GEOSPATIAL ANALYSIS OF BANKING AGENTS IN COLOMBIA
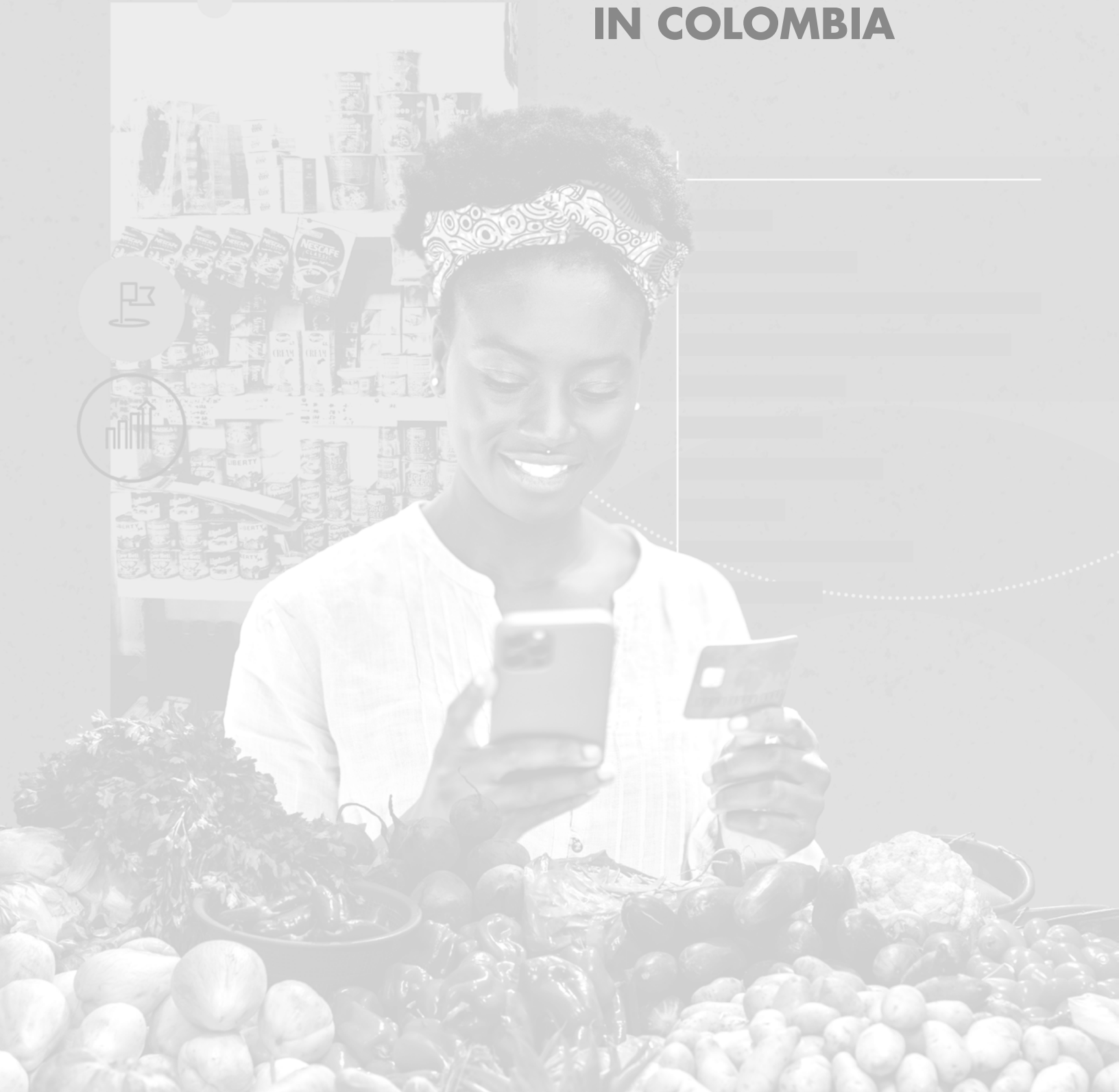
GEOSPATIAL ANALYSIS OF BANKING AGENTS IN COLOMBIA

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INDEX OF ABBREVIATIONS

API: *Application Programming Interface*

CGAP : *The Consultative Group to Assist the Poor*

DANE: National Department of Statistics

GRDI: Global Gridded Relative Deprivation Index

RWI: Relative Wealth Index

OSM: *OpenStreetMap*

SEDPE: Specialized Electronic Payment Processing Company

SES: Superintendence of Solidarity Economy

SFC: Financial Superintendence of Colombia

GLOSSARY

Agent: Natural person or legal entity hired to provide financial services on behalf of a credit institution, under the conditions established in Decree 2672 of 2012.

Agentagreement: A legal agreement between a financial institution and an agent whereby the latter operates the institution's agent channel. They can be exclusive or multi-institutional.

Exclusive agreement: Agent agreement whose agent operates the channel exclusively for one financial institution. This means that each location or agent has only one agreement with one institution.

Multi-institutional agreement: Agent agreement that shares the same physical location with at least one other agreement.

Physical location of agent: A physical location that operates with at least one agent agreement. It can be exclusive or multi-institutional.

Physical location - exclusive: A physical location that carries out one single agent agreement with one single financial institution. By definition, it is equivalent to an exclusive agreement.

Physical location - multi-institutional: A physical agent location that provides agent services for more than one financial institution. A multi-institutional location has as many multi-institutional agent agreements as the number of financial institutions it works with.

Active agent: Agent that has carried out operations during the last quarter.

Digital agent: A agent who makes the financial institution's web or mobile applications available for carrying out transactions.

Mobile agent: A agent who provides services on an itinerant basis, via online or offline mobile devices, on behalf of a financial institution.

Self-operated agent: Agent connected through data transmission systems, directly managed by an overseen entity.

Outsourced agent: Agent connected through data transmission systems and whose administration is contracted with the network management entity by the overseen entity.

1

INTRODUCTION

➕ **The challenge of identifying
physical locations
for agents**
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Financial inclusion in Colombia has made significant progress in recent years, reaching traditionally under-served territories and population segments. Among the milestones achieved is that all 1,103 municipalities in Colombia have at least one physical location to access financial institutions. In particular, the agent banking channel has promoted the financial system's coverage[1] throughout the national territory. This channel, created with Decree 2233 of July 7, 2006, has grown exponentially. As of June 2023, there were 550,000 banking agents across all of the country's municipalities. While traditional channels, such as bank branches, have been losing ground, agents have been rising in number, increasing from 1.7 to 145.1 agreements per 100,000 adults between 2008 and 2023.

This framework has made it possible to align interests among stakeholders and add value to the economy. Through the agent banking model, financial institutions have been able to provide coverage solutions through non-banking agents such as neighborhood

stores, pharmacies, or postal or courier service locations in order to serve the rural population or those located in peripheral neighborhoods of cities, where the operation of bank branches was not feasible due to lack of incentives or capacity. From the perspective of financial institutions, agents have played a crucial role in strengthening their value proposition, entering new markets, and deepening existing ones, contributing with increased transaction levels, deposit mobilization, credit recipients, and collection facilities for both the population and the last mile.

From the perspective of the non-banking agents or businesses that operate this channel, this has provided an opportunity to generate additional income from commissions while carrying out their activities. From the point of view of financial consumers, agent banking has provided access to a wide range of services through trusted local businesses and has become the gateway for many Colombians who had not previously engaged with the financial sector. In rural areas, agents reduce the time and money spent traveling long distances to access or use financial services. In medium-sized municipalities and cities, they are valued in peripheral neighborhoods because of the time and money saved by avoiding trips to urban or commercial centers, as well as the option of extended service hours.

Despite progress in agents' network growth and geo-

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1. As of December 2022, Colombia had 1,143,834 access points, distributed as follows: 6,956 branches (0.5%), 473,701 physical agents (32.1%), 5,752 mobile and digital agents (0.4%), 16,305 ATMs (1.1%), and 971,120 POS terminals (65.9%). This distribution assumes a one-to-one relationship between the number of agent agreements and the number of physical locations.

graphical coverage, as well as regulatory innovations,[2] challenges persist.[3] These challenges can be grouped into five categories. First, there is no interoperability in the banking agent network. The same physical location may have a agent agreement with more than one financial institution to operate the channel, which means that they are considered multi-institutional. However, the mandate granted by an exclusive agent agreement with a financial institution does not permit the same location to provide services and products or make transactions—such as withdrawals or transfers—from other financial institutions. This generates inefficiency and additional operating costs for channel operators; it also restricts supply, especially in the country's most rural and remote municipalities.

In practice, an interoperable model would work in a similar way to the ATM network, where people can make withdrawals or carry out transactions with credentials from various financial institutions.

In 2019, the Regulatory Projection and Financial Regulation Studies Unit (URF) proposed a principle of interoperability between agent networks to allow users to make deposits and withdrawals at any agent under the same operational conditions and for the same cost. However, challenges for its implementation were identified, such as standardizing authentication protocols and business models, as well as developing infrastructure to process and clear transactions between various entities (URF, 2019).

Second, a review of this channel's activity indicators shows that the use of agents is varied and inactivity is high.

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2. In addition to more physical locations of agent banks, Decree 222 in 2020 created digital and mobile models in order to increase the financial system's coverage in rural areas. Digital agents make the financial institution's web or mobile applications available to financial consumers in order to carry out transactions. Mobile agents provide services on an itinerant basis, via online or offline mobile devices, on behalf of a financial institution.

3. The Consultative Group to Assist the Poor (CGAP) is a technical research unit of the World Bank that learns and shares knowledge in order to help build inclusive and responsible financial systems that contribute to poverty reduction and promote broader development goals. From broadening the client base that can act as agents to increasing the portfolio of transactions available, CGAP has made efforts to identify those principles that guide the development of inclusive networks **(see document)**.

It also commissioned case studies to assess the diversity in the scope and application of these principles among countries. The five countries selected—China, Colombia, Kenya, Indonesia and India—**(see document)** have mature networks that have increased the financial system's coverage in remote areas.

In the fourth quarter of 2021, working groups—with participation from financial institutions, network managers, government entities, and international cooperation agencies—were held to discuss opportunities to pave the way for the last mile in Colombia. The discussion incorporated international best practices from CGAP's work and gathered inputs in order to develop a safe, sustainable channel with the capacity to enter new sectors. This introduction includes some of the lessons documented by Marulanda & Consultores, the firm in charge of coordinating the working groups with the industry.

As of 2022, the percentage of inactive agent agreements[4] closed at 41.4%. At the departmental level, the indicator ranged from 34% (Córdoba and Caldas) to 61% (San Andrés and Providencia).

Third, agents are overrepresented in cities and urban agglomerations and underrepresented in smaller municipalities. According to the 2022 Financial Inclusion Report, the gap in the number of agreements per 10,000 adults between cities and dispersed rural municipalities is 43. This implies that rural inhabitants have fewer agents at their disposal. In other words, each agent in a rural area must serve a larger number of people. Despite this, transaction levels of agents in rural municipalities are lower than those in cities and urban agglomerations as well as in medium-sized municipalities.

In addition, agents play an important role as cash-out networks in rural areas, especially for some beneficiaries of government-to-person payment (G2P) programs. Georeferenced information on beneficiaries and cash-out networks could help to efficiently target financial service providers where beneficiaries have shorter distances to travel between their homes and cash withdrawal locations. Although digitization is continuously improving and the small-amount payment system is becoming increasingly robust, it is important to clarify that cash withdrawals are still prevalent among beneficiaries of social programs.

Fourth, although the prevalence of the postpaid model[5] has made it easier to control the risk of over-indebtedness, there have been two important consequences for the network's expansion potential

On the one hand, in practice, the quota amount is defined according to the agent's borrowing capacity and not according to the transactional demand of the agent's area of operation. Since quotas are not aligned with transactional demand, they may be insufficient. Thus, in the event of excess liquidity, the agent may close its business temporarily to deposit the cash in one of the financial institution's branches—or suspend the service and wait for withdrawal transactions, in order to free up the allotted quota. On the other hand, the industry has established contracting standards that may limit the number of businesses with agreements. These requirements are higher in rural areas or areas with deficiencies in financial coverage, where the allotted quotas are comparatively high, in order to reduce the opportunity cost of clearing transactions through cash deposits.

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4. Circular 002 March 10, 2021 issued by the Financial Superintendence of Colombia establishes that a agent is reported as inactive when no operations have been carried out during the reporting period (quarterly).

5. Agents in Colombia predominantly use the postpaid model. Under this framework, a quota is granted so that agents can carry out transactions. This implies that most agents are tied to origination practices, which include credit profile inquiries to credit bureaus. Quota availability depends on the type of transaction. Cash inflow transactions increase the amount the agent "owes" to the financial institution, while cash outflow reduces this amount. Agents may receive cash up to their quota limit. When the quota has been reached, they must deposit the surplus in order to be able to continue carrying out transactions involving cash inflows or wait to carry out cash outflow transactions, such as withdrawals. Thus, the quota corresponds to the maximum amount of cash funds that a agent can control at any given time.

Likewise, the expansion of the agent network should not be represented only as a cash-in cash-out transactional operator, but rather as an expansion of the channel to include a range of financial services. The combination of products such as insurance, credit products, and customer service—along with the proximity provided by retailers and other channel operators—provides an opportunity to create a more inclusive environment. In addition, generating a portfolio of financial services would allow financial institutions to expand their market and promote use of the channel.

The fifth challenge is related to the lack of information needed to predict the delay in quota management by multi-institutional agents who have agent agreements with more than one institution or network manager, as well as business intelligence on quota offer and management.

In addition to the absence of data on the number and monetary amount of quotas granted to these multi-institutional agents, industry contracting standards are rigorous.

In order to propose alternatives that would make agent contracting standards more flexible, the correlation between these challenges must be assessed. Figure 1 outlines the implications of the prevalence of the postpaid model and the absence of public information on quotas.

Figure 1. Challenges in expanding agent banking under the postpaid model

Source: Banca de las Oportunidades y CGAP.
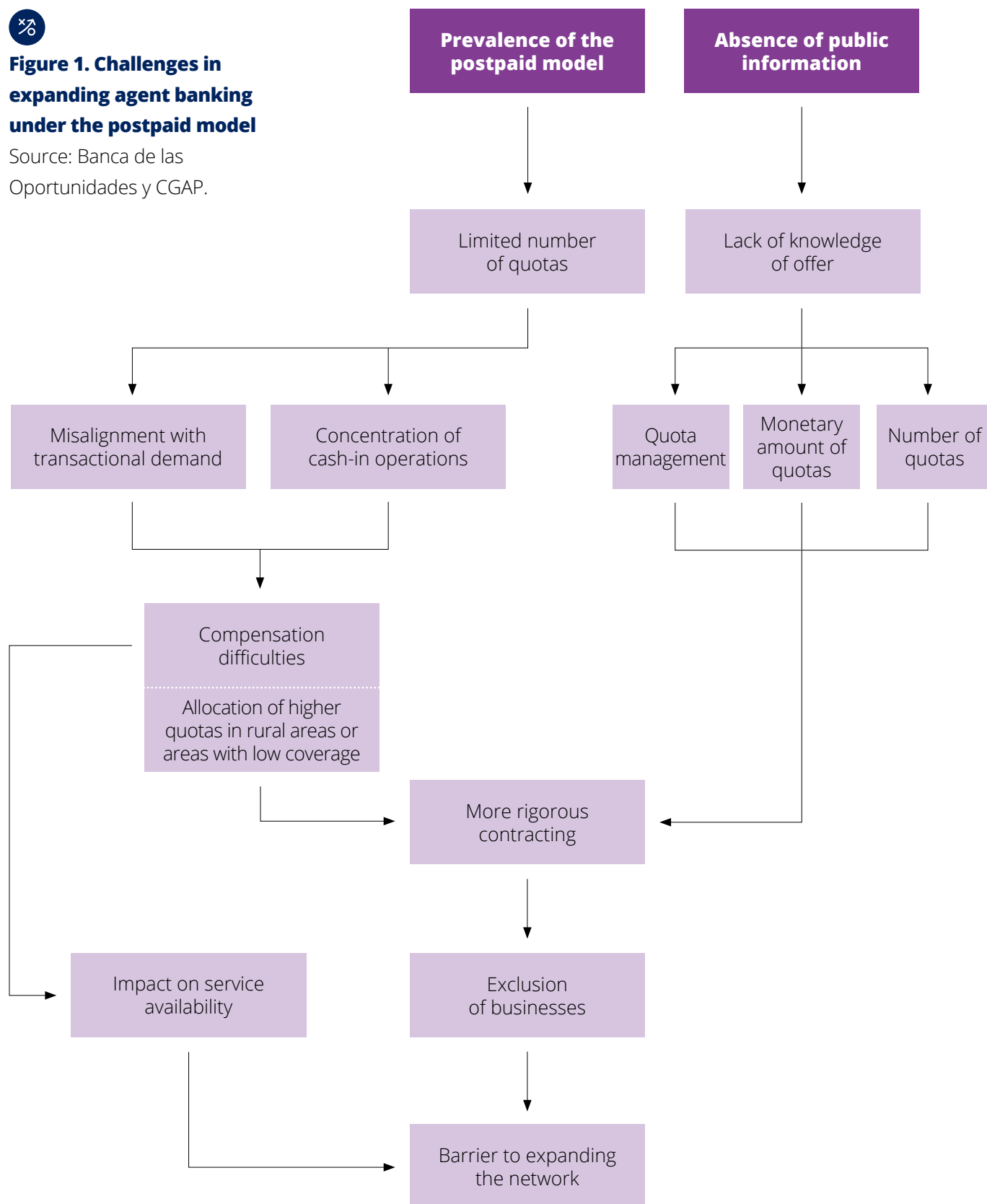
1.1
THE CHALLENGE OF IDENTIFYING PHYSICAL LOCATIONS OF AGENTS

Colombia does not have information on the number of physical locations of agents. The administrative records of the Financial Superintendence of Colombia (SFC) have made it possible to characterize the status and evolution of agents, but not that of this channel's physical locations. A multi-institutional physical location may have as many agent agreements as there are institutions operating via this channel.[6]

The absence of data on the number and geographical location of these physical locations makes it difficult to determine the total transactions and the transactional demand at each location. In addition, the lack of data also does not facilitate other relevant analyses, such as the distribution and geographic density of this channel,

exclusivity (how many agents work only with one institution), or service aggregation (how many institutions agents work with on average).

These difficulties limit the design and implementation of more effective public policies—along with strategies to target and prioritize the channel as well as identify saturated or potentially underserved areas—in order to promote agent banking and financial inclusion that align with the reality in the regions.

As such, this study aims to address these difficulties through a geospatial analysis of the agent banking network in Colombia by providing an alternative measurement and a more detailed understanding of the specific geographic locations of agents. This information can be used to understand the distribution and penetration of the physical locations of this channel throughout the Colombian territory, as well as to identify existing gaps between regions, departments, and levels of rurality. The geo-referencing of fixed locations for agents not only allows strategies for deepening coverage to be developed, but also improves risk management by detecting locations that share agreements with more than one financial institution.

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6. It is common to find agents working with two, three, or even more financial institutions. This is the case for all outsourced network agents, whose strategy specifically focuses on aggregating services from different institutions in the same location. This strategy does not imply disadvantages per se; on the contrary, it entails benefits for the user (who can access more services at the same place) and for the agent (who can carry out more transactions and thus increase income generated).

This analysis—conducted by Banca de las Oportunidades[7] and CGAP, with the technical support of Masae Analytics— is the first comprehensive effort to carry out georeferencing and thoroughly analyze the agent banking network's coverage in Colombia. For this purpose, Banca de las Oportunidades and CGAP identified that many institutions overseen by the SFC publish the address and map location of their agents, branches, or ATMs on their websites. With CGAP support, Banca de las Oportunidades was able to extract information, geocode, and show the map location of agents on the Internet.

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7. Banca de las Oportunidades is the government program that leads the implementation of the National Policy on Economic and Financial Inclusion and Education. Its objective is to promote access to financial products and services for low-income adults as well as micro-, small-, and medium-sized enterprises and entrepreneurs. It also aims to promote the coordination, implementation, and monitoring of economic and financial inclusion and education policies in order to reduce poverty, promote social equality, and stimulate economic development **(see website).**

This study consists of seven sections, including the introduction, which describes an overview of the study, the challenges it poses, and various next steps. The second section, called overview, describes the current situation of agent banking agreements with the information reported by financial institutions, while the third section explains the methodology implemented in the geospatial analysis study.

The fourth section presents the main findings of the analysis regarding the distribution and geographic density of banking agents, differentiating the information on agent banking agreements and physical locations of this channel—concepts that contribute to understanding how to manage this model in Colombia. The fifth section identifies areas without financial coverage that have great potential for financial system access points, which could respond to the needs and characteristics of both the population and the regions. The sixth shows the drivers and effects of financial inclusion, while the last section ends with the study's conclusions and the opportunities for joint work of the public and private sectors in order to geo-reference this channel.

2

OVERVIEW OF AGENT AGREEMENTS

The number of agent agreements has been growing rapidly in recent years, particularly as a result of the new circumstances created by the COVID-19 pandemic, such as the need for financial institutions to provide nearby channels for beneficiaries of cash transfer programs to withdraw cash or carry out other cash-out transactions.

In fact, these agreements tripled between 2019 and 2023, and the country went from having 159,039 agreements in 2019 to 550,482 in the second half of 2023. At the peak of the pandemic (2020-2021), there was a 70% annual growth in this regard (Graph 1).

Graph 1. Number of agent agreements and annual growth rate 2019-2023 (panel A) and percentage of agent agreements by type of entity, 2023 (panel B)
Source: Banca de las Oportunidades and CGAP, based on SFC and the Superintendence of Solidarity Economy (SES).

Panel A
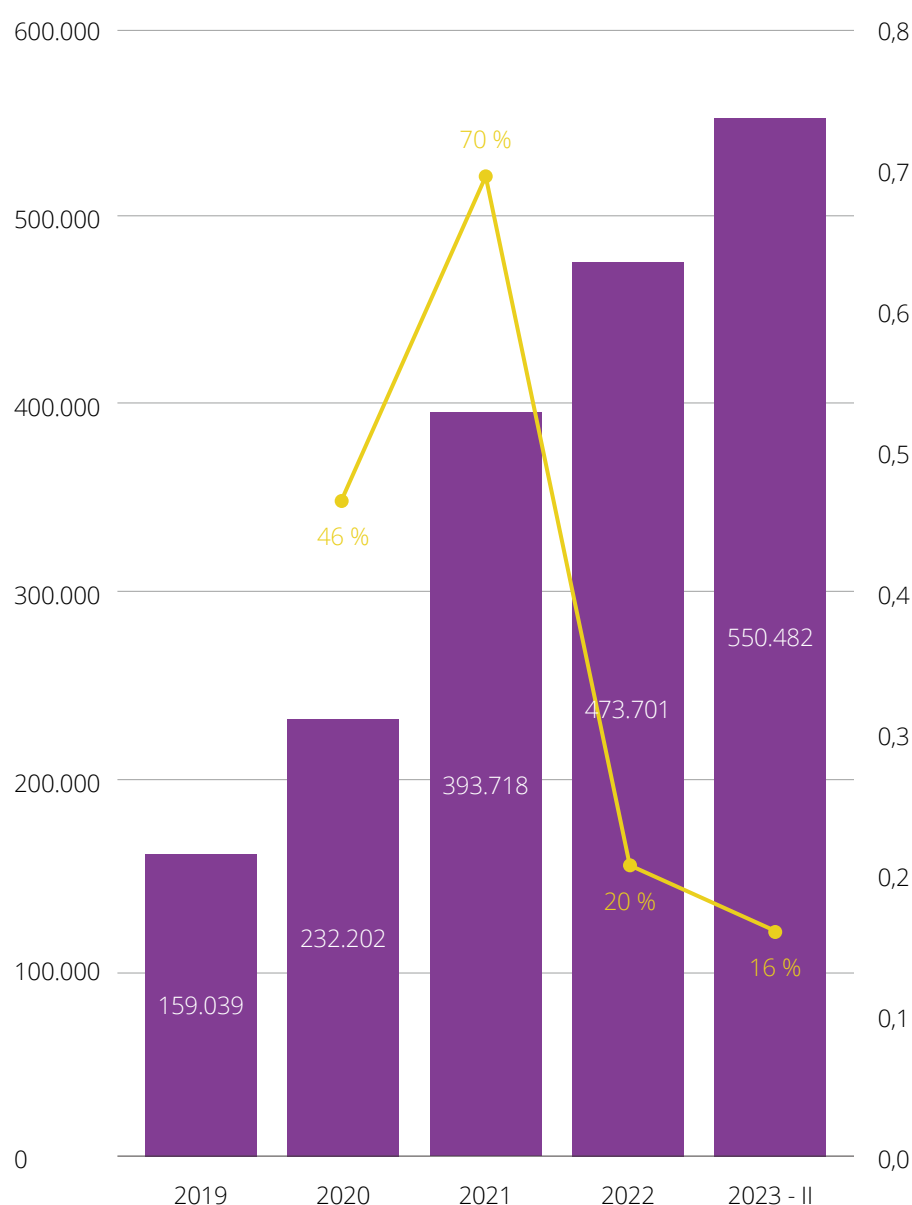
- Number of agents
- Growth rate

Panel B

- ● Banking establishments
- ● Financing companies
- ● Saving and credit unions
- ● Financial credit unions
- ● SEDPEs
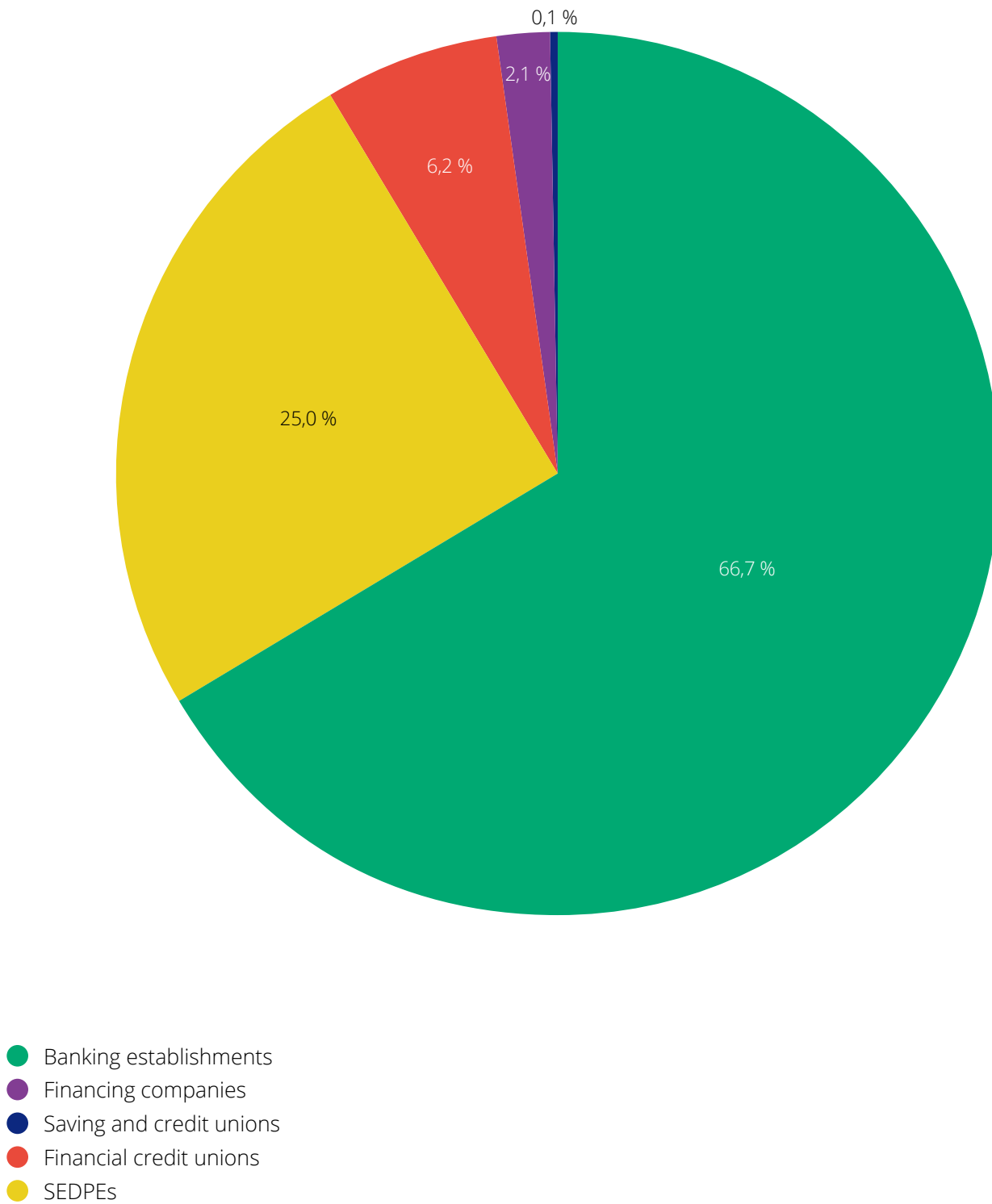
Graph 2. Number of total and active agent agreements (panel A) and percentage of agent activity, by type of operation and level of rurality (panel B).
Source: Banca de las Oportunidades and CGAP, based on SFC and the SES.

● Active agent agreements
● Agent agreements

Panel A

	Cities and urban agglomerations	Medium-sized municipalites	Rural municipalites	Dispersed rural municipalites
Agent agreements	351.536	78.745	41.575	20.715
Active agent agreements	189.744	41.713	21.917	10.709

Panel B

● Self-operated
● Outsourced

	Cities and urban agglomerations	Medium-sized municipalites	Rural municipalites	Dispersed rural municipalites
Self-operated	51,3 %	66,8 %	73,2 %	72,3 %
Outsourced	53,2 %	50,7 %	48,3 %	48,0 %
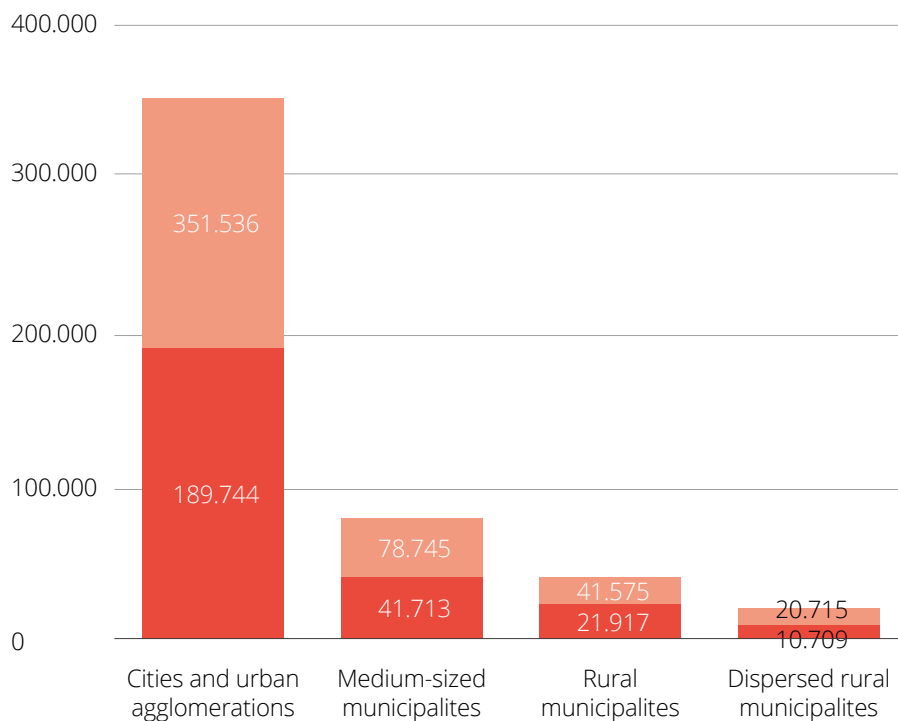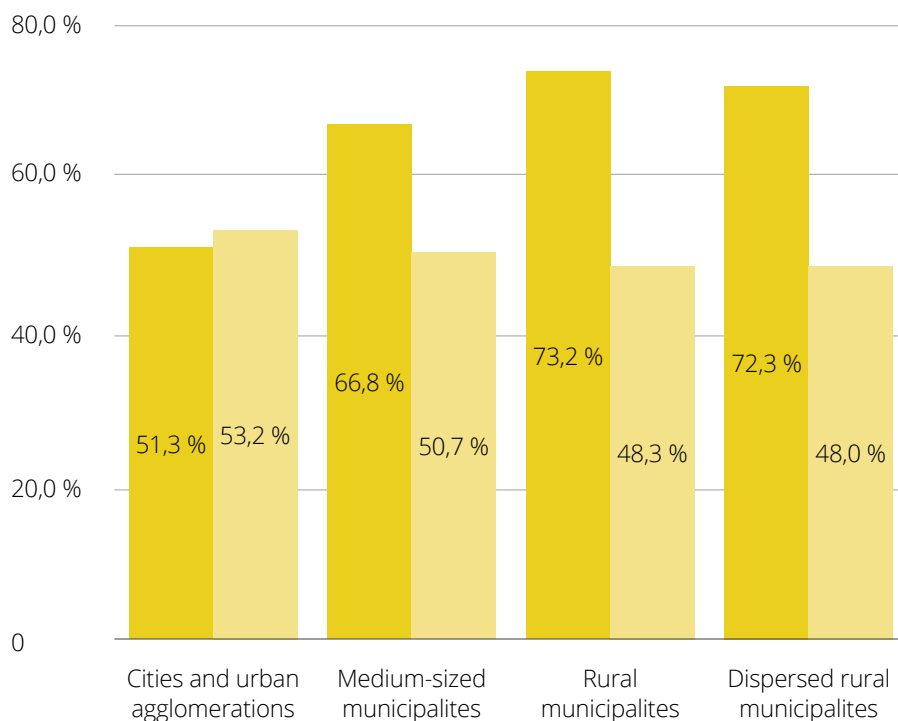
Existing gaps between urban and rural municipalities have persisted for several years. Cities and medium-sized municipalities have 367,991 more banking agents than rural and dispersed rural municipalities, which translates to 28 banking agents per 10,000 adults. This difference is maintained with active (28.4 per 10,000 adults), self-operated (16.8 per 10,000 adults), and outsourced (26.1 per 10,000 adults) agents.

In Colombia, two main models have been established to manage the agent model: self-operated and outsourced. In the former, the locations are managed directly by the financial institution; in the latter, the institution contracts a third party to manage the location. Most financial institutions employ mixed networks (a combination of self-operated and outsourced agents); however, in general, they favor outsourced agents.

There are important differences between the self-operated and outsourced agent models. Self-operated agents facilitate the adoption of the bank's service standards and operate with larger quotas, which can increase service availability. These attributes require a more robust administrative structure. In contrast, outsourced agents have facilitated the adoption of high coverage levels with a lighter operating model that does not tend to stray from conventional network business archetypes such as those offering top-ups, lottery tickets, and money orders. Presumably, self-operated agent agreements correspond to physical locations exclusive to the financial institution managing them, while outsourced agent agreements can be either exclusive physical locations of one institution, or multi-institutional, operating the channel for more than one institution.[8]

In Colombia, outsourced networks are the most prevalent, representing 89.3% of the reported agreements, regardless of the level of rurality analyzed (Graph 3).

From a regional point of view, Colombia's northern departments, as well as a few others in the southwest, have a higher percentage of outsourced agent agreements (Map 1). In any case, most of them have percentages above 83%. This overview highlights the importance of outsourcing agent services so that the financial system may provide coverage to the entire Colombian territory.

The distribution of agent banking agreements by institution is distinct, concentrated in traditional banking. Indeed, 67% of agent banking agreements are with banks, followed by companies specializing in electronic deposits and payments (SEDPEs)[9]—with 25% of agreements—financial credit unions with 6%, and financing companies with 2% (Graph 3, Panel A).

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8. Between 2018 and 2021, Banca de las Oportunidades collaborated with banks and network management entities to promote the development of banking agents, strengthening their technical, operational, commercial, and financial capacities. This initiative made it possible to identify the aforementioned conclusions.

9. Entities known as SEDPEs are defined as financial institutions whose exclusive purpose is to obtain resources by receiving deposits, making payments and transfers, acquiring domestic and international loans specifically focused on financing their operating activity, and sending and receiving financial transfers.

Gráfico 3. Percentage of agents by type of operation: by type of entity (panel A), and by level of rurality (panel B).

Source: Banca de las Oportunidades and CGAP based on SFC.

Panel A

● Self-operated
● Outsourced

SEDPEs	6,2 % / 93,8 %
Financial credit unions	99,5 %
Financing companies	10,4 % / 89,6 %
Banking establishments	13,2 % / 86,8 %

Panel B

● Self-operated
● Outsourced

	Cities and urban agglomerations	Medium-sized municipalities	Rural municipalities	Dispersed rural municipalities
Outsourced	89,9 %	88,5 %	87,2 %	87,3 %
Self-operated	10,1 %	11,3 %	12,5 %	12,6 %

Map 1. Percentage of outsourced agent agreements by department

Source: Banca de las Oportunidades and CGAP based on SFC.

Percentage Outsourced

95,3 %

83,4 %
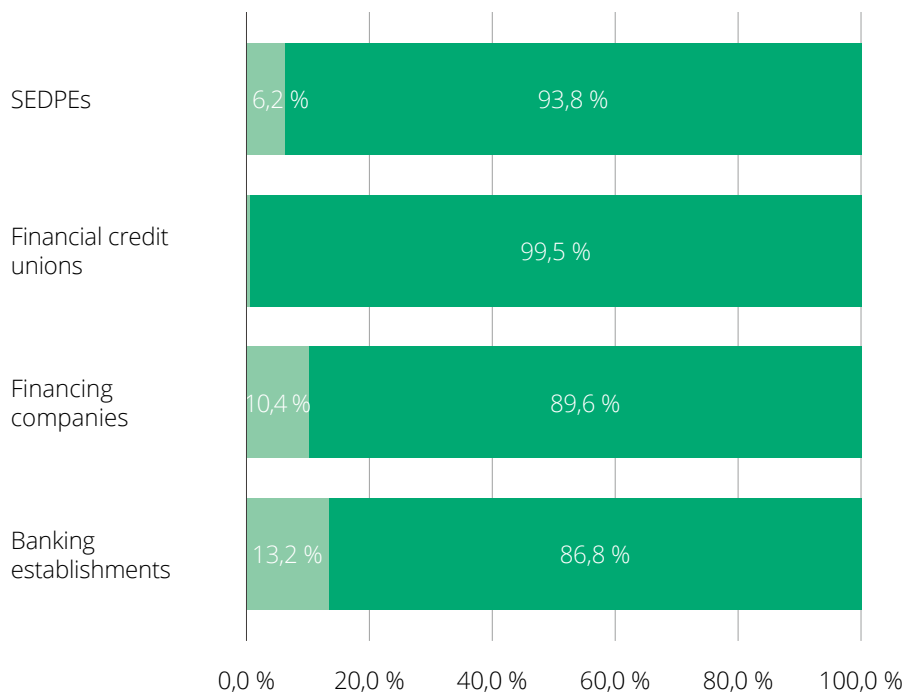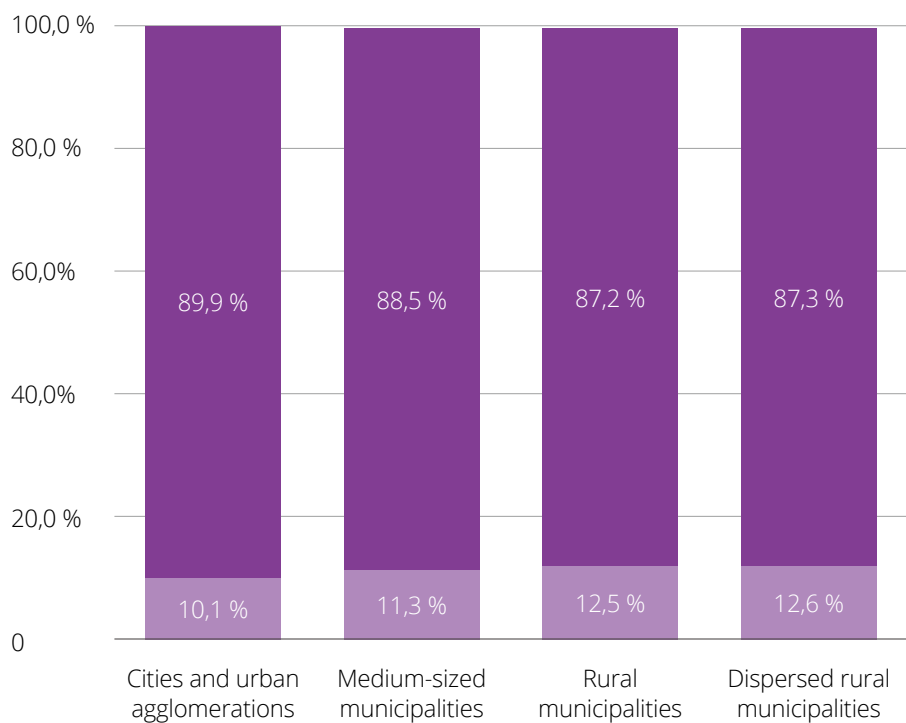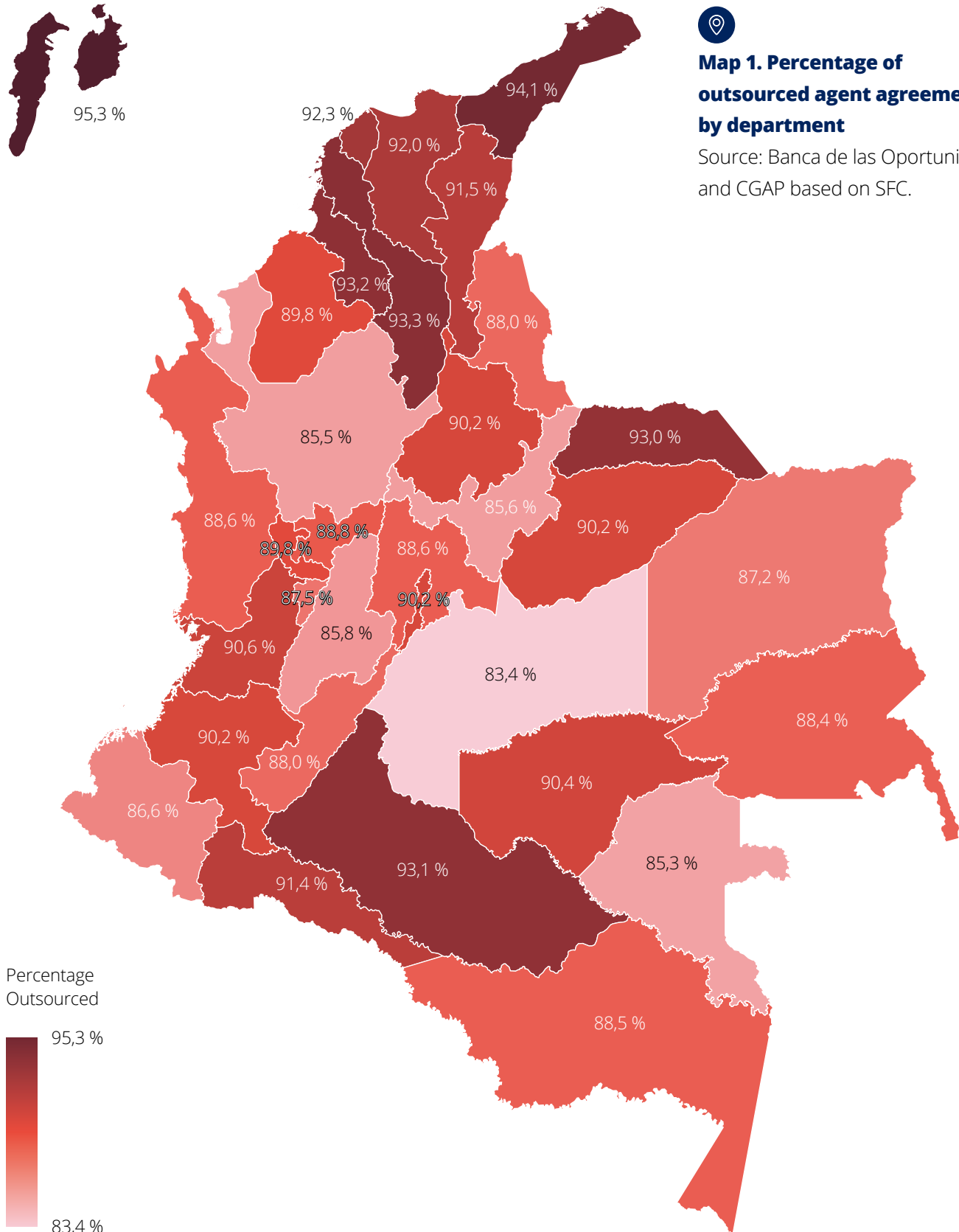
Graph 4. Percentage of activity by type of operation (panel A) and by level of rurality (panel B)

Source: Banca de las Oportunidades and CGAP based on SFC.

Panel A

SEDPEs	Outsourced: 12,8 % Self-operated: 0,5 %
Financial credit unions	Outsourced: 52,0 % Self-operated: 92,6 %
Financing companies	Outsourced: 45,8 % Self-operated: 65,9 %
Banking establishments	Outsourced: 68,3 % Self-operated: 66,7 %

0,0 %　20,0 %　40,0 %　60,0 %　80,0 %　100,0 %
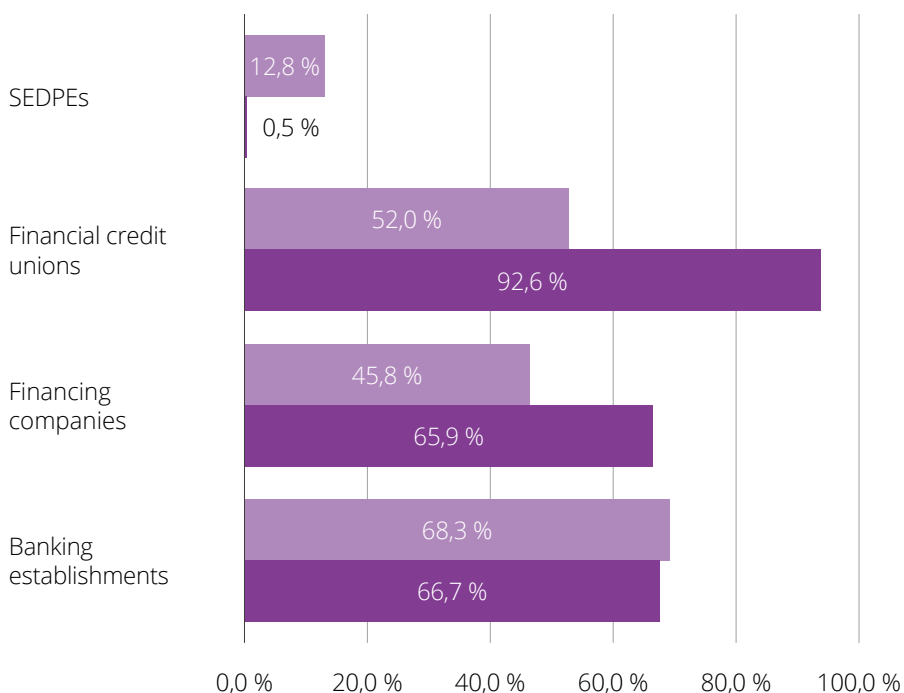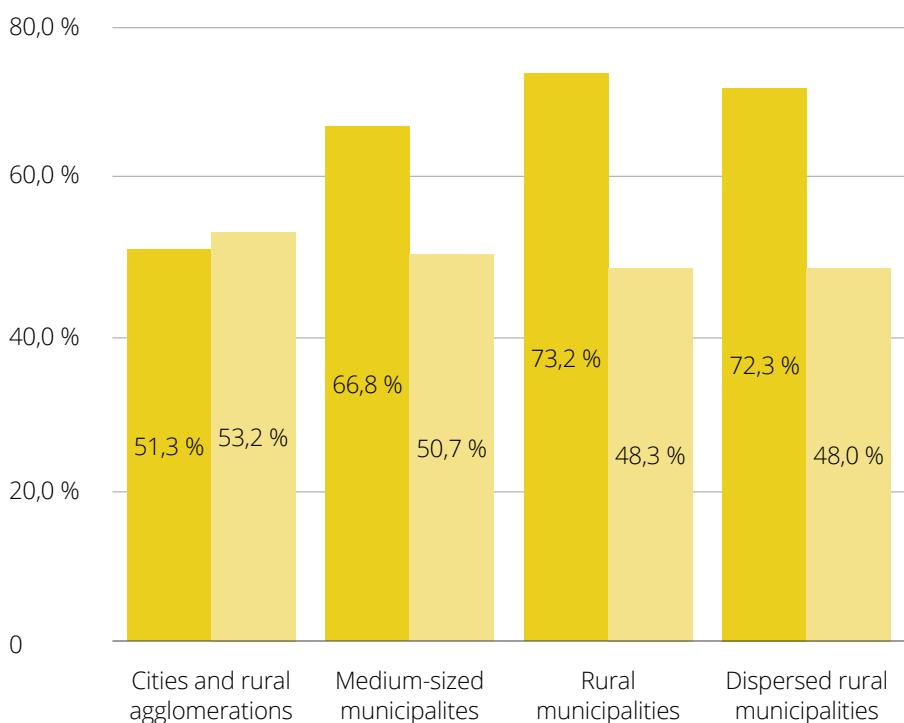
● Self-operated
● Outsourced

Panel B

	Self-operated	Outsourced
Cities and rural agglomerations	51,3 %	53,2 %
Medium-sized municipalites	66,8 %	50,7 %
Rural municipalities	73,2 %	48,3 %
Dispersed rural municipalities	72,3 %	48,0 %

● Self-operated
● Outsourced

Map 2. Percentage of agent activity operated by outsourced model (panel A) and self-operated model (panel B)
Soruce: Banca de las Oportunidades and CGAP based on SFC.

Percentage Outsourced

59,9 %

32,9 %
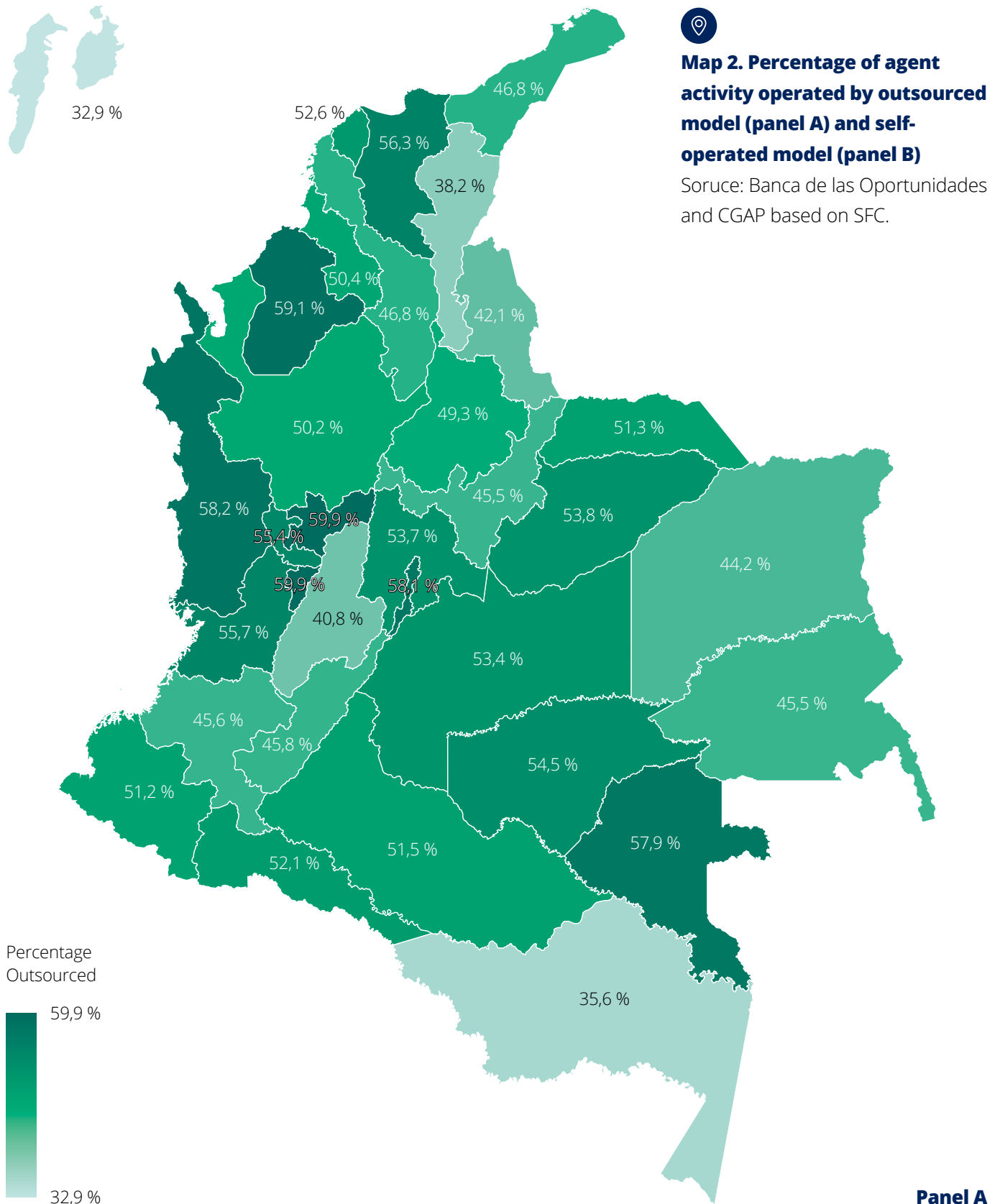
Panel A

Percentage
Self-operated

73,9 %

35,5 %

Panel B

Although the outsourced model is the most widely used, an analysis by type of operation (outsourced vs. self-operated agents) shows that their level of activity is varied. The percentage of activity of the latter, which measures the percentage of agents that have carried out a transaction in the last quarter, is higher for financial credit unions and financing companies (92.6% and 65.9%, respectively) (Graph 4). On the other hand, this trend is reversed for credit institutions and SEDPEs.

In turn, the level of activity of agent agreements in cities is similar for both self-operated and outsourced agents: 51.3% of the country's self-operated agents in cities are active, while this percentage stands at 53.2% for outsourced agents (Graph 4). However, the higher the level of rurality, the higher this percentage increases (medium-sized municipalities: 66.8%; rural municipalities: 73.2%; dispersed rural municipalities: 72.3%), while for outsourced agents, it decreases (medium-sized municipalities: 50.7%; rural municipalities: 48.3%; dispersed rural municipalities: 48%).

This trend is similar in all of the country's departments, where self-operated agents are used in greater percentages than outsourced ones (Map 2). In Bogotá, Vaupés, Caldas, Risaralda, and Quindío, the pattern is the opposite: outsourced agents are used more than self-operated agents.

3

GEOSPATIAL ANALYSIS METHODOLOGY FOR AGENTS

+ Main limitations of the analysis
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The process of geospatial analysis of banking agents in Colombia was carried out in five phases, described below.

1

IDENTIFICATION OF THE INSTITUTIONS WITH INFORMATION ON THE LOCATION OF BANKING AGENTS

First, available data was collected from 19 financial institutions that, as of the end of December 2021,[10] had public information informing their clients, associates, financial consumers, or users about the locations of their agents, branches, and ATMs. Table 1 lists the 19 financial institutions with information available on their websites.

According to SFC Form 534, 27 entities reported on their banking agents in 2022. Through this geospatial analysis, information was obtained from 19 of these, meaning that the study was carried out with only 70% of the institutions that have this type of channel.

10. Except in the case of Movii, whose information was extracted in November 2023.

Table 1. List of financial institutions overseen by the SFC that published agent information on their websites as of the end of 2021
Source: Banca de las Oportunidades and CGAP.

Nº	Financial Institution	Type of entity
1	Bancamía	Banking establishment*
2	Banco Agrario	Banking establishment
3	Banco AV Villas	Banking establishment
4	Banco Caja Social	Banking establishment
5	Banco de Bogotá	Banking establishment
6	Banco de Occidente	Banking establishment
7	Banco Popular	Banking establishment
8	Banco W	Banking establishment*
9	Bancolombia	Banking establishment
10	Bancoomeva	Banking establishment
11	BBVA	Banking establishment
12	Citibank	Banking establishment

* Banking establishment specializing in microfinance.

Nº	Financial Institution	Type of entity
13	Crezcamos	Financing company
14	Davivienda	Banking establishment
15	Itaú	Banking establishment
16	Mibanco	Banking establishment*
17	Movii	SEDPEs
18	Scotiabank Colpatria	Banking establishment
19	Serfinanza	Banking establishment

* Banking establishment specializing in microfinance.

2

EXTRACTION OF INFORMATION USING DATA ANALYTICS TECHNIQUES

Between January and June 2022, the automated web scraping technique, also known as web data mining, was used to collect data from the websites of the institutions listed in Table 1. This method is widely used in various areas such as market analysis, data mining, and internet research.[11] The elements found were in various formats: text, links to PDF documents, and images.

The information extracted for each agent banking agreement was based on two main sources: (i) the coordinates, which reflect the latitude and longitude of the agent bank in the Colombian territory, or (ii) the address of the agent banking location. This information could include the name of the business, network management entity, contracting financial institution, municipality, and department.

After finding the information and carrying out the scraping through various strategies,[12] the data needed to be systematically structured and standardized. In this way, we sought to ensure the accuracy and usefulness of these findings, transforming them into a format suitable for subsequent use and analysis. Thus, 194,094 records were extracted from the agent agreements of the 19 entities included in the analysis.

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11. From a legal point of view, this technique is viable to the extent that all the information can be obtained manually by reviewing each financial institution's website, made publicly available on the Internet by the institution themselves. In turn, the information extracted through this technique did not include sensitive data, such as the name of the person who manages the agent, nor his or her identification.

12. In some cases, the web scraping relied on browser automation through HTTP requests, which emulate human Internet browsing or make direct requests to web servers or to the network of the website hosting the information. In other cases, the technique consisted of identifying information regarding the agents' location, which was usually in tables embedded in the website, and then extracting the HTML code associated with this target. In more extreme cases, tools were used to convert PDF files into structured databases.

3

GEOCODING WITH PRECISE LOCATIONS

With the location coordinates or physical address, the analysis was divided into two major components.

On the one hand, web scraping was sufficient in order to extract coordinates—which incorporate the geographical latitude and longitude of a location—and thus directly provide the georeferencing of the agents. However, the addresses of the agents required an additional step to convert them into coordinates. To this end, an address geocoding process was carried out to obtain consistent and geographically accurate data.

Table 2. Geocoding of agents
Source: Banca de las Oportunidades and CGAP.

Coordinates	Number of records	% of records
From data extraction	98.644	50,82 %
From ArcGIS	87.181	44,92 %
From Google	8.231	4,24 %
Not geocoded	38	0,02 %
Total	**194.094**	**100 %**

Of the 194,094 records collected, 98,644 agents (50.82% of the total records) had information on their geographic coordinates in the data collected (Table 2). For those records that did not indicate the coordinates—but rather their addresses—on the website, a geocoding application processing interface (API) was used to translate these physical addresses into geographic coordinates. Initially, the ArcGIS API[13] was used to geolocate 87,181 records (44.92%), and for the 8,231 records (4.24%) where the ArcGIS API could not locate addresses or did not have the best quality, the Google API[14] was used. The remaining 38 records could not be geocoded.[15] Therefore, 194,056 records (99.98% of the total) were geocoded with precise location information.

13. The ArcGIS Geocoding API tool, developed by Esri, is part of the ArcGIS suite and is used to convert addresses to geographic coordinates and vice versa. It is characterized by its integration with geographic information systems (GIS), which makes it valuable for mapping, spatial analysis, and geographic data management applications **(see website)**.

14. Google's geocoding API, part of the Google Maps Platform, provides similar services to ArcGIS, but is more focused on web and mobile applications. Google's geocoding API integrates tightly with other Google Maps services, making it ideal for applications that require interactive maps, navigation, and route planning **(see website)**.

15. Agents were considered not geocoded if neither of the two geocoders used in the analysis (ArcGIS or Google) were able to find a location corresponding to their addresses in Colombian territory.

4

DEBUGGING AND ELIMINATION OF DUPLICATES IN THE SAME INSTITUTION

From the database of the 194,056 geolocated records, those that were repeated in the same institution were eliminated, keeping only one entry for agents with the same address, standardized name, and financial institution. This process eliminated 14,175 repeated records (7.3% of the total).

This resulted in a refined database of 179,881 geolocated records (Table 3). The institution with the largest number of agent agreements is Scotiabank Colpatria, with 31,451 agreements, representing 17.5% of the total number of agreements extracted. Next, the institutions with the largest number of agreements are Davivienda (26,150), BBVA (24,337), Bancoomeva (23,350), and Bancolombia (22,544). Together, these five banks account for 70.9% of all agreements. At the other extreme, the institutions with the lowest number of agreements are Citibank (41), Crezcamos (66), Banco Popular (117), Mibanco (160), and Itaú (293). These five institutions account for 0.4% of total agreements.

Table 3. Number of agent agreements, by financial institution

Source: Banca de las Oportunidades and CGAP.

Financial institution	Number of agent agreements
Scotiabank Colpatria	31.451
Davivienda	26.150
BBVA	24.337
Bancoomeva	23.350
Bancolombia	22.544
Banco de Occidente	18.733
Banco Agrario	9.674
Banco de Bogotá	9.664
Movii	6.684
Banco Caja Social	2.195
Banco AV Villas	1.861
Banco w	1.599
Bancamía	565
Serfinanza	396
Itaú	293
Mibanco	160
Banco Popular	117
Crezcamos	66
Citibank	41
Total	**179.881**

Geospatial analysis covers most of the agreements reported to the SFC. As of 2021, these 19 institutions reported 281,310 agreements of this type to the SFC; the sample extracted with web scraping represents 63.9% of those agreements reported to this superintendence (see appendices).

In relation to the sources of information used for this study, it should be noted that the institutions overseen by the SFC are responsible for reporting accurate information on the forms provided for this purpose. Likewise, the accuracy of this study's sample extracted with web scraping relies on how up-to-date the information contained in the corresponding institution's websites is.

5
GEOREFERENCING OF BANKING AGENTS LOCATIONS

In order to identify the physical locations of agents, the multi-institutional agent agreements that operate this channel for two or more financial institutions were determined using one of the following criteria:

1 Records located at exactly the same geographic location, thus sharing the same coordinates.

2 Records located at exactly the same address, within the same municipality and standardized department.

3 Records whose addresses coincide after the elimination of special characters such as spaces, hyphens, periods(e.g.,#.,-_), within a distance of less than 20 meters, and in the same standardized municipality and department.

4 Records with approximately similar addresses (by partial string matching),[16] after removing special characters, within a distance of less than 20 meters and in the same standardized municipality and department.

The 20 most frequent combinations of financial institutions in multi-institutional agent agreements are presented in Table 4.

The institutions that appear most frequently in the most common combinations are BBVA (9), Scotiabank Colpatria (8), and Bancoomeva (7). On the other hand, those that least frequently share agents with other financial institutions are Av Villas (1), Movii (2), and Banco W (2) (Table 4).

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16. Partial string matching is a process used in computing and data processing that involves finding matches between segments of text strings, rather than requiring a complete match of the entire string. This means that two strings are considered "matched" if there is sufficient similarity between a significant part of them, even if they are not entirely identical. In data analysis, it is used to group or rank data based on partial similarities, which is particularly useful in large data sets where exact matches may be rare.

Table 4. Number of agents for 20 most common combinations of more than one agent agreement

Source: Banca de las Oportunidades and CGAP.

Financial Institutions	Number of agents
Davivienda and Scotiabank	8.128
BBVA and Bancoomeva	7.922
Banco de Occidente and Bancoomeva	3.918
BBVA, Banco Agrario and Bancoomeva	2.440
BBVA and Banco Agrario	595
Banco de Occidente, Davivienda and Scotiabank	568
Banco Agrario and Banco de Bogotá	504
Banco de Bogotá and Banco de Occidente	462
Banco de Occidente and Scotiabank	447
BBVA, Banco W and Bancoomeva	447
BBVA, Bancoomeva and Scotiabank	415
Banco de Bogotá and Bancolombia	381
BBVA and Banco AV Villas	366
Davivienda and Movii	324
Banco de Occidente and Bancolombia	314
Davivienda, Movii and Scotiabank	288
BBVA and Scotiabank	274
BBVA, Banco Agrario, Banco W and Bancoomeva	259
BBVA, Banco Agrario, Bancoomeva and Scotiabank	469
Bancolombia, Davivienda and Scotiabank	433

⑥

DEFINITION OF PHYSICAL LOCATIONS OF AGENTS

To facilitate the identification of the physical locations of agents, Figure 2 is presented as an example to clarify the definition of the concepts used.

From this illustration, we derive five key concepts that will be used throughout the document:

① Agent agreement: A legal agreement between a financial institution and an agent whereby the latter operates the institution's agent channel.

In the illustration, the number of agent agreements corresponds to each point in the hypothetical geographical area. They can be exclusive or multi-institutional.

● **Exclusive agreement:** Agent agreement whose agent operates the channel exclusively for one financial institution. This means that each location or agent has only one agreement with one institution. In the hypothetical geographic area, it is represented by each of the four points outside the circles.

● **Multi-institutional agreement:** Agent agreement that shares the same physical location with at least one other agreement. These are the points within the three circles on the hypothetical geographic area.

✂

Figure 2. Exemplification of the types of records identified in the georeferencing
Source: Banca de las Oportunidades and CGAP.

Hypothetical geographical area
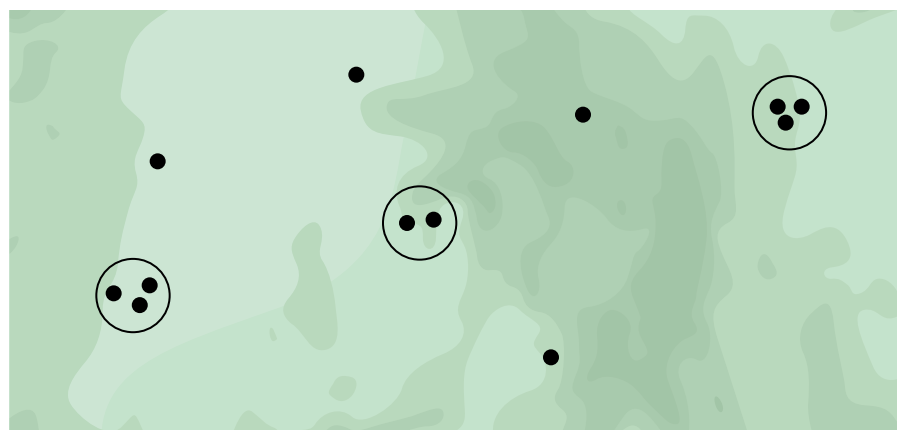
The following types of records are identified in the illustration:

12 Agent agreements
8 multi-institutional agreements
7 physical locations:
A. **4 exclusive physical** locations
B. **3 multi-institutional** physical locations

○ Physical location with more than one agreement
● Agent agreement

2 **Physical location of agent:** One specific physical location that operates with at least one agent agreement. It corresponds to the four points outside the circles and the three circles on the hypothetical geographic area. They can be exclusive or multi-institutional:

● **Exclusive physical location:** A physical location that has an exclusive agent agreement with one financial institution. Like the exclusive agreements, they are the four points outside the circles.

● **Multi-institutional physical location:** One specific physical agent location that provides services for more than one financial institution. A multi-institutional location has as many multi-institutional agent agreements as the number of financial institutions it works with. It can be calculated by adding the three circles of the hypothetical geographic area.

After the fourth phase of georeferencing agents, it was found that 99,186 (55.1%) of the 179,881 agent agreements identified were exclusive to a single financial institution, and the remaining 80,695 (44.9%) were multi-institutional.

The 99,186 agent agreements registered with a single financial institution correspond to the same number of physical locations exclusive to this channel, i.e., 99,186 exclusive physical locations. The 80,695 multi-institutional agreements correspond to 35,258 multi-institutional physical locations. The vast majority of the multi-institutional locations (77.1%) operated two agreements.

In summary, of the 179,881 agent agreements identified across 134,444 physical locations; of these, 99,186 (77.3%) are exclusive and 35,258 (26.2%) are multi-institutional (Figure 3).

Figure 3. Categorization of extracted records, by type
Source: Banca de las Oportunidades and CGAP.

Panel A. Distribution of agent agreements and physical locations, by type of agreement

	Agent agreements		Physical locations
Exclusive	**99.186** (55 %)	=	**99.186** (74 %)
Multi-institutional	**80.165** (45 %)	→	**35.258** (26 %)
Total	**179.881**	→	**134.444**

Panel B. Distribution of multi-institutional locations, according to the number of agreements in operation

| Resulting agreements | 54.370 | 19.059 | 5.568 | 1.168 | 80.165 Multi-institutional agreements |
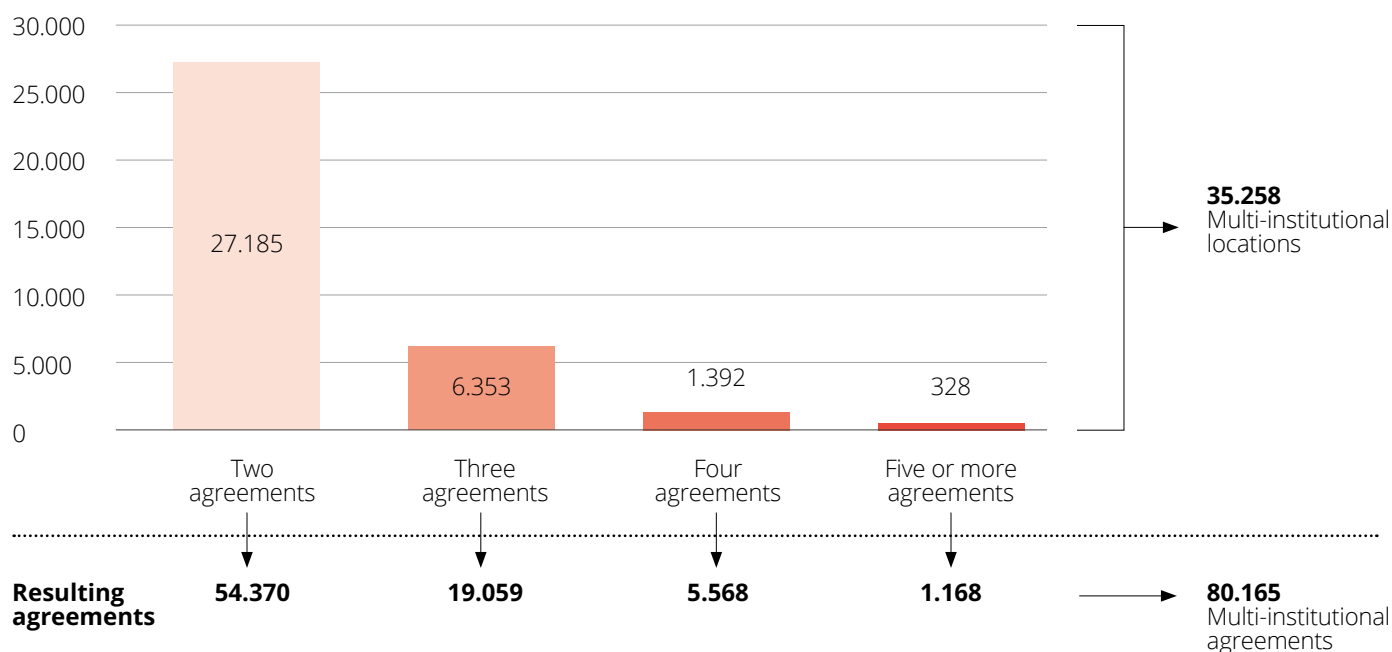
3.1
MAIN LIMITATIONS OF THE ANALYSIS

Several limitations have been identified regarding the information and methodology related to geospatial data analysis of banking agents.

① DATA LIMITATIONS

① **Representativeness:** Not all financial service providers have public information on their websites about customer service channels, including agents' locations.

In our analysis, we found that 19 of 30 financial institutions had reported this data as of the end of 2021.

② **Recurrence:** The date of the information published on financial institutions' websites, or the frequency with which such information is updated, was not found.

③ **Completeness:** There may be information gaps in terms of the number of agent agreements available on the websites.

For example, in the case of financial service providers that belong to a financial group or holding

company, there may be interoperability of channels between institutions, leading to a possible underestimation of the number of multi-institutional agents for these institutions. Furthermore, the information on most of the websites does not differentiate between outsourced networks that provide services to financial institutions and their self-operated agents (if applicable), so there is not enough evidence to determine whether all of them include information on their outsourced networks that provide agent services. [17] Additionally, this analysis did not include information on the agents for credit unions overseen by the SES.

4 **Categorization:** Even when the information exists, it may not be possible to categorize it by operating frameworks (prepaid vs. postpaid, fixed vs. mobile, self-operated vs. outsourced, or by type of network management entity).

5 **Standardization:** Reports on websites, and therefore data, are not standardized among institutions.

6 **Quality:** This constraint has two aspects:

● For the same institution, there may be repeated records, leading to potential duplication in the number of agent agreements.

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17. One way to do this is by georeferencing the information on the outsourced networks, but there is no efficient way to determine which institutions, for which regions, or what type of services they offer (e.g., there are some that only offer collection), so this information remains incomplete.

The methodology presented in the document found 14,175 repeated records, equivalent to 7.3% of the total records extracted from the analyzed websites.

● Structured address data may not be available. The coordinate information extracted from websites may deviate from the exact geographical latitude and longitude of an agreement.

On the other hand, capturing and systemizing information from the addresses where agent agreements are operating is a process that can be operationally demanding, especially for areas where land use planning is not fully defined. Additionally, this last group of information requires further processing by geocoding, whose potential limitations are discussed in the following section.

② METHODOLOGY LIMITATIONS

1 **Periodicity:** This study was carried out with information as of the end of 2022. The rapid quarterly expansion in the number of agent agreements may mean that the analysis loses relevance as new information from administrative records is published.

2 **Scalability:** The methodology used is computationally expensive. This is related to the web scraping technique itself. Recently, Luscombe *et*

al. (2021), among other authors,[18] have discussed the benefits and challenges of web scraping in the social sciences, focusing on how to navigate technical, legal, and ethical hurdles by adopting "algorithmic thinking in the public interest." Although it is a powerful tool for automatic data collection from websites, it has several disadvantages:

● **Load on web servers:** Automated requests can overload a website's servers, affecting its performance and availability to other users.

● **Maintenance and updating:** Websites are constantly changing their structure and content, which can quickly make scraping scripts obsolete, thus requiring constant maintenance.

● **Dependence on third parties:** In some cases, data obtained through scraping may depend on the accessibility and stability of third-party websites, which can be unpredictable.

● **Technical difficulties:** Websites that combine multiple complex features, such as dynamic content loading or CAPTCHA, present significant technical challenges for scraping.

● **Incomplete or inaccurate data:** Scraping may result in the collection of incomplete or misinterpreted data, especially if the website has measures to obfuscate its data or if the scraper is not well designed.

In these cases, scraping can lead to the collection of low-quality or irrelevant data, requiring additional processing to clean and organize it.

3 **Accuracy:** As for the addresses where agent agreements operate, there may be limitations on geocoders in obtaining accurate latitudes and longitudes. In particular, this may be due to the lack of information quality; incomplete land use planning in some municipalities means that geocoders cannot guarantee the accuracy of the coordinates provided.

4 **Identification:** Several of the above limitations may lead to significant challenges in identifying physical locations—a key aspect of georeferencing—thus affecting the criteria proposed in the fourth step of this section.

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18. Black (2016) explores the methodological complexities and the legal and ethical issues digital humanists face when using web scraping to search the internet, highlighting the importance of distinguishing research from commercial and malicious activities. Speckmann (2021) provides an overview of web scraping in psychology, pointing out its possibilities, limitations, and ethical and legal challenges associated with this data collection approach. Boegershausen *et al.* (2022) discuss idiosyncratic and sometimes insidious challenges in web data collection for marketing research, emphasizing the importance of addressing valid concerns that require joint consideration of technical, legal, and ethical issues. Krotov, Johnson, and Silva (2020) review the legal and ethical literature to identify areas of concern and specific questions that researchers and practitioners should address when performing web scraping, with the goal of decreasing the likelihood of legal and ethical controversies.

4

MAIN FINDINGS OF THE GEOSPATIAL ANALYSIS

4.1
GEOREFERENCED PHYSICAL LOCATIONS, BY INSTITUTION

This section compares the geographic presence of the 19 financial institutions included in the analysis. In particular, the geospatial distribution of its physical locations—both exclusive and multi-institutional—is presented.

Information on agent agreements, broken down into multi-institutional and exclusive, is also presented, offering a perspective on the types of operation and expansion of these institutions. In order to perform this analysis, several levels of disaggregation must be carried out in order to compare the figures of the various concepts in the analysis.

Table 5. Number of agent agreements reported from geospatial analysis (GA), reported to the SFC, and exclusive

Source: Banca de las Oportunidades and CGAP.

Institution	GA agent agreements		SFC agent agreements		Exclusive agreements (exclusive physical)	
	Self-operated	Outsourced	Self-operated	Outsourced	Self-operated	Outsourced
Institution 1	565	-	640	23.253	543	-
Institution 2	-	9.674	729	11.165	-	5.893
Institution 3	-	1.861	359	2.976	-	1.298
Institution 4	-	2.195	902	1.766	-	1.948
Institution 5	9.664	-	9.862	4.792	8.454	-
Institution 6	-	18.733	-	38.570	-	16.831
Institution 7	-	117	78	-	-	114
Institution 8	237	1.362	289	32.864	155	421
Institution 9	22.544	-	28.546	14.700	20.874	-
Institution 10	-	23.350	-	1	-	6.099
Institution 11	-	24.337	-	43.232	-	24.337
Institution 12	-	41	-	48	-	24
Institution 13	66	-	129	-	62	-
Institution 14	-	26.150	-	25.587	-	23.164
Institution 15	-	294	-	2.488	-	202
Institution 16	160	-	183	-	113	-
Institution 17	-	6.684	7.255	4.452	-	5.275
Institution 18	-	31.451	-	25.583	-	18.367
Institution 19	-	396	-	861	-	270
Grand total	**33.236**	**146.645**	**50.054**	**423.298**	**30.201**	**104.243**

Table 6. Number of agent agreements, multi-institutional agreements, and physical locations, by institution

Source: Banca de las Oportunidades and CGAP.

Entidad	Agent agreements	Multi-institutional agreements	Exclusive agreements (exclusive physical locations)
Institution 1	24.337	14.407	9.930
Institution 2	26.150	11.745	14.405
Institution 3	22.544	2.371	20.173
Institution 4	31.451	13.092	18.359
Institution 5	18.733	8.073	10.660
Institution 6	9.664	2.876	6.788
Institution 7	23.350	17.579	5.771
Institution 8	9.674	5.644	4.030
Institution 9	6.684	1.533	5.151
Institution 10	2.195	847	1.348
Institution 11	1.861	938	923
Institution 12	1.599	1.119	480
Institution 13	565	127	438
Institution 14	396	126	270
Institution 15	294	93	201
Institution 16	117	35	82
Institution 17	160	48	112
Institution 18	66	19	47
Institution 19	41	23	18
Grand total	**179.881**	**80.695**	**99.186**

Table 7. Number of total, exclusive, and multi-institutional physical locations, by institution

Source: Banca de las Oportunidades and CGAP.

Institution	Physical locations	Exclusive physical locations (exclusive agent agreements)	Multi-institutional physical locations
BBVA	24.337	9.930	14.407
Davivienda	23.164	14.405	8.759
Bancolombia	20.874	20.173	701
Scotiabank	18.367	18.359	8
Banco de Occidente	16.831	10.660	6.171
Banco de Bogotá	8.454	6.788	1.666
Bancoomeva	6.099	5.771	328
Banco Agrario	5.893	4.030	1.863
Movii	5.275	5.151	124
Banco Caja Social	1.948	1.348	600
Banco AV Villas	1.298	923	375
Banco W	576	480	96
Bancamía	543	438	105
Serfinanza	270	270	-
Itaú	202	201	1
Banco Popular	114	82	32
MiBanco	113	112	1
Crezcamos	62	47	15
Citi	24	18	6
Grand total	**134.444**	**99.186**	**35.258**

Table 8. Number of exclusive and multi-institutional physical locations, per partner

Source: Banca de las Oportunidades and CGAP.

Partner	Exclusive physical locations (exclusive agent agreements)	Multi-institutional agreements
No information from partners or self-operated agents	59.330	32.930
Punto de Pago	15.023	5.032
Gelsa - Paga Todo	6.187	860
Punto Red	5.859	9.287
Supergiros	4.137	21.676
Efecty	3.200	5.617
Fullcarga	1.008	836
Refácil	768	124
Red de Servicios Norte de Santander	539	52
Maphephone	510	16
La Rebaja	410	21
Betred	356	6
Giramás	270	126
Facilísimo	215	95
Bancamía	194	25
Gane	142	1.668
Éxito	133	28
Récord	124	698
Multipagas	121	12
Copenesa	103	17
Consuerte	95	381
Distracom	87	16
Susuerte S. A.	74	713
Cencosud	72	22
Carulla	63	22
Surtimax	54	24
Pyme	26	4
Apostar S. A.	24	340
Surtimayorista (C&C)	21	4
Reval	18	23
Super Inter	17	10
Edeq	6	10
Grand total	**99.186**	**80.695**

4.2
DISTRIBUTION OF GEOREFERENCED PHYSICAL LOCATIONS, BY LEVEL OF RURALITY

This section focuses on the distribution of financial institutions' georeferenced physical locations across different levels of rurality. It shows data and graphs with the number of multi-institutional agreements and physical locations per 10,000 adults in areas categorized as cities and urban agglomerations, medium-sized municipalities, rural areas, and dispersed rural areas, according to the National Planning Department's (DNP) Mission for the Transformation of the Colombian Countryside.

Graph 5. Number of agreements reported to the SFC, agreements recorded via geospatial analysis (GA), and physical locations per 10,000 adults, by level of rurality
Source: Banca de las Oportunidades and CGAP.

- SFC agent agreements
- AG agent agreements
- Physical locations

	Cities and urban agglomerations	Medium-sized municipalities	Rural municipalities	Dispersed rural municipalities
SFC agent agreements	136,3	117,4	110,6	89,4
AG agent agreements	50,6	44,9	50,0	34,2
Physical locations	37,7	33,4	38,3	25,9
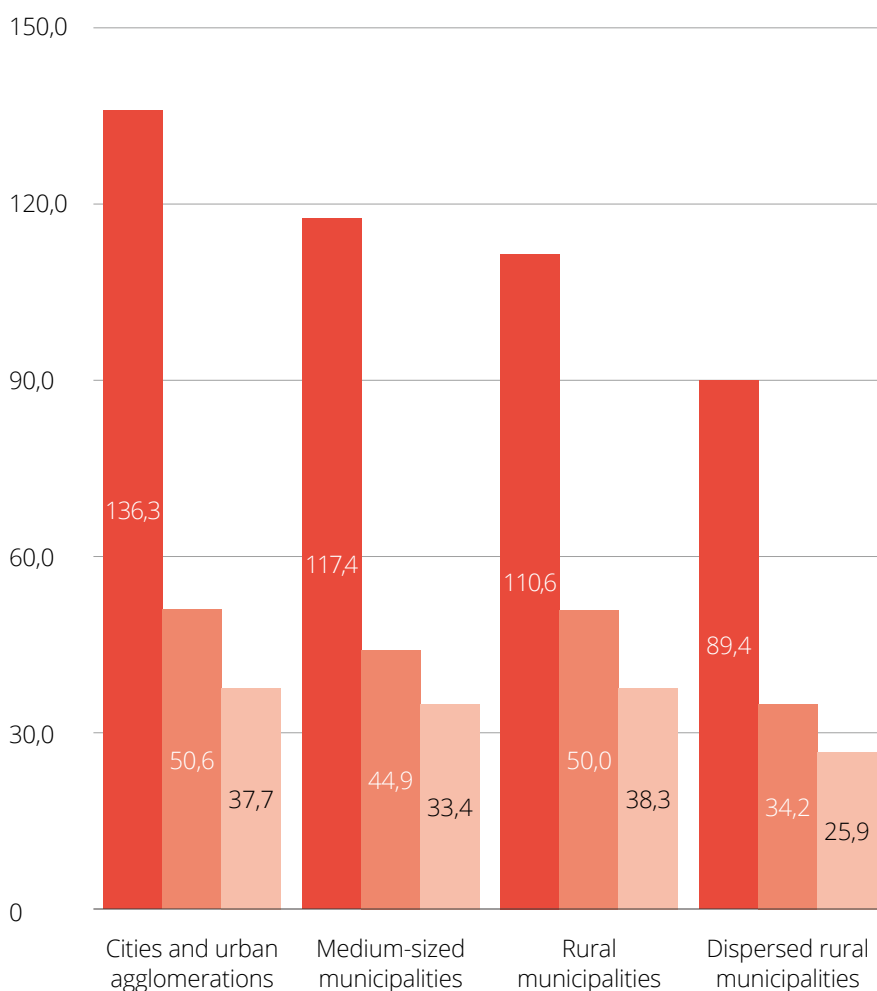
Graph 6. Number of exclusive and multi-institutional physical locations per 10,000 adults, by level of rurality.
Source: Banca de las Oportunidades and CGAP.

Exclusive physical locations
Multi-institutional physical locations

	Cities and urban agglomerations	Medium-sized municipalities	Rural municipalities	Dispersed rural municipalities
Multi-institutional	9,9	9,1	9,4	6,6
Exclusive	27,8	24,3	28,9	19,3
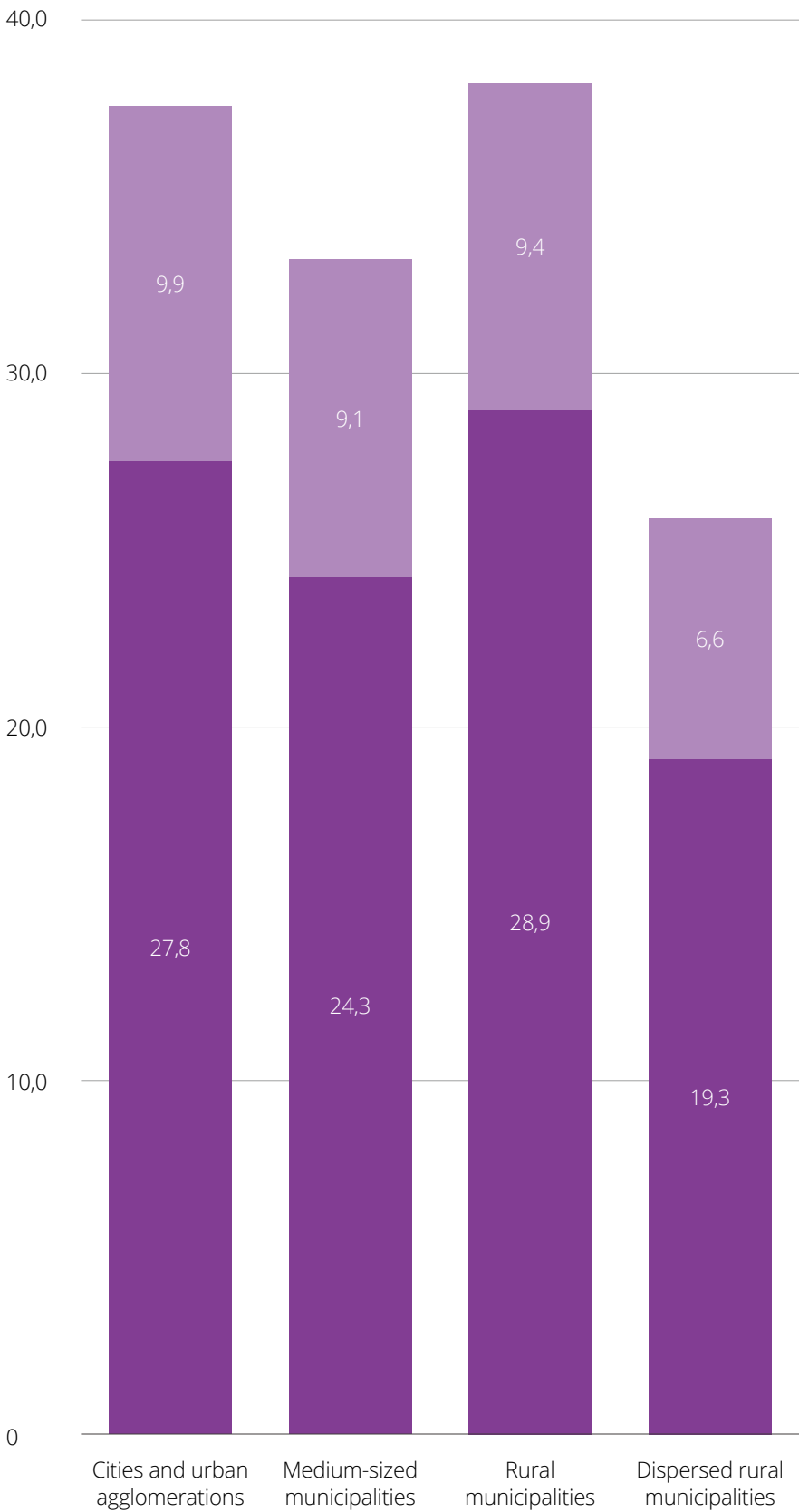
4.3
DISTRIBUTION OF GEOREFERENCED PHYSICAL LOCATIONS, BY REGION

This section shows the distribution of physical locations by region. It includes graphs illustrating the number of physical locations, both exclusive and multi-institutional, per 10,000 adults in the regional division suggested by the DNP: Caribbean, Central, Eastern, South Central, Eje Cafetero, Llano region, and Pacific

Graph 7. Number of agreements reported to the SFC, from geospatial analysis (GA) and per 10,000 adults, by region
Source: Banca de las Oportunidades and CGAP.

- SFC agent agreements
- AG agent agreements
- Physical locations

Region	SFC agent agreements	AG agent agreements	Physical locations
Caribbean	108,0	49,2	32,7
East central	163,9	57,8	44,2
South Central	159,8	56,7	46,1
Eje cafetero region	86,7	32,9	27,1
Llano region	157,4	56,3	41,1
Pacific	108,1	42,0	30,6
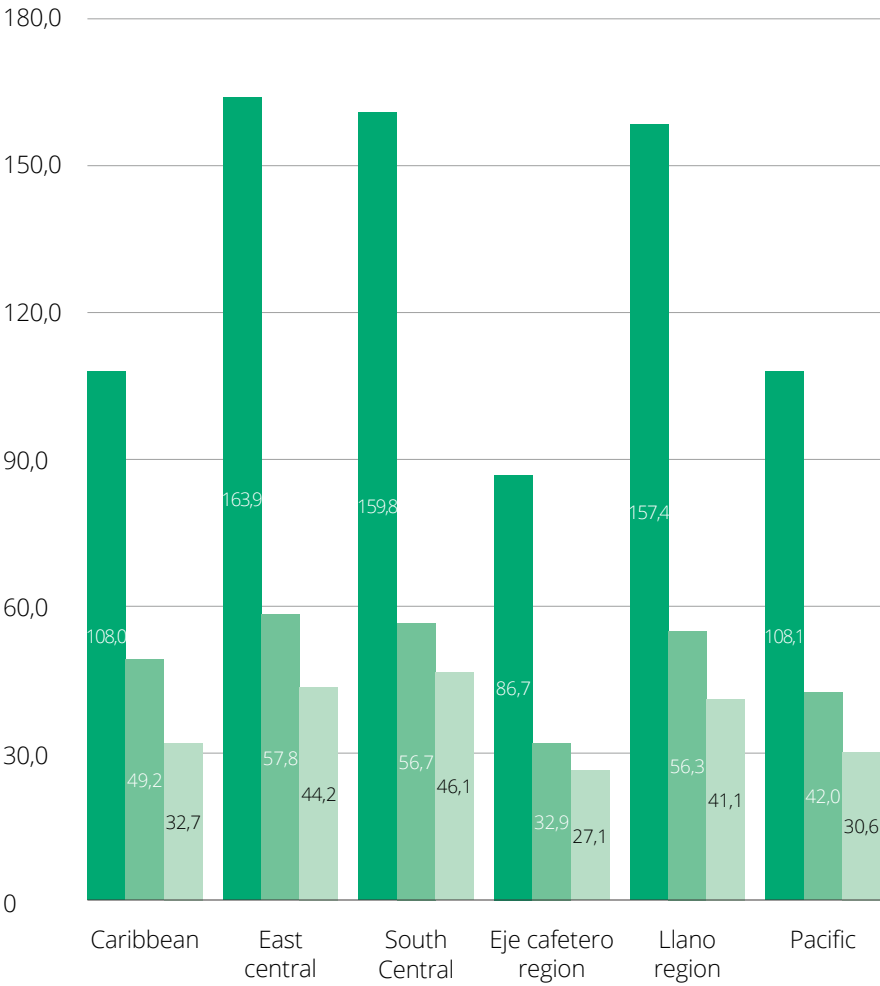
Graph 8. Number of exclusive and multi-institutional physical locations per 10,000 adults, per region

Source: Banca de las Oportunidades and CGAP.

Region	Exclusive physical locations	Multi-institutional physical locations
Caribbean	20,9	11,8
East central	33,6	10,6
South Central	37,1	9,0
Eje cafetero region	22,2	4,9
Llano region	28,9	12,2
Pacific	21,3	9,3

Legend:
● Exclusive physical locations
● Multi-institutional physical locations

4.4
DISTRIBUTION OF GEOREFERENCED PHYSICAL LOCATIONS, BY DEPARTMENT

This section presents maps with the distribution of physical locations and agreements, by department. It also shows the percentage of exclusive agents, by department.

At the end is the table with the comparison of agents reported to the SFC, resulting from the geospatial analysis (GA), and exclusive agreements or exclusive physical locations.

Map 3. Number of agent agreements and physical locations, per department and per 10,000 adults
Source: Banca de las Oportunidades and CGAP.

GA agent agreements

67,8

8,8

Panel A

Physical locations

53,9

7,3

Panel B

Map 4. Percentage of exclusive agents, per department and per 10,000 adults [19]
Source: Banca de las Oportunidades and CGAP.

Percentage of exclusive physical locations

87,8 %

51,1 %
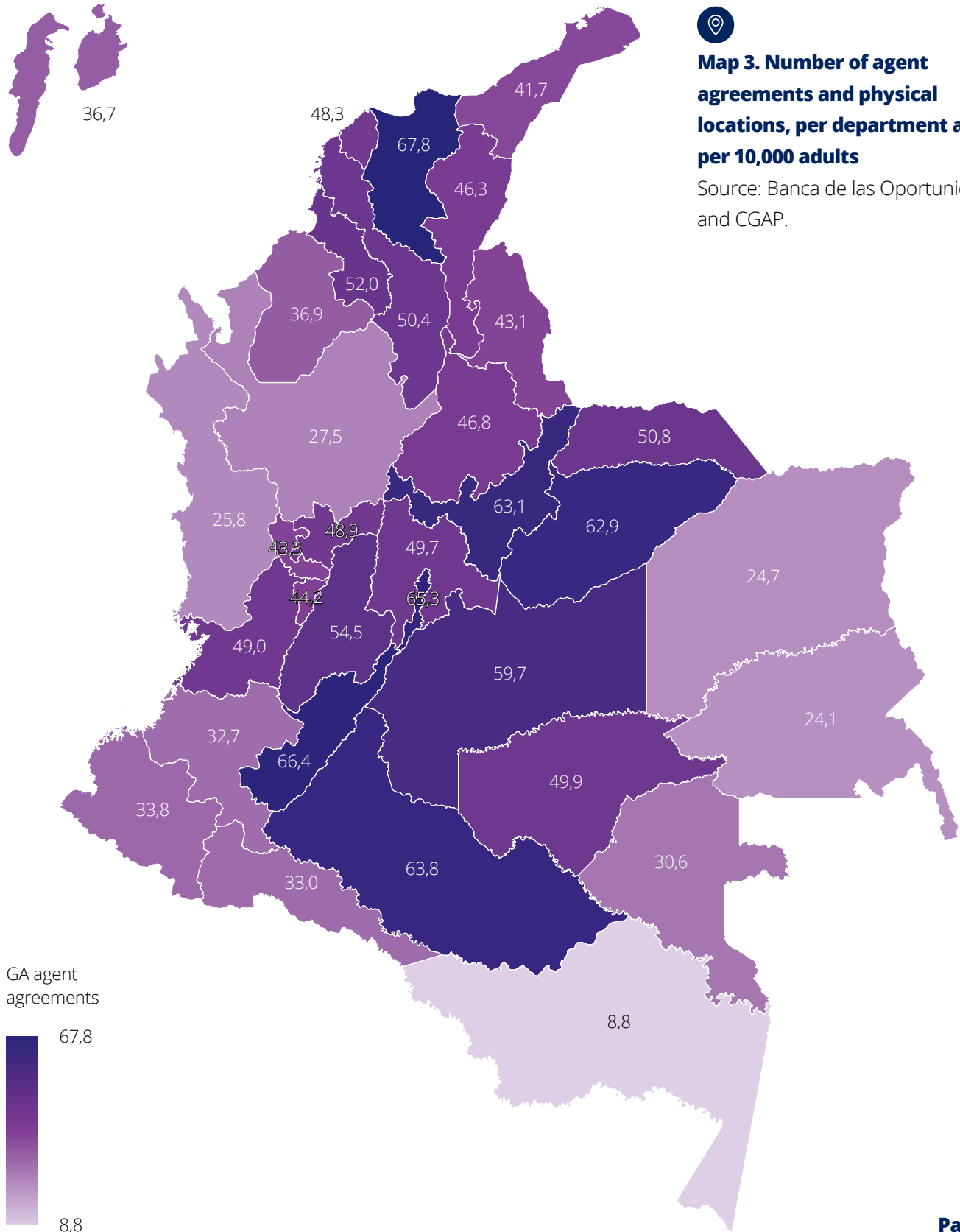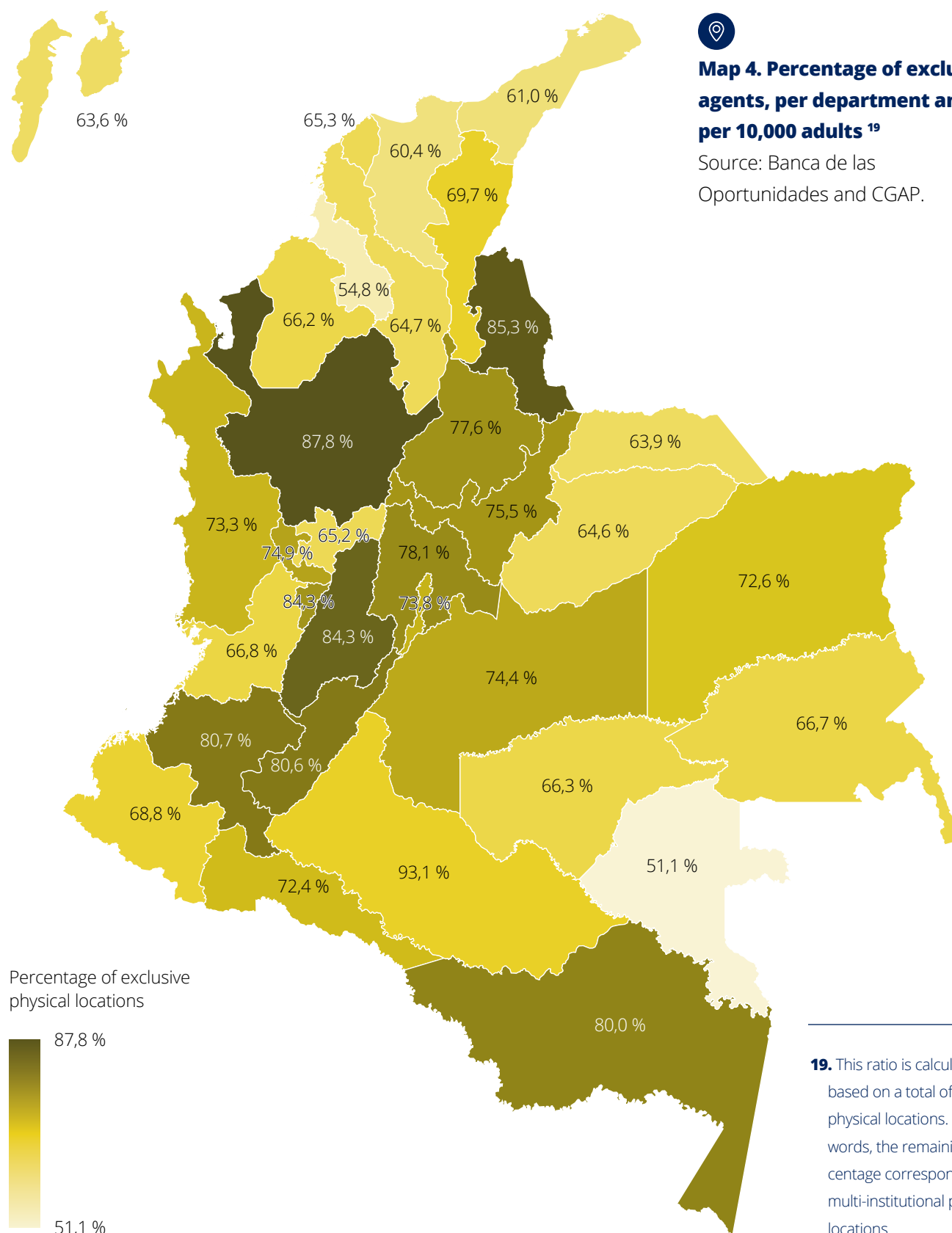
19. This ratio is calculated based on a total of 134,444 physical locations. In other words, the remaining percentage corresponds to multi-institutional physical locations.

Table 9. Number of agreements reported to the SFC, recorded from geospatial analysis (GA), and per 10,000 adults by department
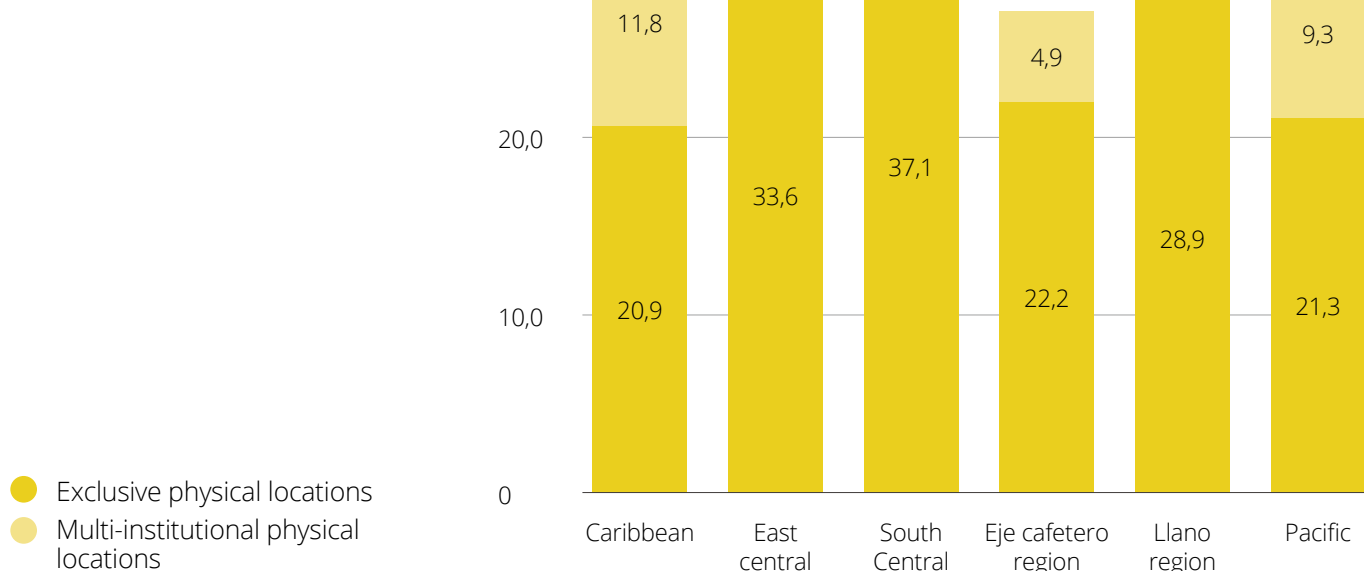
Source: Banca de las Oportunidades and CGAP.

Department	SFC agent agreements	GA agent agreements	Physical locations
National	**126,7**	**48,2**	**36,0**
Amazonas	58,2	8,8	7,3
Antioquia	82,1	27,5	24,0
Arauca	160,0	50,8	35,3
SPS* Archipelago	146,7	36,7	24,6
Atlántico	90,1	48,3	31,2
Bogotá, D. C.	179,3	65,3	48,0
Bolívar	119,2	50,4	32,6
Boyacá	186,8	63,1	49,3
Caldas	104,4	48,9	34,7
Caquetá	208,9	63,8	47,1
Casanare	181,3	62,9	44,1
Cauca	104,2	32,7	26,6
Cesar	159,6	46,3	34,8
Chocó	74,2	25,8	18,1
Córdoba	83,4	36,9	25,4
Cundinamarca	131,6	49,7	39,3
Guainía	69,4	24,1	16,7
Guaviare	139,1	49,9	35,3
Huila	179,4	66,4	53,9
La Guajira	99,0	41,9	27,9
Magdalena	96,8	67,8	44,7
Meta	160,7	59,7	45,0
Nariño	94,0	33,8	24,4
Norte de Santander	136,2	43,1	36,9
Putumayo	108,0	33,0	24,3
Quindío	98,8	44,2	34,3
Risaralda	84,5	43,3	33,1
Santander	153,0	46,8	37,1
Sucre	125,7	52,0	33,1
Tolima	146,5	54,5	46,4
Valle del Cauca	116,6	49,0	35,0
Vaupés	69,4	30,6	19,2
Vichada	63,8	24,7	17,6

*SPS: San Andrés, Providencia and Santa Catalina Archipelago

4.5
DISTANCE TO THE NEAREST AGENT

When analyzing the proximity of banking agents to the population, the average of median distance in all departments, except Vichada and Amazonas, is 1 km. This means that, in most departments, half of the population is less than 1 km from a agent.[20] In Vichada and Amazonas, the median distances are 3.6 and 11.3 km, respectively.

Bogotá, Atlántico, Valle del Cauca, and Risaralda are the departments whose populations are closest to agents, with a median distance of less than 0.15 km. Additionally, Atlántico and Bogotá have the shortest maximum distance; in these departments, the population that is farthest from a agent must travel between 10 km and 11 km, respectively.

Although the median distance is less than 500 m for almost all departments, in terms of the maximum distance and the extreme deciles, the proximity of agents to the population shows varied results.

Ten departments have a maximum distance of more than 45 km and, among these, half of them exceed 100 km: Caquetá, La Guajira, Guainía, Vichada, and Amazonas. Amazonas shows the greatest differences between the extreme deciles (Table 10).

In line with the results at the departmental level, the shortest median distances at the municipal level prevail in the northwestern quadrant of Colombia (Map 5).

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20. To analyze the proximity of banking agents to the population, the distance to the nearest agent was calculated per pixel, i.e., per inhabitant in every 0.01 km².

## Table 10. Distribution of distance to nearest agent

Source: Banca de las Oportunidades and CGAP.

Department	Median (km)	Max. (km)	First decile (km)	Ninth decile (km)
Bogotá, D. C.	0,08	11,08	0,03	0,24
Atlántico	0,10	9,95	0,03	0,44
Valle del Cauca	0,12	31,07	0,04	0,81
Risaralda	0,13	13,37	0,04	0,57
Cesar	0,15	23,42	0,04	3,18
Antioquia	0,15	25,38	0,04	2,91
Caldas	0,16	17,12	0,04	2,76
Sucre	0,16	13,37	0,04	2,31
Huila	0,17	25,32	0,04	2,40
Quindío	0,17	13,61	0,04	1,02
Santander	0,17	18,39	0,04	2,79
Norte de Santander	0,17	17,45	0,05	3,31
Tolima	0,17	16,88	0,04	2,93
Boyacá	0,18	29,07	0,04	2,87
Córdoba	0,20	16,90	0,05	3,29
Magdalena	0,21	22,27	0,05	4,41
Cundinamarca	0,21	15,93	0,04	1,91
Meta	0,23	52,16	0,05	6,96
Bolívar	0,23	23,67	0,05	3,51
SPS Archipelago	0,27	2,94	0,07	1,08
Caquetá	0,29	100,89	0,05	10,93
Casanare	0,29	34,08	0,06	5,17
Nariño	0,30	36,08	0,05	5,41
La Guajira	0,35	125,02	0,06	37,93
Cauca	0,38	33,23	0,06	3,97
Putumayo	0,41	46,59	0,07	4,58
Guaviare	0,43	76,00	0,07	8,73
Arauca	0,52	29,29	0,08	11,45
Vaupés	0,59	81,37	0,07	54,91
Guainía	0,73	117,44	0,10	55,50
Chocó	0,85	53,48	0,11	13,25
Vichada	3,62	111,55	0,11	55,79
Amazonas	11,25	187,96	0,21	96,42

Map 5. Median distance to the agent at the municipal level
Source: Banca de las Oportunidades and CGAP.
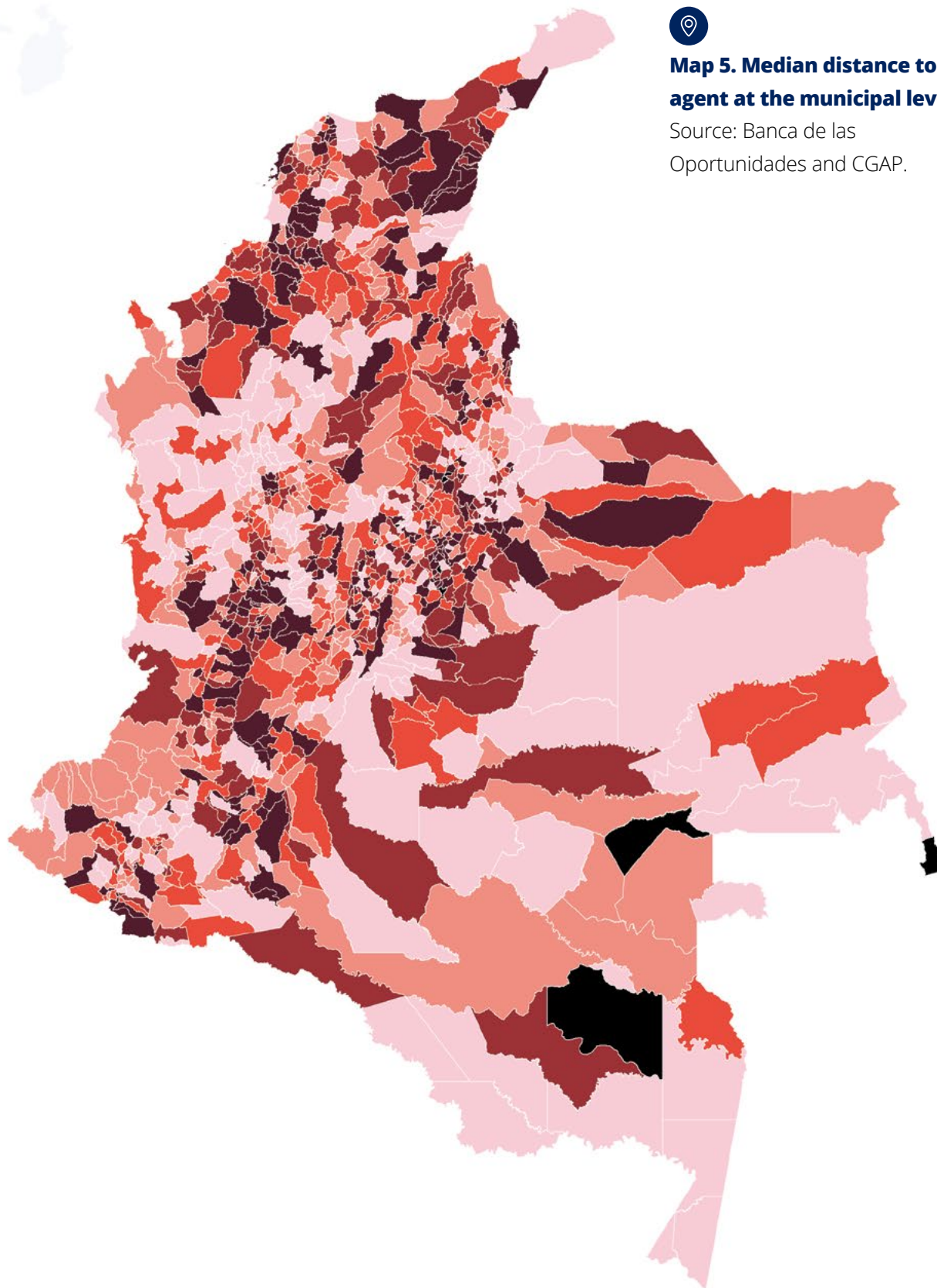
4.6
PERCENTAGE OF THE POPULATION WITHIN 5 KM OF A AGENT

94% of the population resides within 5 km of a banking agent. This percentage exceeds 98% in the six best-served departments: Archipelago of San Andrés, Providencia, and Santa Catalina, Bogotá, Atlántico, Valle del Cauca, Quindío, and Cundinamarca.

In contrast, the departments of Chocó, Arauca, Vaupés, Guainía, Amazonas, and Vichada are the furthest behind; less than 70% of their population lives within 5 km of a banking agent. In Amazonas, this percentage drops to 35% (Table 11).

The municipalities with the highest percentage of the population within 5 km of a agent are located mainly in the central areas of Colombia (Map 6).

Table 11. Percentage of departmental population located within 5 km of a agent

Source: Banca de las Oportunidades and CGAP.

Department	Percentage of populationwithin 5 km of a agent (%)
SPS Archipelago	100,00
Bogotá, D. C.	99,95
Atlántico	99,41
Valle del Cauca	98,96
Quindío	98,65
Cundinamarca	98,59
Risaralda	97,37
Sucre	96,42
Huila	95,52
Santander	95,13
Boyacá	95,11
Antioquia	94,94
Norte de Santander	94,46
Caldas	94,44
Tolima	94,28
Cauca	93,54
Córdoba	92,77
Bolívar	91,71
Putumayo	91,67
Cesar	91,64
Magdalena	91,18
Casanare	89,55
Meta	87,73
Nariño	85,79
La Guajira	82,12
Guaviare	80,88
Caquetá	79,98
Chocó	69,27
Arauca	69,19
Vaupés	60,33
Guainía	58,03
Vichada	51,52
Amazonas	35,36

Map 6. Percentage of municipal population within 5 km of a agent

Source: Banca de las Oportunidades and CGAP.

Percentage of municipal population within 5 km of a agent

- 99,99 % - 100,00 %
- 99,09 % - 99,99 %
- 93,17 % - 99,09 %
- 77,27 % - 93,17 %
- 0,00 % - 77,27 %
- No data
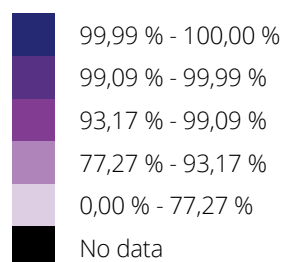
More than 70% of the people living more than 5 km from a agent are located in rural and dispersed rural municipalities (Table 12).

Table 12. Percentage of population residing more than 5 km from a agent, by level of rurality
Source: Banca de las Oportunidades and CGAP.

Level of rurality	Total percentage of population (%)	Percentage of population residing more than 5 km from a agent (%)
Cities and urban agglomerations	64,03	12,82
Medium-sized municipalities	16,76	15,78
Rural municipalities	11,13	31
Dispersed rural municipalities	8,07	40,4

5

IDENTIFICATION OF POTENTIAL COVERAGE AREAS

As a tool to identify and prioritize potential places to assign and open new agent locations, potential coverage areas were identified as those settlements or zones with the following characteristics: (i) they did not have agents within 5 km; (ii) they had sufficient population density when compared to the agents' average coverage per population: 544 inhabitants, calculated at the municipal level; and (iii) they had road connectivity, being located less than 2 km from the main road network. This last criterion was defined to promote the accessibility of agents.

The process of identifying potential coverage areas was carried out in phases, as follows:

1 A total of *29,286 settlements* were identified in the country,[21] and the population of each settlement was calculated.

2 Settlements with agents within 5 km were excluded, leaving *7,296 potential settlements* without coverage.

3 Settlements located less than 2 km from the country's main road network (main roads, primary, secondary, tertiary, and unclassified) were filtered out, [22] resulting in *4,415 settlements.*

4 Settlements with a population above the agents' average population coverage were filtered out. This resulted in *766 settlements* that were defined as potential areas in which to provide coverage.

These potential coverage areas have an average population of 36,751 inhabitants, representing 3.2% of Colombia's total population. Antioquia, Córdoba, Bolívar, La Guajira, and Meta stand out as the departments with the largest number of these areas, with more than 52 each. I*n La Guajira, Guaviare, Caquetá, Vichada, and Amazonas, people living in these settlements represent more than 10% of the department's population.* This implies that, in these departments, one out of every ten people lives in a potential coverage area without current agent coverage (Table 13).

21. A settlement layer has been created using data provided by WorldPop. The term "populated pixel" refers to the smallest unit of area on the digital maps generated by WorldPop. Each of these pixels represents an estimate of the number of people residing in a specific area. In general, in WorldPop maps, a pixel can cover an area as small as 100x100 m, especially in urban areas. This implies that population density and distribution can be modeled in detail, allowing a precise understanding of how and where people live in various parts of the world.
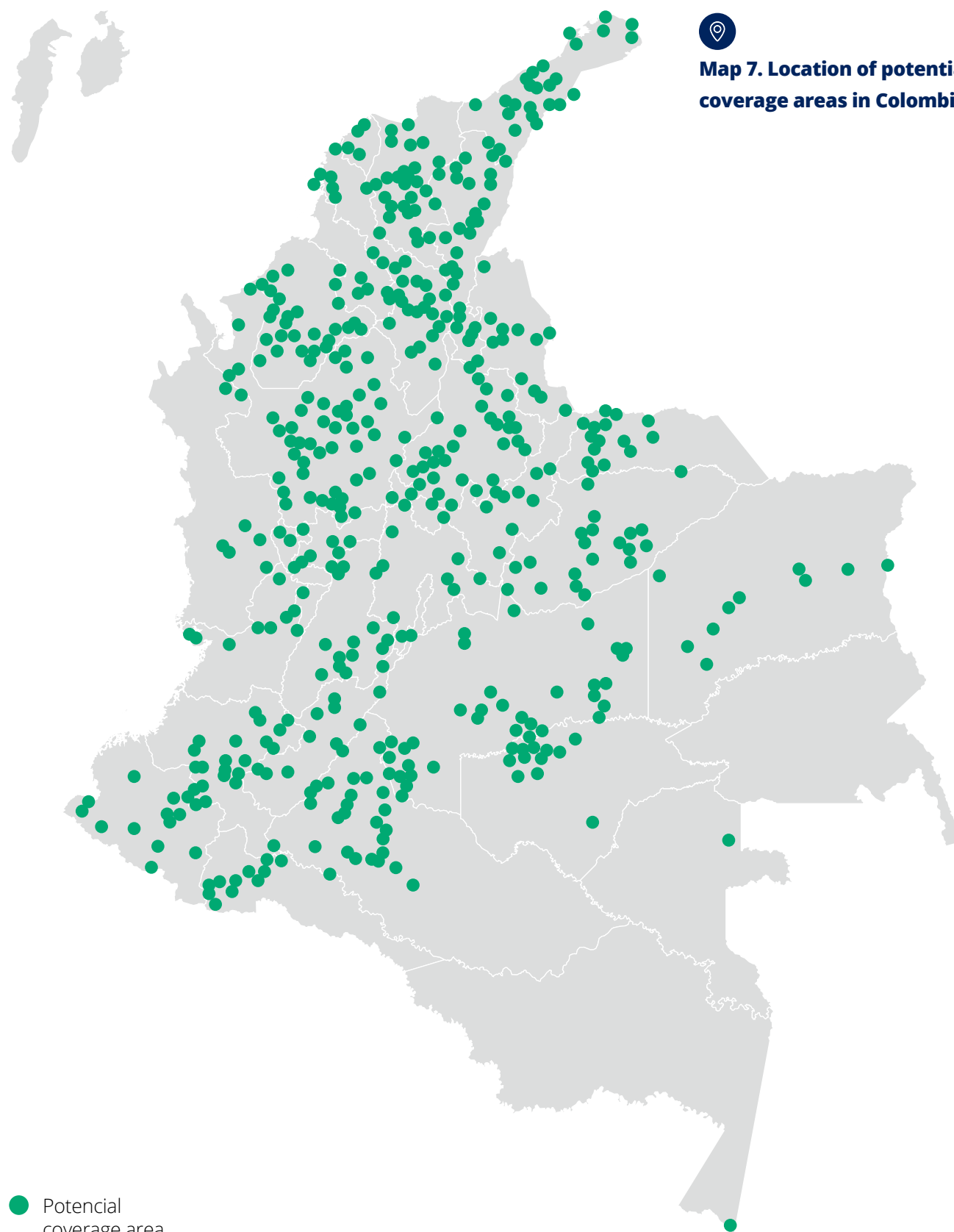
The methodology used to calculate the population per pixel in WorldPop integrates census and survey data, satellite imagery, and geospatial analysis. In addition, United Nations demographic projections are used, resulting in the creation of highly detailed population maps. In the context of this particular analysis, the populated pixels that were within 100 m of each other are grouped into a single settlement, reflecting the various settlements around the country.

22. The term "unclassified" is a historical vestige of the United Kingdom's road system and refers to local roads connecting towns and villages.

Table 13. Number of areas without coverage and percentage of population living in these areas

Source: Banca de las Oportunidades and CGAP.

Department	Number of areas without coverage	Percentage of population living in areas without coverage (%)	Population in areas without coverage	Departmental population 2022
Antioquia	81	1,3	89.474	6.787.846
Córdoba	64	5,6	106.029	1.882.211
La Guajira	53	14,0	142.769	1.017.121
Bolívar	52	7,2	160.972	2.227.184
Meta	46	4,8	53.267	1.113.810
Cesar	45	4,2	56.636	1.349.162
Magdalena	43	2,6	38.325	1.476.366
Caquetá	42	10,1	42.665	421.797
Santander	38	1,5	34.640	2.335.238
Cauca	25	1,9	28.725	1.541.265
Tolima	24	1,8	25.046	1.367.802
Casanare	22	10,4	47.968	459.973
Arauca	21	11,3	34.790	307.628
Nariño	21	1,8	30.914	1.689.002
Putumayo	21	5,3	20.072	377.095
Boyacá	19	1,2	14.987	1.285.035
Norte de Santander	17	1,2	20.207	1.678.975
Guaviare	16	22,6	21.391	94.625
Huila	16	2,2	25.884	1.164.463
Caldas	15	2,7	27.459	1.034.151
Chocó	14	3,0	17.430	584.521
Cundinamarca	13	0,4	14.842	3.334.637
Valle del Cauca	12	0,5	24.177	4.626.064
Sucre	10	1,2	11.609	980.942
Vichada	10	10,7	12.980	120.942
Amazonas	8	13,4	11.251	83.690
Atlántico	7	0,2	6.221	2.774.958
Risaralda	6	1,0	9.822	970.138
Quindio	3	0,9	5.037	559.810
Bogotá, D. C.	1	0,0	3.019	7.873.316
Vaupés	1	1,5	663	45.579
Total	**766**	**2,2**	**1.139.271**	**51.682.692**

Map 7. Location of potential coverage areas in Colombia

● Potencial
coverage area

Map 8. Example of potential coverage areas in Antioquia

- Agent
- Potencial coverage area
- Roads
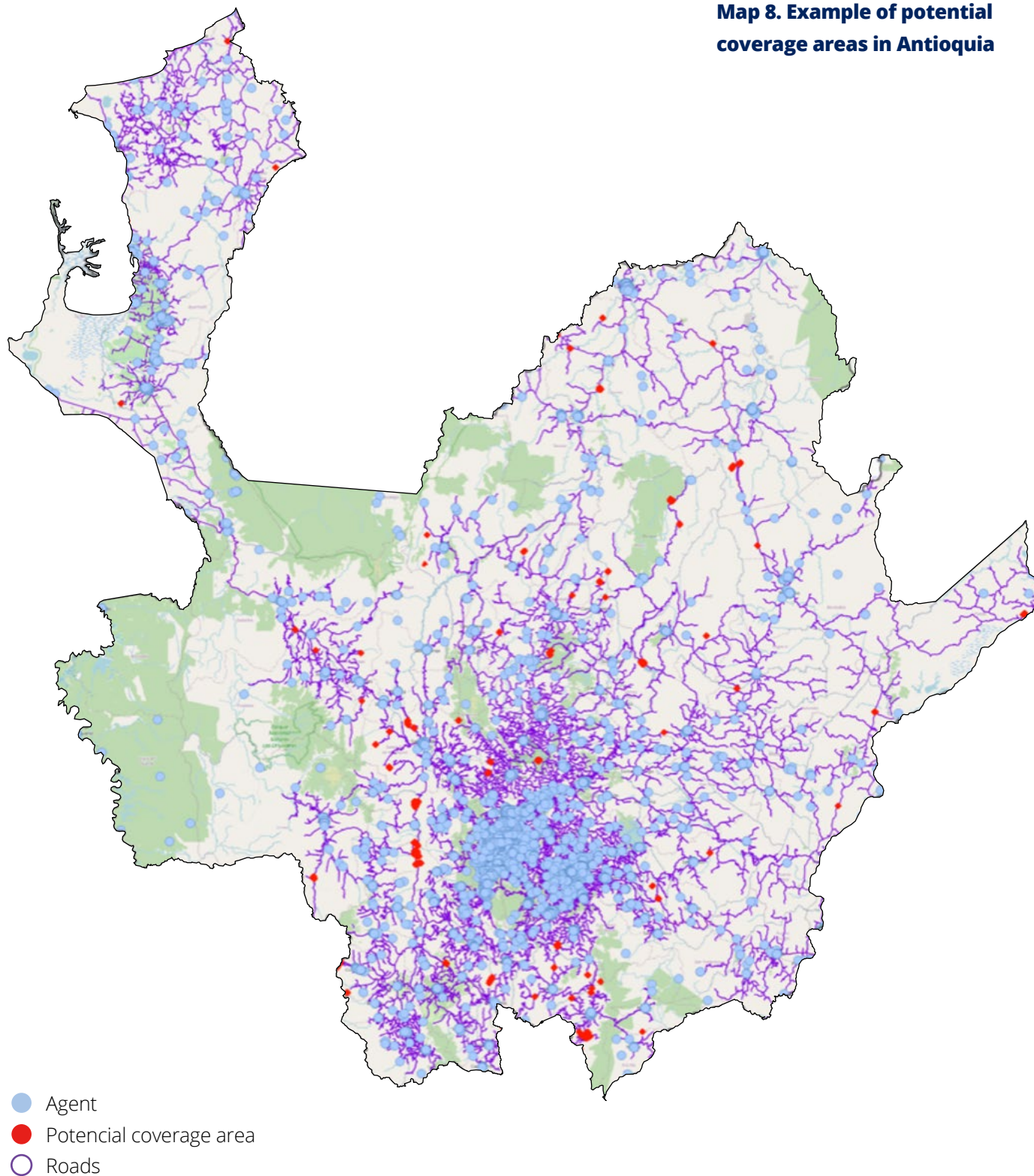
6

RESEARCH ON THE DRIVERS AND EFFECTS OF FINANCIAL INCLUSION

This section examines the factors that influence the presence or absence of agents and evaluates the bi-directional relationships between sociodemographic indicators, obtained from secondary data sources, and the presence of agents. These secondary data sources include:

1 Meta's relative wealth index (RWI),[23] a metric designed to assess and compare standard of living levels among different countries. This index considers various factors such as per capita income, wealth distribution, access to basic services, and quality of life. Although specific to Meta, this variable may reflect differences in economic and social wellbeing.

2 The Global Gridded Relative Deprivation Index (GRDI), an analytical tool to identify geographic areas where the most impoverished population resides. This parameter measures deprivation in relation to the living standards of a particular society and is based on indicators such as access to education, health, employment, and housing conditions. The GRDI helps to identify socioeconomic disparities and is used in the design of public policies focused on poverty reduction.

3 The use of OpenStreetMap (OSM)[24] road data to estimate road density by calculating the ratio between the total length of the road network and the total area of the municipality. This methodology takes advantage of OSM's extensive database, which includes detailed and up-to-date information on roads, streets, and highways.

Road density is a key indicator for understanding a region's connectivity, access to services, and urban and rural planning.

4 Multidimensional poverty levels by municipality, obtained from the geospatial portal of the National Department of Statistics (DANE),[25] provide a holistic view of poverty by encompassing various indicators beyond economic income. This index includes indicators such as education, health, labor, access to public services, and housing conditions. Multidimensional measurement allows for a more precise identification of different communities' needs and helps to formulate more effective public policies to combat multidimensional poverty.

These indicators are geolocated with a high degree of detail, which facilitates the analysis and calculation of specific correlations at very specific settlement levels, such as cities, municipalities, and villages. The sources of information are presented in Table 14.

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23. See **https://dataforgood.facebook.com/dfg/tools/relative-wealth-index**

24. See: **https://databank.worldbank.org/metadataglossary/world-development-indicators/series/IS.ROD.DNST.K2**

25. See: **https://dane.maps.arcgis.com/apps/MapJournal/index.html?appid=54595086fdd74b6c9effd2fb8a9500dc**

Table 14. Description of the sources of information used

Source: Banca de las Oportunidades and CGAP.

Name	Description	Type	Granularity	Year	Source
Worldpop	Residential population distribution, expressed as the number of people per pixel	Raster	100x100 m pixel	2020	**Worldpop**
RWI	Estimated relative living standards per country for each pixel	Raster	2,4km	2022	**META**
GRDI	Estimated relative living standards per country for each pixel	Raster	1 km	2020	**SEDAC**
DANE multidimensional poverty	Municipal multidimensional poverty measure (%)	Zones	Municipality	2020	**DANE**
Subnational administrative boundaries of Colombia	Administrative boundaries of Colombia at level 0 (country), 1 (department), and 2 (municipality)	Zones	Municipality	2021	**OCHA**
Colombian roads network	Road transportation in Colombia	Lines	Exact location	2022	**OSM**

As a first step, a correlation matrix was developed, shown in the appendices, to analyze the relationships between sociodemographic characteristics and coverage indicators in the departments.[26] The density of banking agents is positively correlated with population density, road density, and average RWI. In contrast, there is a negative correlation with the GRDI, multidimensional poverty, and the percentage of people exceeding the average levels of the GRDI.

In a second step, the relationship between various poverty and wealth indicators and the proximity of agents was explored. Multiple linear regression models were developed to determine whether these variables are significantly linearly related.[27]

This analysis evaluates several equations, where the outcome variables Y are the number of agents per 10 km², the number of agents per capita, or the percentage of population within 5 km of a agent. The set of predictor variables X includes average RWI, GRDI, multidimensional poverty level, road density, and population density. Multiple linear regression models are calculated at the department, municipality, and settlement levels.

In addition, the associated *p-values* are calculated to determine whether the results of the study are statistically significant or likely to have occurred by chance. A small *p-value* (generally less than 0.05) suggests that the results are unlikely to have occurred by chance alone, indicating evidence of a real effect or difference.

Due to the *p-values* being less than 0.05, it can be said that the number of agents per square kilometer is significantly positively correlated with population density, road density, and RWI. Likewise, the number of agents per capita is significantly related, at least at 10% significance, to all the explanatory variables included in the analysis. Finally, the percentage of population within 5 km of a agent presents a significant negative correlation with multidimensional poverty and road density (Table 15).

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26. The correlation coefficients in this matrix range from -1 to 1, where a value close to 1 suggests a strong positive correlation, indicating that the variables tend to increase together. On the other hand, a value close to -1 indicates a strong negative correlation, which implies that the variables move in opposite directions. A value close to 0 implies a weak or non-existent correlation.

27. A multiple linear regression analysis provides estimates for the slope and intercept of the linear equation that predicts an outcome variable, Y (also known as the dependent variable), as a function of the values of a set of predictor variables, X (also called independent variables). The general form of this equation is shown below: $Y=b0+b1 X1 + b2 X2 + ... + bi Xi$. The constant, b_0, represents the predicted value of Y when $X=0$. On the other hand, the slope, b1, represents the average change in Y for each one-unit increase in X. Beyond providing the strength and direction of the linear relationship between X and Y, the slope estimate allows for the interpretation of how Y changes as X increases. In addition, this equation can be used to predict Y values for a given X value.

Table 15. Coefficients and p-values of multiple linear regression (departmental level)[28]

Soruce: Banca de las Oportunidades and CGAP.

		Number of agents per km²	**Number of agents per capita**	**Proportion of population within 5 km of a agent**
Constant	Coef.	–1,7147	2,8417	125,1779
	p value	0,010	0,03	0,44
Population density	Coef.	0,0248	–0,0003	–0,0055
	p value	0	0,018	0,037
Road density	Coef.	1,399e+06	1,603e+06	8,67e+06
	p value	0,002	0,024	0,483
RWI	Coef.	–2,7634	–2,9529	–4,4004
	p value	0,006	0,058	0,872
GRDI	Coef.	0,0078	–0,0289	–0,3940
	p value	0,455	0,094	0,203
Multidimensional poverty	Coef.	–0,0082	–0,0275	–0,5651
	p value	0,201	0,012	0,005
R²		**1,000**	0,635	0,724

At the municipal level, except when the number of agents per 10 km² is used as the dependent variable, the models face greater challenges in explaining all the variability in the dependent variables through the independent variables. This suggests the possible existence of other factors that could explain agent density.

However, several coefficients show statistical significance. The number of agents per 10 km² continues to reflect a positive correlation with population density as well as with the RWI, correlating negatively with the GRDI. The number of agents per capita has a negative correlation with multidimensional poverty, while the percentage of the population within 5 km of a agent has a positive correlation with road density and a negative correlation with the GRDI, multidimensional poverty, and population density.

In general, the dependent variables (presence of agents) tend to have a positive correlation with wealth indicators and a negative correlation with poverty indicators.

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28. The coefficients (R-squared or R2)—which represent the percentage of variability in the dependent variable, explained by the independent variables in the model—were also calculated to assess how well the regression model fit the observed data. The R2 varies from 0 to 1; the closer the R2 value is to 1, the better the model fits the data. At the departmental level, the high R2 coefficients indicate that the model fits the data well.

Table 16. Multiple regression coefficients and p-values (municipal level)

Source: Banca de las Oportunidades and CGAP.

		Number of agents per 10 km²	Number of agents per capita	Proportion of population within 5 km of a agent
Constant	Coef.	3,2727	3,1340	106,5314
	p value	0	0	0
Population density	Coef.	0,0178	-9,219e-05	-0,0023
	p value	0	0,629	0,004
Road density	Coef.	5,423e+05	2,053e+05	8,023e+06
	p value	0,064	0,422	0
RWI	Coef.	3,1878	-1,6341	0,9256
	p value	0	0,035	0,774
GRDI	Coef.	-0,0401	0,0190	-0,3446
	p value	0,002	0,088	0
Multidimensional poverty	Coef.	–0,0001	-0,0483	-0,1792
	p value	0,993	0	0
R²		**0,905**	0,024	0,270

At the settlement level, the models fail to fit the data completely, but some statistically significant coefficients can be identified. In the case of the number of agents per 10 km², the positive correlation with the RWI and the negative correlation with the GRDI are particularly noteworthy.

Surprisingly, there is a positive correlation between the density of agents per square kilometer and multidimensional poverty. However, the interpretation of this last finding is limited by the availability of the poverty indicator, which is only found at the municipal level; as such, the same value is reported for all settlements within the same municipality.

Table 17. Multiple regression coefficients and p-values (level of settlement)

Source: Banca de las Oportunidades and CGAP.

		Number of agents per 10 km²	Number of agents per capita	Proportion of population within 5 km of a agent
Constant	Coef.	53,7816	1,8334	99,4111
	p value	0	0	0
Population density	Coef.	0,0009	−5,206e-06	4,861e-06
	p value	0	0,108	0,440
Road density	Coef.	1,0915	0,0505	0,0601
	p value	0	0	0,001
RWI	Coef.	7,0568	0,0438	0,8682
	p value	0	0,517	0
GRDI	Coef.	−1,0585	−0,0329	−0,0015
	p value	0	0	0,714
Multidimensional poverty	Coef.	0,5806	0,0170	−0,0026
	p value	0	0	0,445
R²		**0,097**	0,635	0,724

Having confirmed that the presence of agents has a positive correlation with wealth levels and a negative correlation with poverty levels, we proceeded to determine the exact maximum distance between a settlement and a agent in order to consider the agent close enough to have a positive socioeconomic impact on the settlement. In other words, we sought to understand how close people must live to agents in order to benefit from them.

For this purpose, models have been developed to predict the RWI (relative wealth index) and the GRDI (global relative deprivation index) at the settlement level.

The main variable in these predictions is a binary variable that takes the value of 1 if the average distance between the settlement and the nearest agent is below a given threshold. In addition, multidimensional poverty levels at the municipal level were incorporated as control covariates, with the objective of discerning the effects inherent to each municipality's poverty level.

Thus, by calculating the coefficient of our binary variable and the corresponding confidence levels for different thresholds, it is possible to determine at what distance the binary variable becomes null and non-significant. This provides information on the distance from a agent in which its proximity no longer has a positive correlation with lower levels of poverty in a settlement.

Figure 9 shows that the distance from the nearest agent after which its proximity ceases to be positively correlated with RWI is 21.4 km. The presence of a agent beyond this distance does not have a significant impact on the prosperity of the settlement.

It is important to note that the results are more easily interpreted when there is a sufficient number of observations on both sides of the threshold, which explains the peak at the beginning of the RWI curve.

Graph 9. RWI prediction: Coefficient values and confidence interval according to the distance to the nearest agent used as a threshold
Source: Banca de las Oportunidades and CGAP, based on regression analysis by Masae Analytics.
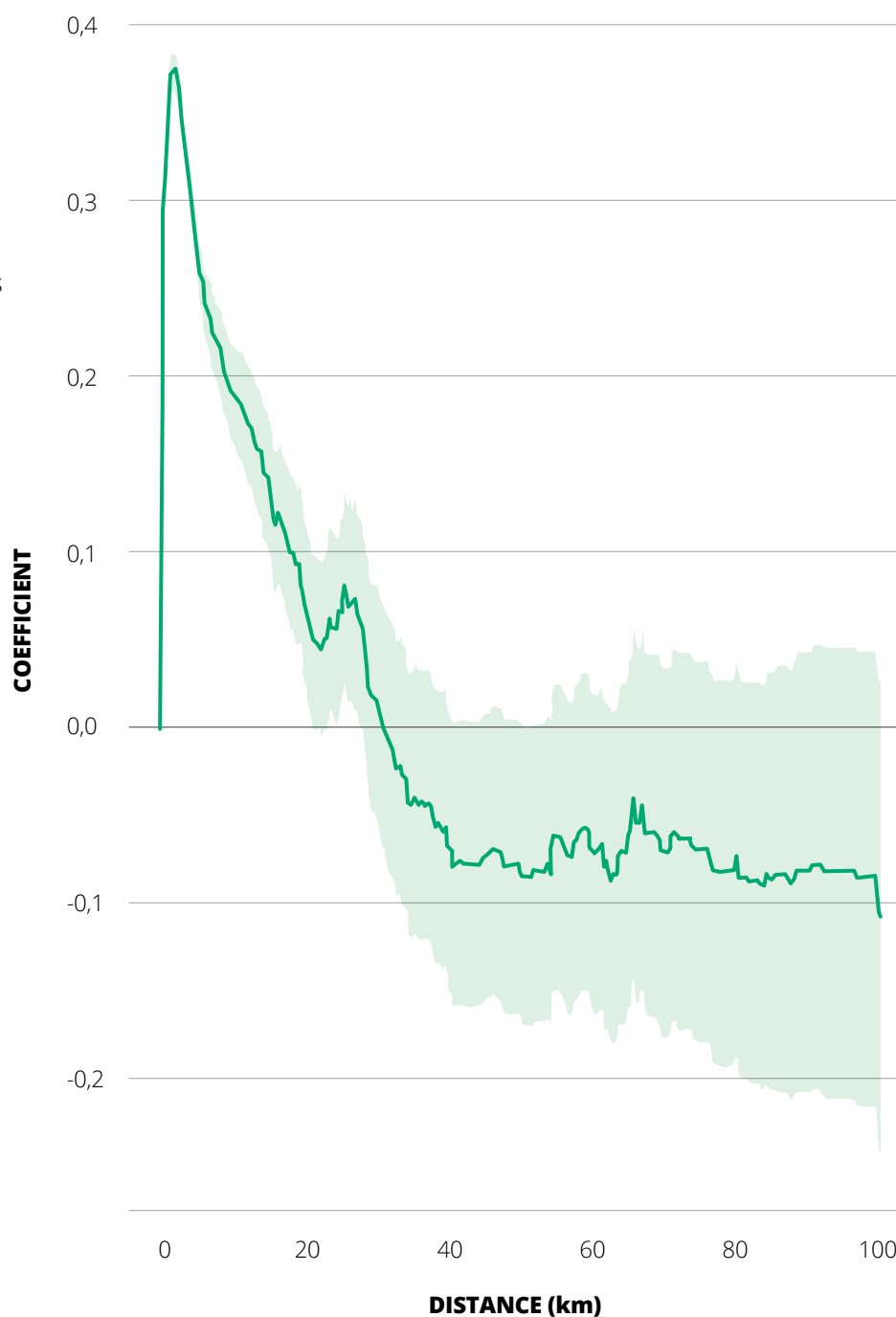
In our analysis of levels in the GRDI—our detailed poverty indicator—we observed very similar results. The proximity coefficient ceases to be significantly negative when the threshold distance exceeds 17.4 km.

This indicates that the presence of a agent more than 17.4 km away has no significant effect on poverty levels, while being less than 17.4 km from an agent significantly decreases poverty levels (Graph 10).

Graph 10. GRDI prediction: Coefficient values and confidence interval according to the distance to the nearest agent used as a threshold.
Source: Banca de las Oportunidades and CGAP, based on regression analysis by Masae Analytics.
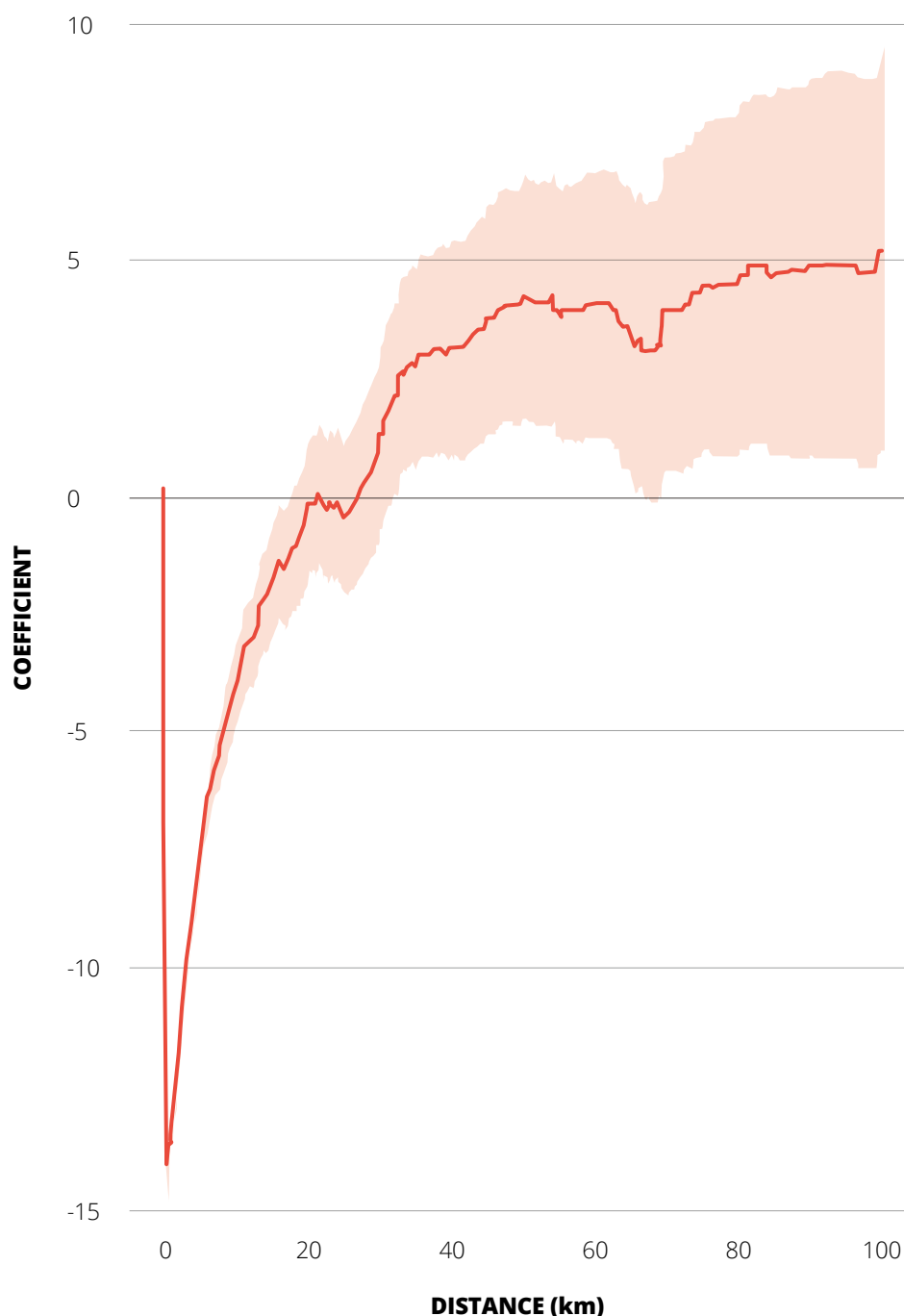
7

CONCLUSIONS

This study shows that banking agents in Colombia increase the population's overall proximity to the financial system. On the one hand, half of the country's population is less than 1 km away from a banking agent—a figure that is considerably lower in Bogotá, Atlántico, Valle del Cauca, and Risaralda. In turn, 94% reside within 5 km of a banking agent, a percentage that increases to at least 98% in six of the country's departments.

However, the few living in the furthest areas from Colombia's urban centers do not have access to the agent network. Some noteworthy results include the fact that half of the population in departments such as Vichada and Amazonas have an access point less than 3.6 km and 11.3 km away, respectively. In addition, in 10 of the country's 33 departments, the maximum distance a person has to travel to reach a agent is 45 km, which decreases to 10 km in five of them. In Chocó, Arauca, Vaupés, Guainía, Vichada, and Amazonas, less than 70% live within 5 km of a banking agent, a percentage that drops to 35% in Amazonas.

Thus, the network of agents in the country has made significant progress in terms of expansion and activity, but there are still a number of people in certain regions who must travel considerable distances to access financial services.

This highlights the relevance of discussing the opportunities and challenges faced by the channel to increase financial inclusion in the areas farthest from the municipal capitals and, as such, to balance out opportunities for the entire Colombian population to have access.

The geolocation of banking agents and the contrast with other similar information sources made it possible to identify and prioritize potential places to assign and open new agent locations. Among the criteria that defined the potential of opening a agent in these settlements is the non-existence of a agent, minimum population density, and proximity to main roads. Thus, 766 of these settlements were identified—with an average population of 36,751 inhabitants—in Antioquia, Córdoba, Bolívar, La Guajira, and Meta.

A relevant result of this exercise is that in departments such as La Guajira, Guaviare, Vichada, and Amazonas, the inhabitants of the settlements identified as potential agent locations represent 10% of each department's population. This finding is a key and innovative source of information for closing gaps in areas with the lowest levels of access to the financial system. More specifically, this information is an input to address these areas and focus efforts to prioritize the most neglected sectors.

On the other hand, identifying settlements as potential coverage areas provides relevant information for the industry to facilitate market expansion in commercially viable areas. At the same time, these areas can serve a social function by promoting financial inclusion for underserved populations.

This paper also presents evidence on the relationship between the presence of banking agents and some measures of income and wealth. First, as the number of agents increases, adjusted for population and area, the population density, road volume, and population living standards also increase. In contrast, as the number of agents decreases, living standards also decrease. An exercise predicting the level of poverty based on inhabitants' distance to the nearest agent found that the quality of this prediction decreases considerably when the distance exceeds 17 km.

Another conclusion found in the study is the discrepancy there is between the data found on the financial service providers' websites and the data they report to the SFC. A comparison of the information extracted from 19 institutions' websites showed that 15 (78%) report more agents to the SFC than those registered on their websites—a figure amounting to 31,554. This highlights the need to create different strategies to provide information to the overseer and the financial consumer in order to offer them the best quality service.

The database of geo-referenced agents allows us to understand the dynamics of the agent network in Colombia. For example, multiple agent agreements being carried out by the same business may determine how to approach the channel's main challenges.

The definition of multi-institutional agreements and physical locations is key to the discussion of the channel's future. In fact, the database shows that there is only a considerably high gap in dispersed rural municipalities, while the other levels of rurality are similar.

This contrasts with the gaps that are reflected when reviewing the data from the financial overseer's report, because the number of agents adjusted for population size decreases as rurality increases. This indicator is relatively similar for the regions of East Central, South Central, and Llano region, while the Eje Cafetero and Caribbean regions have the lowest levels; this is consistent with the information from the agent agreements. Additionally, the study's data confirm that the outsourced agent model provides the greatest access to the financial system, with five institutions managing 86% of the network.

Despite the potential public policy discussions raised by this new database, there are certain limitations to the study, which fall into two main groups: those related to the data and those related to the methodology. In the first case, not all the information on financial service providers overseen by the SFC is available, nor is data on agents overseen by the SES. Likewise, some institutions do not provide certain information on their websites; some addresses and institution data are not standardized, and there is no clear indication of how often information is updated.

Furthermore, methodological limitations include the fact that the extracted information is from 2021—so it is not up to date—scraping on some web pages is computationally expensive, and there are challenges of determining physical locations, as highlighted by the study.

These limitations and the other findings propose an agenda for discussing the opportunities and challenges of the agent channel.

The interoperability of the different agents, the expansion of a portfolio of financial services, and the design of new models for granting quotas are crucial tasks to ensure that the agent network continues to be a vehicle for accelerating financial inclusion in Colombia. Banca de las Oportunidades and CGAP invite the industry, policy makers, academia, international cooperation agencies, and other organizations to make the most of the opportunity to use this database, which can be viewed on the Banca de las Oportunidades website.

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APPENDICES

This section provides additional tables and maps to support the report's findings.

Table A1. Number of agent agreements reported by the financial institutions to the SFC and extracted from the geospatial analysis.
Source: Banca de las Oportunidades and CGAP based on SFC.

Institutions	Financial Superintendence of Colombia (SFC)			Geospatial Analysis			Difference
	Self-operated	Outsourced	Total	Self-operated	Outsourced	Total	
▲ Institutions 1		25.583	25.583		31.451	31.451	5.868
▲ Institutions 2		25.587	25.587		26.150	26.150	563
▼ Institutions 3		43.232	43.232		24.337	24.337	−18.895
▲ Institutions 4		1	1		23.350	23.350	23.349
▼ Institutions 5	28.546	14.700	43.246	22.544		22.544	−20.702
▼ Institutions 6		38.570	38.570		18.733	18.733	−19.837
▼ Institutions 7	729	11.165	11.894		9.674	9.674	−2.220
▼ Institutions 8	9.862	4.792	14.654	9.664		9.664	−4.990
▼ Institutions 9	902	1.766	2.668		2.195	2.195	−473
▼ Institutions 10	359	2.976	3.335		1.861	1.861	−1.474
▼ Institutions 11	289	32.864	33.153	237	1.362	1.599	−31.554
▼ Institutions 12		2.488	2.488		294	294	−2.194
▼ Institutions 13	640	23.253	23.893	565		565	−23.328
▼ Institutions 14		861	861		396	396	−465
▼ Institutions 15	129		129	66		66	−63
▼ Institutions 16	183		183	160		160	−23
▼ Institutions 17		11.707	11.707		6.684	6.684	−5.023
▲ Institutions 18	78		78	117		117	39
▼ Institutions 19		48	48		41	41	−7
▼ **Total**	**31.855**	**232.338**	**281.310**	**33.353**	**146.528**	**179.881**	**63,9 %**

Tabla A2. Correlation matrix at departmental level

Source: Banca de las Oportunidades and CGAP based on SFC.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
No agents	1	0,72	0,37	0,47	0,44	0,98	–0,29	0,7	0,36	–0,58	0,54	0,72	–0,65	–0,55
No agents / 10 km²	0,72	1	0,14	0,24	0,23	0,66	–0,31	1	–0,21	–0,51	0,67	0,61	–0,57	–0,47
No agents / Inhabitants	0,37	0,14	1	0,71	0,68	0,25	–0,46	0,12	0,18	–0,45	0,48	0,57	–0,58	–0,63
Percentage of population within 5 km of a agent	0,47	0,24	0,71	1	0,97	0,44	–0,77	0,25	0,4	–0,49	0,64	0,72	–0,7	–0,81
Percentage of the poor population within 5 km of a agent	0,44	0,23	0,68	0,97	1	0,41	–0,8	0,25	0,43	–0,41	0,66	0,71	–0,63	–0,79
Population	0,98	0,66	0,25	0,44	0,41	1	–0,25	0,64	0,46	–0,54	0,46	0,66	–0,6	–0,5
Area	–0,29	–0,31	–0,46	–0,77	–0,8	–0,25	1	–0,32	–0,16	0,38	–0,68	–0,66	0,58	0,63
Population density	0,7	1	0,12	0,25	0,25	0,64	–0,32	1	–0,22	–0,53	0,69	0,61	–0,59	–0,48
Population with a GRDI above the national average	0,36	–0,21	0,18	0,4	0,43	0,46	–0,16	–0,22	1	0,11	–0,06	0,1	–0,09	–0,14
Percentage of poor population	–0,58	–0,51	–0,45	–0,49	–0,41	–0,54	0,38	–0,53	0,11	1	–0,73	–0,78	0,84	0,68
Road density	0,54	0,67	0,48	0,64	0,66	0,46	–0,68	0,69	–0,06	–0,73	1	0,93	–0,8	–0,79
RWI	0,72	0,61	0,57	0,72	0,71	0,66	–0,66	0,61	0,1	–0,78	0,93	1	–0,84	–0,85
GRDI	–0,65	–0,57	–0,58	–0,7	–0,63	–0,6	0,58	–0,59	–0,09	0,84	–0,8	–0,84	1	0,77
Multidimensional poverty	–0,55	–0,47	–0,63	–0,81	–0,79	–0,5	0,63	–0,48	–0,14	0,68	–0,79	–0,85	0,77	1

1. No agents
2. No agents / 10km²
3. No agents / inhabitants
4. Percentage of population within 5 km of a agent
5. Percentage of the poor population within 5 km of a agent
6. Population
7. Area
8. Population density
9. Population with a GRDI above the national average
10. Percentage of poor population
11. Road density
12. RWI
13. GRDI
14. Multidimensional poverty

Table A3. Distance to the nearest agent for people living more than 5 km away from a agent

Source: Banca de las Oportunidades and CGAP based on SFC.

Department	Median (km)	Max. (km)	First decile (km)	Ninth decile (km)
Nariño	5,41	36,08	5,41	15,11
Atlántico	6,25	9,95	5,21	7,86
Quindío	6,34	13,61	6,00	13,40
Sucre	6,55	13,37	5,13	9,48
Norte de Santander	6,72	17,45	5,23	12,75
Bolívar	6,78	22,79	5,86	11,64
Antioquia	6,86	25,38	5,25	11,88
Cauca	6,87	33,23	5,24	11,63
Valle del Cauca	6,92	31,07	5,36	17,57
Cundinamarca	6,93	15,93	5,20	12,54
Santander	7,10	18,39	5,41	12,41
Risaralda	7,20	13,37	5,43	12,79
Magdalena	7,25	22,27	5,35	12,03
Bogotá, D. C.	7,34	11,08	5,31	7,66
Córdoba	7,34	16,90	5,54	13,29
Huila	8,25	25,32	5,39	13,81
Tolima	8,72	16,88	5,39	12,52
Arauca	8,78	29,29	5,54	16,84
Boyacá	8,85	29,07	5,38	20,95
Cesar	8,88	23,42	5,66	13,40
Putumayo	9,48	46,59	5,22	23,36
Guaviare	10,17	76,00	6,17	24,65
Chocó	10,47	53,48	6,13	20,12
Caldas	10,81	17,12	5,78	16,20
Caquetá	10,92	100,89	6,44	35,80
Meta	12,91	52,16	6,21	26,41
Casanare	14,71	34,08	5,49	21,91
Amazonas	20,05	187,96	7,61	126,37
Vichada	25,07	111,55	11,45	83,71
Guainía	35,32	117,44	11,93	68,51
Vaupés	42,12	81,37	11,00	72,29
La Guajira	61,85	125,02	6,75	117,65

Map A1. Location of agents, per banking institution
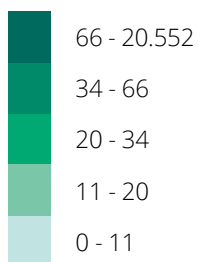Source: Banca de las Oportunidades and CGAP.

Bancamia
Banco Agrario
Banco AV Villas
Banco Caja Social
Banco de Bogotá
Banco de Occidente
Banco Popular
Banco W
Bancolombia
Bancoomeva
BBVA
Citi

Crezcamos
Davivienda
Itaú
Mi Banco
Scotiabank
Serfinanza

Map A2. Number of agents, by municipality
Source: Banca de las Oportunidades and CGAP.

Number of agents by municipality

- 66 - 20.552
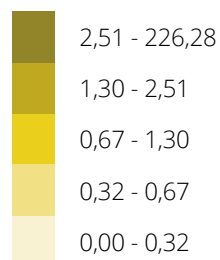- 34 - 66
- 20 - 34
- 11 - 20
- 0 - 11

Map A3. Number of agents per 10 km² (municipal level)
Source: Banca de las Oportunidades and CGAP.
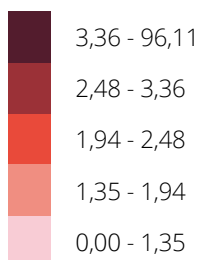
Number of agents per 10 km² (municipal level)

- 2,51 - 226,28
- 1,30 - 2,51
- 0,67 - 1,30
- 0,32 - 0,67
- 0,00 - 0,32

Map A4. Number of agents per 1,000 inhabitants (municipal level)

Source: Banca de las Oportunidades and CGAP.

Number of agents per 1,000 Inhabitants

- 3,36 - 96,11
- 2,48 - 3,36
- 1,94 - 2,48
- 1,35 - 1,94
- 0,00 - 1,35

Financial inclusion in Colombia has made significant progress in recent years, reaching traditionally underserved territories and population segments. Among the milestones achieved is that all 1,103 municipalities in the country have at least one physical location to access financial services.