

# Assessing the Transportation Accessibility and Administrative Service Areas in Côte d'Ivoire Using ArcGIS

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**Abstract:** This study investigates the accessibility of the land transport network in Côte d'Ivoire using ArcGIS software to analyze accessibility across various spatial scales. The findings reveal that the accessibility to most regions in the country is generally favorable, with the majority of areas reachable within 3 hours of travel time. The spatial distribution of accessibility follows a core-periphery pattern, where accessibility time increases as one moves further from administrative centers. Interestingly, higher-level administrative centers tend to have poorer accessibility, primarily due to their fewer numbers and more dispersed locations. The overall accessibility time for various administrative divisions typically remains within 2 hours. When compared to the original administrative boundaries, the variation in the service area based on transportation accessibility typically does not exceed 60%. The analysis also indicates that regions with stronger economic development, denser road networks, and smaller administrative units tend to have larger service areas. This research offers valuable insights into the planning of Côte d'Ivoire's transport network, providing recommendations for improving regional connectivity and enhancing the efficiency of administrative operations through better transport accessibility.

**Keywords:** Land transport; Accessibility; Scope of services; Côte d'Ivoire.

## 1. Introduction

Accessibility, also known as reachability or ease of access, refers to the ease with which one can travel from one place to another. The concept of accessibility was first proposed by Hansen in 1959 [2], defined as the opportunity for interaction between nodes in a transportation network [3]. With the development of science and technology and the continuous improvement of transportation infrastructure, scholars have diversified their research on accessibility.

Currently, domestic and foreign scholars have conducted extensive research on accessibility based on transportation networks [4]. They have used methods such as weighted average travel time [5], gravity models [6], shortest time distance [7], two-step floating catchment area method [8], network analysis [9], and space syntax [10] to study accessibility at various scales, including national [11, 12], economic zones [13, 14], provincial [15], municipal [16], county, and township [17] levels. The research has covered various transportation modes, including roads [18, 19], railways [11, 12], rail transit [16], and comprehensive transportation modes [20, 21]. The research content mainly involves the evolution and development of transportation network spatial patterns [22], public service facilities (such as medical facilities [23], schools [24], parks, and green spaces [25, 26] and vulnerable groups and their travel modes [27, 28]).

From a regional perspective, domestic and foreign scholars have focused more on developed countries and regions [29-31]. Existing literature on transportation accessibility in sub-Saharan Africa highlights significant barriers to maternal health services, with studies like Tanou et al. focusing on Benin showing that geographical distance and poor transportation infrastructure severely limit women's access to antenatal care and delivery services. The lack of reliable transportation, particularly in rural areas, exacerbates these

challenges, as women face high costs and long travel times to reach health facilities. Regional disparities further complicate the issue, with northern areas experiencing greater accessibility challenges. Addressing these barriers through improved road networks, affordable transport options, and mobile healthcare services is essential for improving maternal health outcomes. However, more research is needed to explore the full impact of transportation on healthcare access and to assess effective policy interventions across the region [32].

Nadella et al studied the geographic accessibility of radiotherapy facilities in sub-Saharan Africa; and some scholars have conducted accessibility studies in economically developed African countries such as South Africa [33]. Tsoka et al. [34] and Tanser et al. [35] studied the accessibility of clinics in rural South Africa from distance and time perspectives, respectively; Mokomane et al. examined the accessibility of public health facilities for adolescents and youth in South Africa. Despite a strong policy framework, barriers to access include inconvenient operating hours, long travel times, and lack of transport options. The study found that physical accessibility is generally good, but transport and affordability remain issues, especially for economically disadvantaged youth. Extended hours and better transport options were recommended, along with improvements in service quality to increase youth confidence in using health services. [36] and Das et al. [37] studied the accessibility of urban parks in South Africa. It is evident that existing research on accessibility in Africa has focused on developed countries like South Africa, primarily on the accessibility of medical facilities. Moreover, existing research on accessibility in Africa has overlooked the comparative analysis of administrative division ranges and service ranges based on transportation accessibility at different scales and their relationship with administrative efficiency.

Côte d'Ivoire is one of the most developed countries in Africa in terms of transportation, with its transportation network accounting for nearly half of the road mileage in the West African Economic and Monetary Union. Land transportation, as an important carrier for strengthening national management, enhancing regional connections, and promoting economic development, plays a significant role in national construction and development. However, its transportation accessibility has rarely been mentioned in existing research. Based on this, this paper attempts to take Côte d'Ivoire as the research area, using ArcGIS software and land transportation network data to explore and analyze the transportation accessibility of Côte d'Ivoire at different spatial scales. Furthermore, it compares the service ranges based on transportation accessibility with administrative division ranges and explores their impact on administrative efficiency. This not only scientifically evaluates the land transportation accessibility of Côte d'Ivoire but also provides theoretical references for the rational planning of transportation networks in Côte d'Ivoire and other African countries and regions.

## 2. Materials and Methods

### 2.1. Overview of the Study Area

Côte d'Ivoire, officially known as the Republic of Côte d'Ivoire, is also referred to as the "Ivory Coast. It borders Liberia and Guinea to the west, Mali and Burkina Faso to the north, Ghana to the east, and the Gulf of Guinea to the south, with a coastline of about 550 km. The Fig.1 visually supports this description by marking the international borders with Liberia, Guinea, Mali, Burkina Faso, and Ghana, as well as showcasing the primary road network that connects various parts of the country and facilitates both internal and cross-border transportation.



Figure 1. Map Côte d'Ivoire Road Network [38]

The country covers an area of approximately 322,000 km<sup>2</sup>, with a north-south length of about 600 km and an east-west width of about 500 km. Côte d'Ivoire is divided into three levels of administrative divisions: regions, districts, and departments, with a total of 14 regions (including 2 autonomous regions and 12 ordinary regions), 31 districts, and 109 departments. The political and administrative capital of Côte d'Ivoire is Yamoussoukro, and the economic capital is

Abidjan. The official language is French, and the currency is the West African CFA franc.

As one of the most developed countries in Africa in terms of transportation, Côte d'Ivoire is particularly well-developed in maritime and road transportation. The total length of the road transportation network in Côte d'Ivoire is about 83,000 km, accounting for 45.00% of the road mileage in the West African Economic and Monetary Union, making it the most developed country in West Africa in terms of road transportation. Over 98.00% of Côte d'Ivoire's import and export trade is conducted through maritime transportation, with the Port of Abidjan handling over 9,107,149 tons of cargo in 2024, representing a 10.6% increase from the previous year. This growth underscores the importance of the port as a central hub for trade in the region [39].

Côte d'Ivoire has 28 airports, and air transportation has seen a notable rise in the first quarter of 2024, particularly at Abidjan International Airport, which saw an 11.5% increase in passenger traffic due to the CAN 2023 football tournament. This increase highlights the role of global events in boosting air travel and the tourism economy [39].

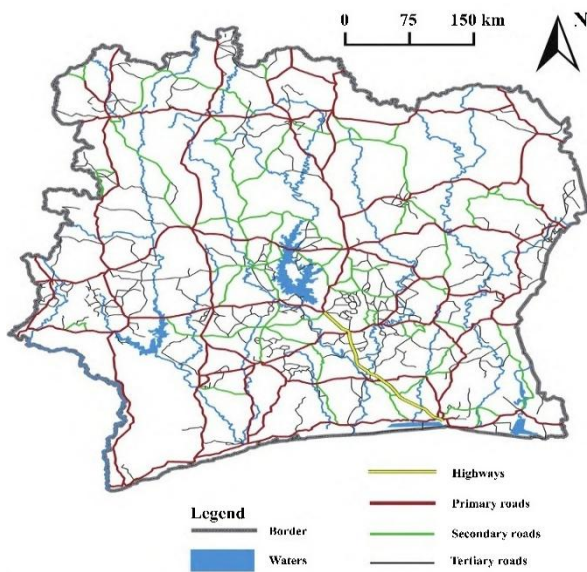
Côte d'Ivoire's road network, which spans approximately 83,000 km, plays a crucial role in the movement of goods within the country. However, the road transport sector saw a 19.9% decrease in freight traffic in 2024, attributed to challenges in adapting to the new Document Unique de Transport (DUT) requirements. This decline reflects the regulatory hurdles facing the sector but also points to areas for improvement [39]. In addition to the Abidjan Metro project, which aims to alleviate urban congestion, SOTRA, the city's bus company, saw a 12.7% drop in passenger traffic in 2024. This decrease points to ongoing challenges in public transport provision, highlighting the need for more modern and efficient solutions to meet the city's growing population (Les Transports en Chiffres, 2024) [39]. While passenger services remain suspended, freight traffic on the Abidjan-Ouagadougou railway increased by 4.2% in 2024, reaching 216,865 tons. This uptick indicates potential for expanding rail services in the future, especially to enhance regional trade and passenger mobility [39]. According to Sheppard Software (2023), the country's coastline, stretching 550 km, allows direct access to international maritime routes, which is vital for maintaining trade relations not only with neighboring countries but also with global markets [40]. This maritime connectivity complements the country's well-developed road network, which spans approximately 83,000 km, the largest in the West African Economic and Monetary Union (WAEMU). As Bohrer mentions, Côte d'Ivoire's road infrastructure is critical in facilitating internal and cross-border trade, significantly contributing to its status as the most developed country in terms of road transportation in the region [41]. In addition to its maritime and road networks, Côte d'Ivoire is investing in urban mobility, particularly in its economic capital, Abidjan.

The Abidjan Metro project is a major initiative aimed at addressing the challenges of urbanization and traffic congestion. As Lombard et al. point out, such urban transport systems are essential for reducing traffic jams and improving overall urban mobility, making cities more efficient and sustainable [42].

### 2.2. Data Sources

This study takes Côte d'Ivoire as the research object and uses different levels of administrative divisions in Côte

d'Ivoire as the basic units. The centers of administrative divisions at various levels are abstracted as spatial nodes, and the data for administrative division units at various levels are obtained from the official website of the Côte d'Ivoire government (<https://www.gouv.ci/>) [43]. Considering that Côte d'Ivoire has only one railway line with strict time schedules and few stations, and that there are road transportation routes along the railway line, this study only analyzes the road transportation network. The road transportation network data for Côte d'Ivoire is obtained from the Logistics Capacity Assessments website (<https://dlca.logcluster.org>) [44]. The relevant data is sampled, registered, and vectorized using ArcGIS software, and then checked and corrected. The administrative division centers are divided into regional, district, and departmental levels, and the road transportation network is divided into highways, primary roads, secondary roads, and tertiary roads, resulting in a land transportation network map of Côte d'Ivoire. See Fig.2 for details.



**Figure 2.** Map of Côte d'Ivoire's Transport Network

Note: Based on the standard map service website of the Ministry of Natural Resources, the map approval number is GS (2016) 2940. The base map is unmodified, and the same applies below.

### 2.3. Research Methods

#### 2.3.1. Evaluation Methods

The evaluation index for a point in the region to reach administrative division centers at different levels is:

$$A_i = \min (M_j T_{ij}) \quad (1)$$

Where:

$i$  is any point in the region

$T_{ij}$  is the travel time from point  $i$  to administrative division center  $j$  via the road transportation network;

$M_j$  is the proportion of administrative division center  $j$ . If only transportation accessibility is studied,  $M_j$  can be set to a constant 1;

$A_i$  represents the accessibility of administrative division center  $j$  from point  $i$  in the region.

The evaluation index for the overall accessibility of a certain level of administrative division unit is:

$$R_k = \frac{\sum_{i=1}^n A_i}{n} \quad (2)$$

Where:

$n$  is the number of grids in administrative division unit  $kk$ ;

$A_i$  is the accessibility of administrative division center  $jj$  from point  $ii$  within the range of administrative division unit  $k$ ;

$R_k$  represents the overall accessibility of administrative division unit  $k$ . The smaller the value, the less time it takes to access the transportation network of the administrative unit, indicating better accessibility.

#### 2.3.2. Accessibility Analysis

This paper combines the 1:1,000,000 administrative division map of Côte d'Ivoire and uses ArcGIS 10.8 software for projection transformation and extraction of administrative division centers at different levels. The 1:3,500,000 road transportation network map of Côte d'Ivoire is sampled, registered, and vectorized, and the road transportation network data is added to the 1:1,000,000 administrative division data. This paper mainly uses the Spatial Analyst function in ArcGIS software to conduct accessibility analysis, generating the accessibility time from each point in the region to administrative division centers at different levels, thereby making the spatial accessibility of Côte d'Ivoire more intuitive.

To ensure the accuracy of the calculation, Côte d'Ivoire is first divided into 1,000 m × 1,000 m grids. The grids are very small relative to the area of Côte d'Ivoire (322,000 km<sup>2</sup>), so the spatial accessibility differences within the grids can be ignored. Grids outside the Côte d'Ivoire region are set as invalid grids, and grids within impassable barrier areas such as rivers and lakes are set as barrier grids. The remaining grids are valid grids. This study divides Côte d'Ivoire into 321,739 grid units, including 310,255 valid grids and 11,484 barrier grids.

Based on the traffic control standards of Côte d'Ivoire and considering the road network density and quality, the driving speed for each level of road is determined (see Table 1). For areas without roads, a default speed of 15 km/h is assigned. If a grid has roads of different levels passing through it, the driving speed is determined by the highest level of road.

**Table 1.** Composition and Driving Speed of Côte d'Ivoire's Transportation Network

Road Level	Highway	Primary Road	Secondary Road	Tertiary Road	Others
Driving Speed (km/h)	120	100	80	40	15

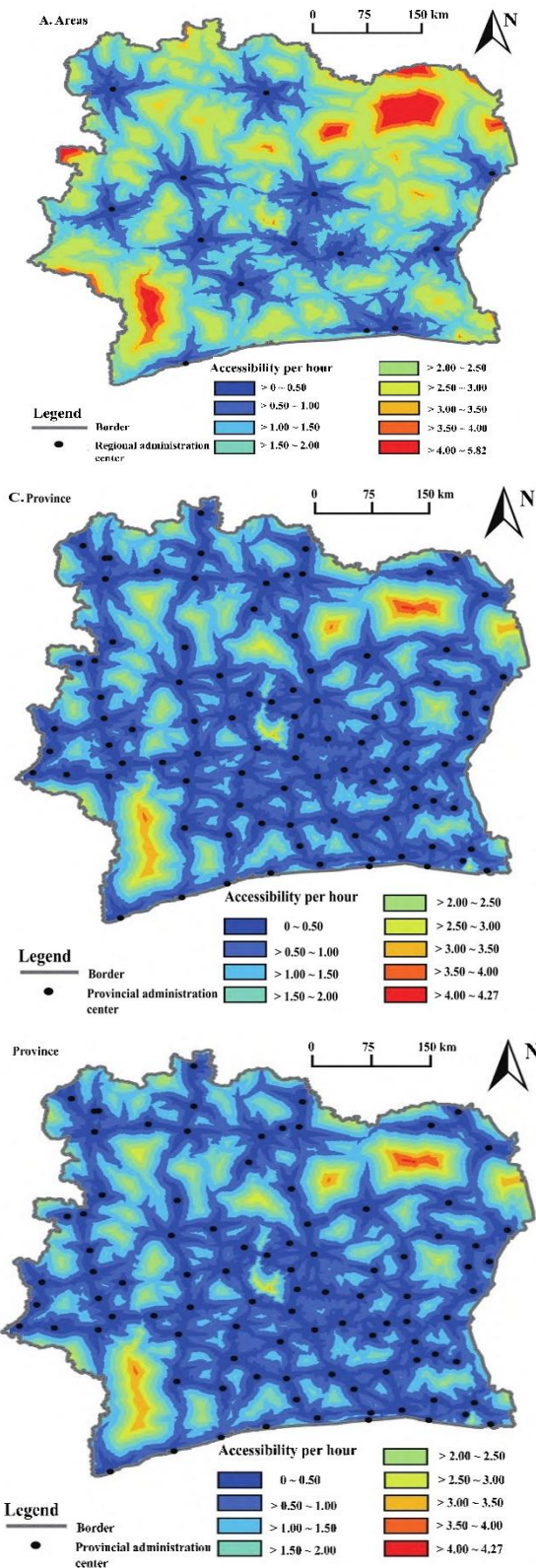
## 3. Accessibility Pattern of Côte d'Ivoire's Transportation Network

### 3.1. Overall Accessibility Pattern

In order to better evaluate the impact of the centers of

administrative divisions at different levels on the surrounding areas, this study uses the centers of various administrative divisions as origin points. By calculating the travel time from each point within Côte d'Ivoire to the centers of these divisions via the land transport network, the accessibility time maps for different levels of administrative division centers are

obtained, as shown in Fig.3



**Figure 3.** Accessibility Time of Administrative Division Centers at Different Levels in Côte d'Ivoire

Overall, the spatial accessibility in Côte d'Ivoire is generally good. The distribution shows a spatial pattern of "the center of each administrative division being the core, with accessibility time increasing outward along the road network." The higher the level of the administrative division,

the longer the time required to reach the administrative division center, resulting in poorer spatial accessibility. This is mainly due to the fewer number and more sparsely distributed higher-level administrative centers. Regions with better accessibility are mainly distributed in the southeastern and central areas of the country, primarily because these regions have a dense road network, and a larger number of administrative division centers are concentrated there. The areas with the weakest accessibility are located at the junction of Ferkessedougou and Bouna in the northeast, and at the intersection of the Tabou, Soubré, and Gagnoa provinces in the southwest. This is due to the presence of the largest nature reserve in Côte d'Ivoire, Comoé National Park, in the northeast, and Tai National Park, which contains about 156,000 hectares of forest reserve, in the southwest. In order to protect the local natural environment, the construction of transportation routes avoids the national parks. As a result, the transportation network is relatively sparse, and accessibility is poor. Accessibility times in these areas are generally above 2.00 hours, with the longest times to reach the regional, district, and provincial administrative centers being 5.82, 5.34, and 4.26 hours, respectively.

In order to further analyze the spatial accessibility of administrative division centers at various levels in Côte d'Ivoire, this study, using 0.50-hour intervals, divides accessibility into 9 levels to analyze the proportional and cumulative distribution of spatial accessibility for administrative division centers of different levels (see Table 2).

As shown in Table 2, the accessibility of administrative division centers at all levels in Côte d'Ivoire is relatively good. The regions within 3.00 hours of accessibility time to regional-level, district-level, and provincial-level administrative division centers respectively account for 91.61%, 97.02%, and 98.65% of the national area; those within 1.50 hours respectively account for 48.81%, 65.83%, and 80.50%.

In terms of spatial distribution frequency across different time periods, the accessibility time to regional-level administrative centers is most widely distributed in the >1.00–1.50 h interval, accounting for nearly one-fourth; while the accessibility time to district-level and provincial-level administrative centers is most widely distributed in the >0.50–1.00 h interval, accounting for 27.71% and 34.14%, respectively.

The area proportions where the accessibility times to regional-level and district-level administrative centers fall within the >0.50–2.00 h period (a span of 1.50 h) are 63.62% and 72.53%, respectively; for provincial-level administrative centers, the area where accessibility time falls within 0–1.50 h (also a span of 1.50 h) is 80.50%.

This indicates that as the level of administrative division decreases, the time required to reach the administrative center becomes shorter, which is more favorable for the administrative center's management of surrounding areas.

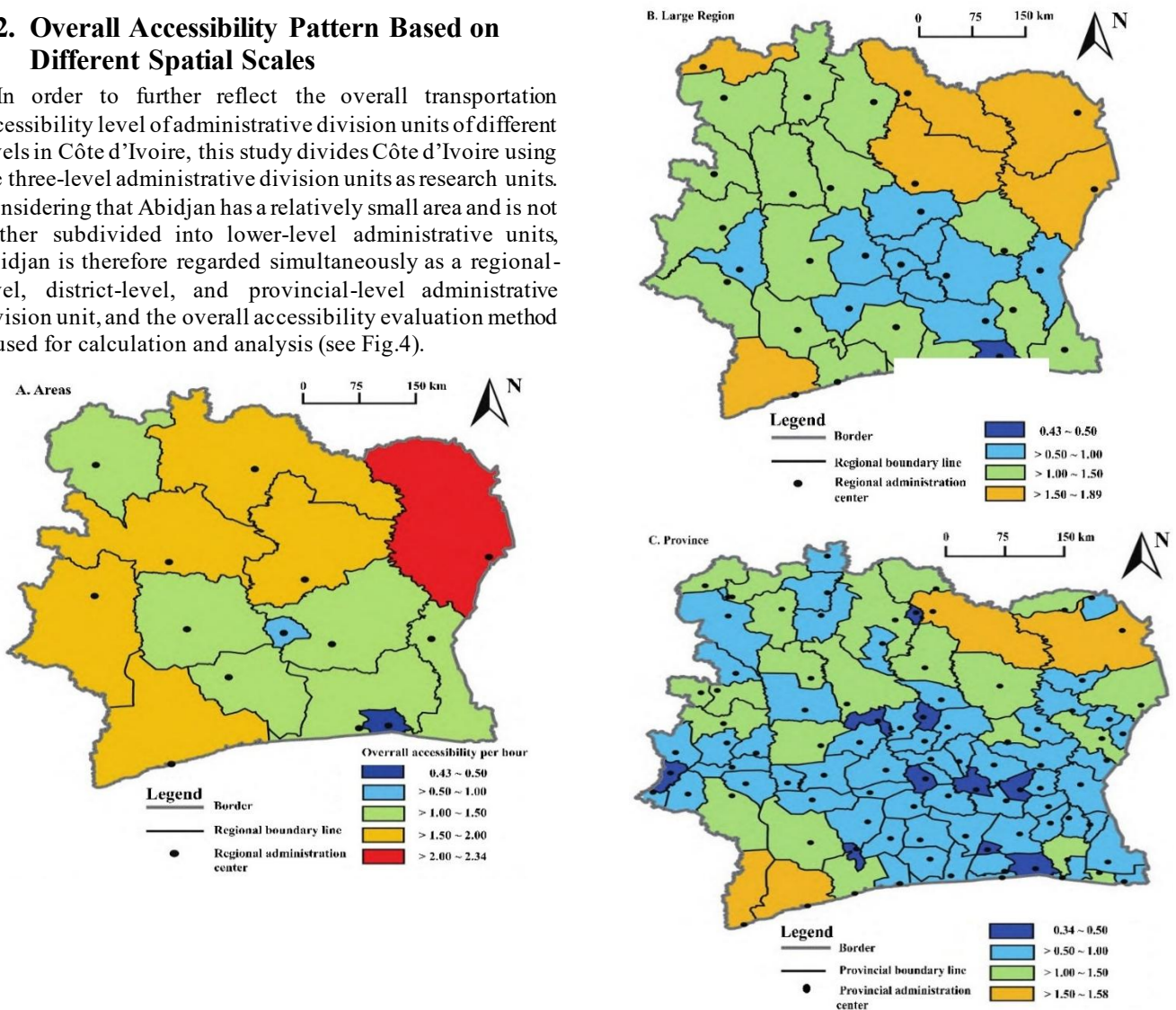
The spatial distribution frequency of accessibility in Côte d'Ivoire overall exhibits a pattern of "first rising, then falling with increasing time, and the downward trend gradually flattens"; while the cumulative frequency exhibits a pattern of "initial rapid growth, followed by a gradually flattening growth trend."

**Table 2.** Relationship Between Accessibility Time (t) and the Corresponding Distribution and Cumulative Proportion of Administrative Centers in Côte d'Ivoire.

t / h	District-Level Administrative Centers		Regional-Level Administrative Centers		Provincial-Level Administrative Centers	
	Distribution (%)	Cumulative (%)	Distribution (%)	Cumulative (%)	Distribution (%)	Cumulative (%)
0 ≤ t ≤ 0.50	6.06	6.06	11.38	11.38	24.48	24.48
0.50 < t ≤ 1.00	17.91	23.97	27.71	39.09	34.14	58.62
1.00 < t ≤ 1.50	24.84	48.81	26.74	65.83	21.88	80.50
1.50 < t ≤ 2.00	20.91	69.72	18.08	83.91	11.20	91.70
2.00 < t ≤ 2.50	14.34	84.06	9.24	93.15	4.79	96.49
2.50 < t ≤ 3.00	7.56	91.61	3.87	97.02	2.16	98.65
3.00 < t ≤ 3.50	4.07	95.68	1.94	98.96	1.07	99.72
3.50 < t ≤ 4.00	2.30	97.99	0.59	99.55	0.26	99.98
t > 4.00	2.01	100.00	0.45	100.00	0.02	100.00

### 3.2. Overall Accessibility Pattern Based on Different Spatial Scales

In order to further reflect the overall transportation accessibility level of administrative division units of different levels in Côte d'Ivoire, this study divides Côte d'Ivoire using the three-level administrative division units as research units. Considering that Abidjan has a relatively small area and is not further subdivided into lower-level administrative units, Abidjan is therefore regarded simultaneously as a regional-level, district-level, and provincial-level administrative division unit, and the overall accessibility evaluation method is used for calculation and analysis (see Fig.4).



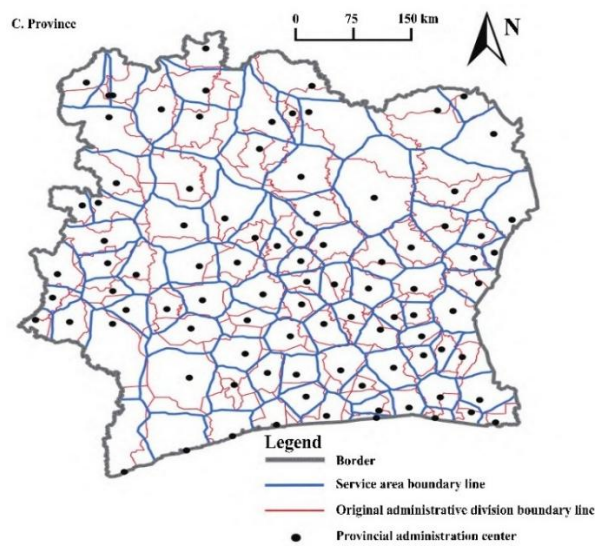
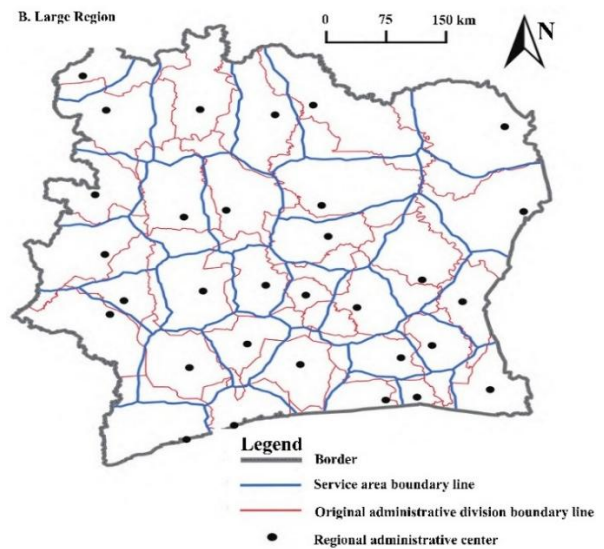
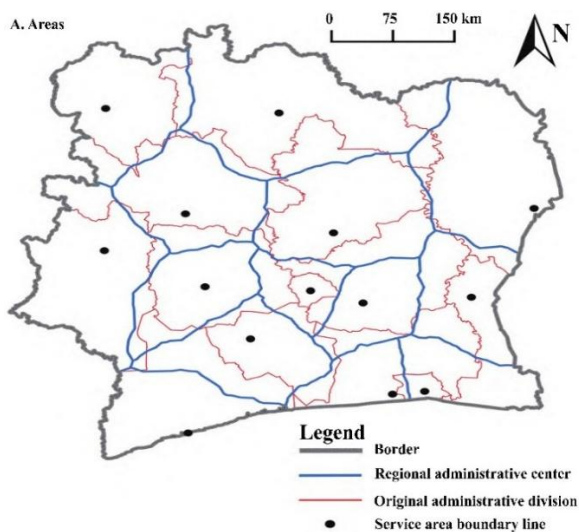
**Figure 4.** Overall accessibility of administrative units at all levels in Côte d'Ivoire

From the perspective of regional administrative division units, the overall accessibility time for most regions is within 2.00 hours. The regions with the best accessibility are Abidjan and Yamoussoukro, with overall accessibility times of 0.43 hours and 0.56 hours, respectively. The region with the poorest accessibility is Zanzan, with an accessibility time of 2.34 hours. From the perspective of district-level administrative division units, most districts have an overall

accessibility time within 1.50 hours. The district with the best accessibility is still Abidjan, with an overall accessibility time of 0.43 hours. Districts with longer overall accessibility times are mainly distributed in the southwest, northwest, and northeast, with 6 districts having overall accessibility times exceeding 1.50 hours, and the maximum value reaching 1.89 hours. As the level of administrative division decreases, the overall accessibility of provincial administrative division units significantly improves. There are 10 provincial administrative division units with accessibility times within 0.50 hours, with the minimum accessibility time being 0.34 hours, while only 4 provincial administrative division units have accessibility times exceeding 1.50 hours, with the maximum accessibility time being 1.58 hours. Due to environmental protection measures near national parks, the transportation network in the northeast and southwest is relatively sparse, resulting in longer accessibility times compared to other regions. However, overall, the overall accessibility level of administrative division units at all levels in Côte d'Ivoire remains relatively good.

#### 4. Service Scope of Administrative Division Centers in Côte d'Ivoire Based on Transportation Accessibility

To further reflect the impact of transportation accessibility on the spatial differences in the service scope of administrative division centers at different levels in Côte d'Ivoire, this study divides the service scope of administrative division centers at different levels. The division criteria are as follows: if the accessibility time from a point in the region to administrative division center X is less than the accessibility time to other administrative division centers, then the point is located within the service scope of administrative division center X. The area formed by a series of such points constitutes the service scope of administrative division center X, and the accessibility time from points on the service scope boundary to adjacent administrative division centers is the same. By calculating the accessibility time from each point in Côte d'Ivoire to different administrative division centers, the service scope of administrative division centers at different levels in Côte d'Ivoire is obtained (see Fig.5).



**Figure 5.** Service Area Division of Administrative Centers at Different Levels in Côte d'Ivoire Based on Transport Network Accessibility

By comparing the service scope of administrative division centers based on transportation network accessibility with the original administrative division ranges, it can be observed that the service scope of administrative division centers has undergone some changes relative to the original ranges. As shown in Figure 4, the service scope of administrative division centers generally shows a pattern of being smaller in the central and southeastern parts of the country and larger in the southwest and northeast. This is mainly related to the distribution of administrative division centers and the transportation network in Côte d'Ivoire. Administrative division centers and the transportation network are densely distributed in the southeast, resulting in smaller service scopes for administrative division centers. In contrast, due to the presence of national parks, the transportation network is sparse in the southwest and northeast, leading to larger service scopes for administrative division centers.

To facilitate a comparative study of the service scope of administrative division centers based on transportation accessibility and the original administrative division ranges, this study divides the variation degree (C) of the service scope of administrative division centers at different levels relative to the original administrative division ranges at intervals of 20.00% (see Table 3).

Overall, the degree of change in the service center scope relative

to the original administrative area is mostly within 60.00%. At the regional administrative level, the changes in service scope are mostly within 60.00%, with only Abidjan and Yamoussoukro having changes exceeding 60.00%. The service ranges based on traffic accessibility for these two cities are 5.50 times and 3.72 times the area of their original administrative divisions, respectively. This is mainly because Abidjan and Yamoussoukro, as the economic and administrative capitals of Côte d'Ivoire, have high levels of economic development, well-developed transportation networks, and, as autonomous regions, their original administrative areas are small, resulting in service ranges that far exceed their original administrative areas. As the level of administrative division decreases, the degree of change in the service scope of administrative centers relative to the original

administrative area generally expands but becomes more concentrated, with 87.10% of regional administrative divisions having changes within 40.00%. Only four administrative units have service scope changes exceeding 40.00%, while slightly more than half (51.38%) of provincial administrative divisions have changes within 20.00%. Overall, the degree of change in the service scope of administrative centers based on traffic accessibility relative to the original administrative area is mainly related to the level of economic development, the state of transportation network construction, and the size of the administrative unit. Regions with higher levels of economic development, better transportation networks, and smaller administrative unit areas tend to have larger service scopes relative to their administrative areas, and vice versa.

**Table 3.** Degree of Change in Service Scope of Administrative Centers in Côte d'Ivoire Based on Traffic Accessibility Relative to Original Administrative Area (C)

C/%	District-Level Administrative Units		Regional-Level Administrative Units		Provincial-Level Administrative Units	
	Number of units	Proportion (%)	Number of units	Proportion (%)	Number of units	Proportion (%)
$C \leq -60$	0	0	0	0	0	0
$-60 < C \leq -40$	2	14.29	0	0	6	5.50
$-40 < C \leq -20$	3	21.43	7	22.58	9	8.26
$-20 < C \leq 0$	1	7.14	8	25.81	43	39.45
$0 < C \leq 20$	3	21.43	10	32.26	13	11.93
$20 < C \leq 40$	2	14.29	2	6.45	13	11.93
$40 < C \leq 60$	1	7.14	1	3.23	7	6.42
$60 < C \leq 80$	0	0	1	3.23	2	1.83
$80 < C \leq 100$	0	0	1	3.23	6	5.50
$C > 100$	2	14.29	1	3.23	10	9.17

If other influencing factors are excluded, the service scope divided based on traffic accessibility, compared to the original administrative scope, will be more conducive to economic, cultural, and other exchanges and connections between the regions within the scope and the administrative centers. It will also be more beneficial for the administrative centers to manage the regions within the service scope. The smaller the difference between the administrative scope and the service scope divided based on traffic accessibility, the more reasonable the administrative scope division, which is more conducive to improving the convenience of internal regional administration and reducing cross-regional transportation and communication costs. On this basis, this study further analyzes the degree of change in the service scope of administrative centers in Côte d'Ivoire based on traffic accessibility relative to the original administrative area. It finds that the percentages of regional, regional, and provincial administrative units with positive changes are 57.15%, 51.63%, and 46.78%, respectively. This further indicates that as the level of administrative division increases, the administrative efficiency based on traffic accessibility becomes more ideal.

## 5. Conclusion

This study analyzes and calculates transport accessibility across different spatial scales in Côte d'Ivoire, providing a clear representation of the accessibility from any given location to the nearest administrative center at different levels. The research then evaluates the overall accessibility of different administrative divisions and defines service areas of

administrative centers based on transport accessibility.

The results indicate that Côte d'Ivoire has a relatively good overall transport accessibility, with the vast majority of areas reachable within 3.00 hours. The spatial distribution follows a pattern where accessibility time increases outward from administrative centers along the road network. Additionally, the higher the administrative level, the poorer the accessibility to administrative centers, mainly due to the limited number and sparse distribution of high-level administrative centers.

At all administrative levels, the overall accessibility time is mostly within 2.00 hours, except for some regions with poor accessibility, primarily in the northeast and southwest, where two national parks are located. The change in service area size of different administrative levels, when compared to the original administrative boundaries, remains within 60.00%. Areas with higher economic development, better road infrastructure, and smaller administrative units tend to have larger service areas, while those with less infrastructure and larger administrative units tend to have smaller service areas.

In summary, the overall transport accessibility in Côte d'Ivoire is well-developed, with central and southeast regions having better accessibility than other areas. However, differences still exist between different administrative levels and among administrative centers of the same level. In the northeast and southwest, where national parks restrict infrastructure development, it is essential to balance environmental protection with reasonable transport infrastructure planning to improve accessibility.

Currently, Côte d'Ivoire has only one expressway, and its total length is relatively short. There is a need to expand the

expressway network to strengthen connectivity between cities and improve regional integration.

Although this study provides a comprehensive analysis of the spatial accessibility of Côte d'Ivoire's transport network at different scales, there are still areas for improvement. For example, the study does not account for road conditions and multimodal transport systems, which may impact accessibility. Additionally, a temporal analysis of accessibility patterns over time is lacking, which should be further explored in future research.

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