household assets, such as TVs, radios and bicycles; b) materials used for housing; and c) type of water and sanitation facilities.

The wealth index is calculated using the Principal Component Analysis and thus allows a relative ranking of households based on their assets.xiii The wealth index is not comparable across countries, however, as it consists of different assets in each country. Cross-country comparison of household access based on “wealth” should be understood with this caveat.

In this series of policy papers, the wealth index is employed as a circumstance to distinguish between different types of households. Although technically not a circumstance over which households have no control, wealth is still a proxy for many hidden conditions that may limit access to a certain opportunity, especially considering the lack of other determinant factors to explore, such as education of mother or father, ethnicity, prevalence of a disability or migrant status.

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xiii For more information see Demographic and Health Surveys (DHS) http://www.dhsprogram.com/programming/wealth%20index/DHS_Wealth_Index_Files.pdf
In this paper, households can belong to one of two possible groups based on the wealth index: the bottom 40 per cent (sometimes labelled as “poorer”) and the top 60 per cent (or “richer”).

Several other possible cuts of the wealth index were considered, including by quintile, top 40 – bottom 40, and top 10 – bottom 40. None of these were selected however, because generally they produce more homogenous groups thus overshadowing other circumstances (e.g. education levels, rural – urban distinctions). The top 40 – bottom 40 approach (and its variation of top 10 – bottom 40) are also rejected because they eliminate 20 to 50 per cent of the sample population from the analysis, with a risk of missing some “middle class” groups with common characteristics (e.g. secondary education).

Narrowing the sample population to only half (top 10 – bottom 40) also runs the risk of not allowing for making statistically significant inferences. Moreover, neither the top node, or root of the tree, nor the size of the groups of the rest of the nodes would be representative of the population.

Finally, the wealth index in the DHS and MICS produces a distribution of households by wealth without any monetary values assigned to the distribution. Therefore, the comparisons of top 1 – top 10 – top 40 per cent do not have the same explanatory value as they would if the wealth index had taken continuous monetary values.

Table A2: Selected Indicators and Factors

<table>
<thead>
<tr>
<th>Opportunity Component</th>
<th>Indicator Reference Group in Survey</th>
<th>Factors used to determine excluded groups</th>
<th>SDG Reference</th>
<th>Survey Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Inclusion</td>
<td>Bank Account</td>
<td>All households</td>
<td>Wealth</td>
<td>Does any member of this household have a bank account?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Residence</td>
<td>HH*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Highest</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: HH* = household
Confirming results through logistic regression

In order to bolster the analytical findings, logistic regressions were conducted to observe the effects of circumstance variables (household wealth, residence and highest educational level in the household) on a household’s ownership rate of a bank account.

The logistic regression model for each country is given by:

\[
\text{logit}(p_i) = \log \left( \frac{p_i}{1 - p_i} \right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5
\]

Where \(p_i\) is a binary variable and assumes two values:

\[
p_i = \begin{cases} 
1, & \text{if a household owns a bank account} \\
0, & \text{if a household does not own a bank account}
\end{cases}
\]

and

where \(\beta_0,...,\beta_n\) are logit model coefficients and \(X_1,...,X_n\) are circumstance variables, i.e. \(X_1\) is household wealth, \(X_2\) is household residence, and \(X_3 - X_5\) is the highest education level in the household, and represent primary, secondary, and higher education respectively.

The base references used in the model are households belonging to the top 60 per cent in terms of wealth, urban households, and households with no education.xiv

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xiv For countries with MICS surveys, the base reference used for education is lower education. This base comprises households with no education and primary education. A total of 21 logistics regression are summarized in Table A3. The regression results (β coefficients, standard errors and calculated odds ratios) indicate that circumstance variables affect household’s bank account ownership rate at a 10%, 5% and 1% significance level.
Table A3: Logit model results: Access to bank account

<table>
<thead>
<tr>
<th>DHS</th>
<th>Afghanistan</th>
<th>Armenia</th>
<th>Bangladesh</th>
<th>Cambodia</th>
<th>India</th>
<th>Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff</td>
<td>SE</td>
<td>Coeff</td>
<td>SE</td>
<td>Coeff</td>
<td>SE</td>
</tr>
<tr>
<td>(Intercept)</td>
<td>-2.87 ***</td>
<td>0.09</td>
<td>-0.45</td>
<td>0.65</td>
<td>-1.44 ***</td>
<td>0.16</td>
</tr>
<tr>
<td>Poorer Household</td>
<td>-1.25 ***</td>
<td>0.05</td>
<td>0.286</td>
<td>-0.62 ***</td>
<td>0.07</td>
<td>0.539</td>
</tr>
<tr>
<td>Residence Rural</td>
<td>-0.12 ***</td>
<td>0.04</td>
<td>0.889</td>
<td>0.16 ***</td>
<td>0.07</td>
<td>1.176</td>
</tr>
<tr>
<td>Highest Education: Primary</td>
<td>0.53 ***</td>
<td>0.1</td>
<td>1.705</td>
<td>-1.55 ***</td>
<td>0.78</td>
<td>0.212</td>
</tr>
<tr>
<td>Highest Education: Secondary</td>
<td>1.56 ***</td>
<td>0.09</td>
<td>4.775</td>
<td>-1.11 ***</td>
<td>0.65</td>
<td>0.329</td>
</tr>
<tr>
<td>Highest Education: Higher</td>
<td>2.84 ***</td>
<td>0.1</td>
<td>17.056</td>
<td>0.19</td>
<td>0.65</td>
<td>2.15 ***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DHS</th>
<th>Maldives</th>
<th>Nepal</th>
<th>Pakistan</th>
<th>Papua New Guinea</th>
<th>Tajikistan</th>
<th>Timor-Leste</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff</td>
<td>SE</td>
<td>Coeff</td>
<td>SE</td>
<td>Coeff</td>
<td>SE</td>
</tr>
<tr>
<td>(Intercept)</td>
<td>1.77 ***</td>
<td>0.15</td>
<td>-0.97 ***</td>
<td>0.08</td>
<td>-2.91 ***</td>
<td>0.1</td>
</tr>
<tr>
<td>Poorer Household</td>
<td>-2.46 ***</td>
<td>0.32</td>
<td>0.085</td>
<td>-1.23 ***</td>
<td>0.05</td>
<td>0.293</td>
</tr>
<tr>
<td>Residence Rural</td>
<td>1.02 ***</td>
<td>0.35</td>
<td>2.770</td>
<td>-0.14 ***</td>
<td>0.05</td>
<td>0.865</td>
</tr>
<tr>
<td>Highest Education: Primary</td>
<td>0.38</td>
<td>0.19</td>
<td>1.405</td>
<td>0.49 ***</td>
<td>0.09</td>
<td>1.626</td>
</tr>
<tr>
<td>Highest Education: Secondary</td>
<td>0.93 ***</td>
<td>0.18</td>
<td>2.547</td>
<td>1.08 ***</td>
<td>0.08</td>
<td>2.934</td>
</tr>
<tr>
<td>Highest Education: Higher</td>
<td>2.79 ***</td>
<td>0.41</td>
<td>16.259</td>
<td>1.82 ***</td>
<td>0.09</td>
<td>6.147</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DHS</th>
<th>Bhutan</th>
<th>Kazakhstan</th>
<th>Kyrgyzstan</th>
<th>Lao PDR</th>
<th>Mongolia</th>
<th>Myanmar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff</td>
<td>SE</td>
<td>Coeff</td>
<td>SE</td>
<td>Coeff</td>
<td>SE</td>
</tr>
<tr>
<td>(Intercept)</td>
<td>-2.51 ***</td>
<td>0.05</td>
<td>-0.43 ***</td>
<td>0.08</td>
<td>-0.92 ***</td>
<td>0.12</td>
</tr>
<tr>
<td>Poorer Household</td>
<td>2.31 ***</td>
<td>0.05</td>
<td>0.100</td>
<td>0.78 ***</td>
<td>0.05</td>
<td>0.457</td>
</tr>
<tr>
<td>Residence Rural</td>
<td>1.53 ***</td>
<td>0.06</td>
<td>0.217</td>
<td>0.33 ***</td>
<td>0.05</td>
<td>0.723</td>
</tr>
<tr>
<td>Highest Education: Primary</td>
<td>1.35 ***</td>
<td>0.09</td>
<td>3.872</td>
<td>0.77 ***</td>
<td>0.08</td>
<td>2.16</td>
</tr>
<tr>
<td>Highest Education: Secondary</td>
<td>1.76 ***</td>
<td>0.09</td>
<td>5.805</td>
<td>1.85 ***</td>
<td>0.08</td>
<td>6.36</td>
</tr>
</tbody>
</table>

Source: ESCAP elaboration based on DHS and MICS household surveys.
Notes: 1. Latest year available for each country. 2. Base reference are richer (top 60) households, urban households, and no education.

Coeff. = Coefficient, SE = Standard Error, OR = Odds Ratio. *** 1% level of significance, ** 5% level of significance, * 10% level of significance.
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