

Importance of the Development and Asphaltting of the Tiwindè- Kaoyèlè Street in the Urban Mobility of the South-East Districts of the City of Kara (North-Togo)

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Abstract— *The mobility of people and goods is governed by quality transport systems. In the south-east of the city of Kara in North-Togo, interactive mobility between neighborhoods is paralyzed by the lack of a bridge over the Kara River. The objective of this study is to show the importance of the development and asphaltting of Tiwindè-Kaoyèlè street in urban mobility in the south-eastern part of the city of Kara. To achieve the results, the working methodology was adopted. This includes documentary research, field surveys, processing and analysis of the data collected. Also, 24 motorists, 60 motorcyclists, 66 traders/artisans, and 75 passengers were surveyed using the probability sampling technique. An interview guide was sent to the municipal authorities, to the leaders of the drivers' unions, and to the regional director of Public Works of Kara. The results show that 60% of motorcyclists surveyed find it difficult to circulate in the study area during periods of heavy rain because of the poor state of the roads. In the dry season, only 13% of pedestrians surveyed manage to cross the Kara River for their mobility needs. The connection of the two banks of the river by motorcyclists and motorists is done through long bypasses due to the absence of a bridge over the Kara River. The development of rue Tiwindè-Kaoyèlè with the construction of a bridge over the Kara River will allow interactive mobility of city dwellers in the South-East districts of the city of Kara and, in turn, stimulate the socio-economic development of populations concerned.*

Keywords— *Road precariousness, interactive mobility, development, Kara River, Kara (Togo).*

I. INTRODUCTION

The transports are the means of movement and have structuring functions for the location of economic activities and populations [1]. The functioning of transport networks is therefore a key element and also a prerequisite for economic development and social participation. Well-maintained road networks attract investment and promote growth. It also contributes to the United Nations Sustainable Development Goals through improved accessibility of socio-economic infrastructure. Transport in developed countries has been preserved and developed since the industrial revolution of the 19th century. Conversely, it is dominated in Africa by poorly developed dirt roads. It is therefore common to imagine that sub-Saharan Africa is not experiencing this process of recomposition of urban spaces [2]. Urban-rural connections are selective and only partially possible in the dry season. Inter-urban connections are weak because of the poor state of the roads. Rural areas suffer from accessibility problems while urban agglomerations are confronted with the challenges of

human mobility. In African cities, urban dynamics have led to the emergence and proliferation of under-equipped and under-integrated informal settlements, impoverishment, a decline in the level of urban services, the degradation of the urban environment, the heterogeneity of urban structures and the persistence of land speculation problems [3], if it is not controlled. The first observation is that the city is moving faster than the development plan that it is necessary to move from works engineering to a more global urban engineering and to free ourselves from the related financing which delays the development of territories [4]. The list of problems continues with the problems of drinking water and electricity supply, the spread of pandemics, sanitation problems and above all the deterioration of urban roads. These problems are experienced in the city of Kara where several neighbourhoods are isolated due to the lack of development and asphaltting of the streets. To curb this scourge, a policy of infrastructure development must be promoted by the local authorities in accordance with the Togolese government's roadmap. It is for this reason that this work aims to show the importance of the layout and the asphaltting of Tiwindè-Kaoyèlè street in urban mobility in the south-eastern part of the city. This expertise is essentially articulated around a research methodology, the results obtained and the discussion.

II. PRESENTATION OF THE PANNED STREET

The Tiwindè-Kaoyèlè road serves the south-eastern districts of the city of Kara. This part of the city is located between 1°10' and 1°13' East longitude and 9°31' and 9°33' North latitude (map n°1).

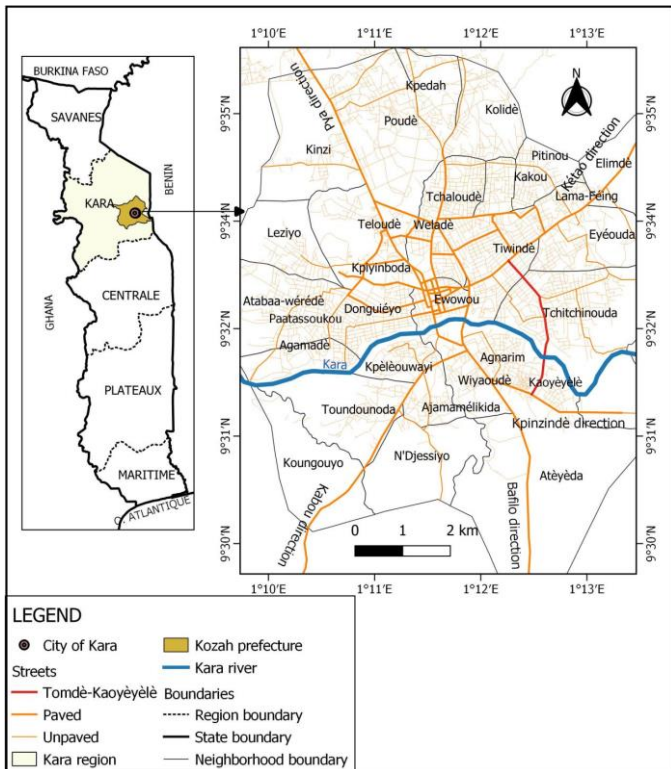
The study area includes the districts of Tchintchinda, Eyéouda and Agnarim. These districts are located on either side of the Kara River, which is a source of isolation and mobility problems for the population.

III. WORKING METHODOLOGY

The research methodology includes information gathering, data processing and analysis.

3.1. Data collection

Data collection revolves around documentary research and field surveys.



Source: Base Maps of the municipality of Kozah 1
Map 1: City location and the planned street illustration

• Existing data

The documentary search was carried out in libraries in specialised departments and on the Internet where books, dissertations, journals and articles relating to the urban mobility were consulted. The central library and that of the FLESH (Faculty of Humanities) of the University of Kara, the library of the Institute Mon Seigneur BAKPESSI of Kara were also visited. The National Institute of Statistics and Economic and Demographic Studies (NISEDS /INSEED) provided information on the population of Kara city. Other information were collected from the Kozah 1 municipality, the Regional Direction of Public Works, the Regional Direction of Transport and the Regional Direction of Land Management. The documentary research was followed by data collection in the field.

• The data to be collected

The fieldwork was based on observation, an investigation by a questionnaire and interviews.

The field observation focused on the conditions of mobility between the adjoining districts of the Kara River. From this observation came the questionnaire. The field study took place from 23 to 28 October 2021, i.e. 5 days. During this operation, questions were asked to motorists, motorcyclists, pedestrians, traders and craftsmen residing in the study districts (Tchintchinda, Eyéouda and Agnarim).

3.2. The sample

¹ Union of Togo drivers' unions (UTDU)

² National union of independent drivers of Togo (NUIDT)

The target population is made up of residents of the Tchintchinda, Eyéouda and Agnarim districts, including pedestrians, motorists, motorcyclists, traders and artisans. As the respective numbers of these population groups were not known, the random sampling technique was adopted for this purpose. The study covers a total of 225 individuals surveyed, distributed equally over the three investigated districts. They were made up of 24 motorists, 60 motorcyclists, 75 pedestrians, 36 shopkeepers and 30 craftsmen. Pedestrians topped the list and represented 33.33% of the road users studied. The motorcyclists investigated ranked second with 26.66% of the total. The importance of the motorcyclists surveyed lies in the fact that they are the main traffic actors. Traders and artisans follow with 16% and 13.33% of the individuals surveyed respectively. The motorists investigated close the gap with 10.66% of respondents.

The interviews took place from 24 September to 7 October 2021. The target persons were the leaders of the drivers' unions (USYNDICTO¹ SYNACIT² SICTO³), the staff of the technical services of the Kozah 1 municipality and the Regional Direction of Public Works of the Kara Region (DRTP-RK).

The management of the data collected was ensured thanks to some computer software. Word was used for word processing. The Arc Gis software and the Excel spreadsheet software were used to draw up the maps and to design the tables respectively. The analysis of the data collected made it possible to obtain results

IV. THE RESULTS

The results mainly relate to the state of the roads in the south-eastern districts of the city of Kara and the conditions of mobility of people. They also relate to the need to develop and pave the road from Tiwindè to Kaoyèlè.

4.1. A precarious road system

The urban road system of Kara is characterised by asphalted streets in the centre of town and earthen streets in poor condition, especially in the outskirts. The streets in the Tchintchinda, Eyéouda and Agnarim districts are in poor condition. They are dusty in the dry season and waterlogged in the rainy season (photo 1).



Source: Photo AGBAMARO, August 2021
Photo 1: Condition of Tiwindè Street-Kaoyèlè in the rainy season

³ Independent union of Togo drivers (IUTD)

The Tiwindè-Kaoyèlè road, as shown in photo 1, is poorly constructed. It is difficult to walk on in the rainy season because of potholes, mud bogging and slipping. The absence of bridge over the Kara River cuts off the neighbourhoods from interactive movements. This street is 3197.63m long and has only 100 m of gutters, causing the problem of drainage of rainwater which degrades the street through run-off.

In addition, the adjacent and diffuse streets that structure the study area are all earthen and un-recharged. Crossing structures are missing, thus paralysing the mobility of people. Some of the existing culverts or scuppers are made of wood and are ineffective (photo 2).



Source: Photo AGBAMARO, October 2021
Photo 2: A wooden culvert over an alley in Eyéouda

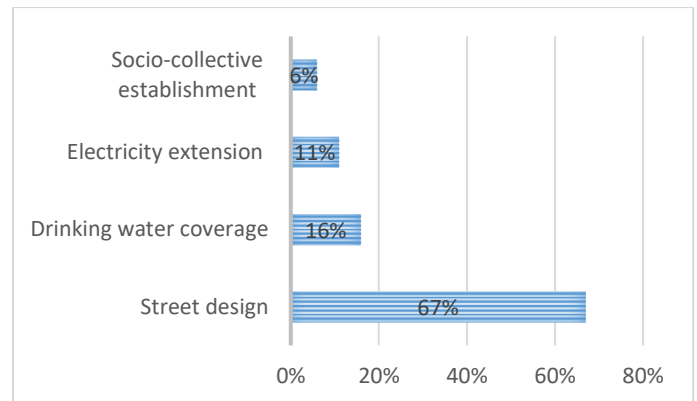
The makeshift culverts are generally used by pedestrians. The condition of these makeshift structures, sometimes made of precarious concrete (photo 3), is a source of accident risks for cyclists and motorcyclists.



Source: Photo AGBAMARO, October 2021
Photo 3: Crossing scupper at Tchintchinda

As shown in photo 3, some of the lanes are equipped and are exclusively and hardly used by two-wheelers and especially by pedestrians. The streets are impassable even up to the front of the houses. Based on these observations, it was useful to

question the residents on the ranking of the choice of projects for the creation of socio-collective infrastructures (figure 1).



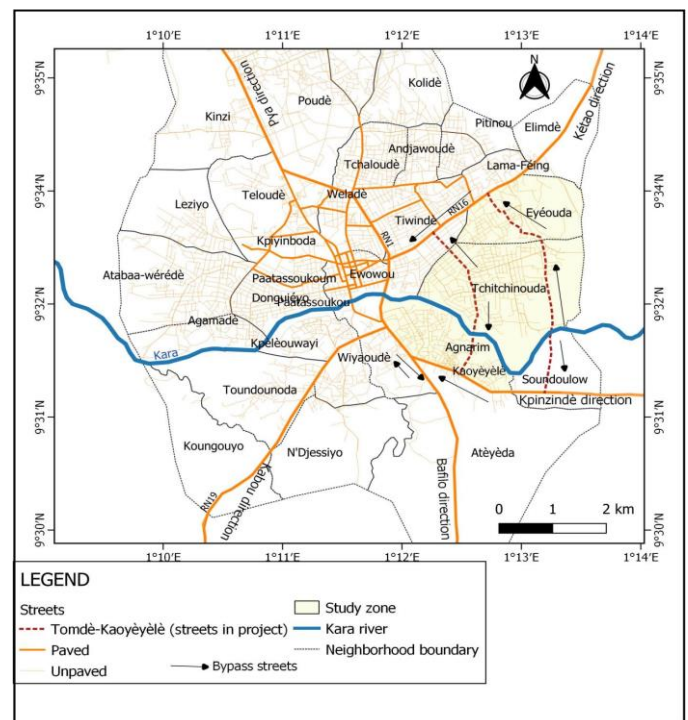
Source: Field survey, October 2021

Figure 1: Distribution of local residents according to the urgency of their need for socio-collective infrastructure.

In the opinion of the local residents surveyed, priority was given to the development of streets over the construction of other socio-community infrastructures. This strong need reflects the precariousness of the streets that structure the study area.

4.2. Urban mobility in crisis

Mobility vulnerability is decried by all road users. While 60% of motorcyclists investigated find it difficult to travel in the study area during periods of heavy rain, all motorists find all the streets in the study area impassable. In the dry season, only 13% of pedestrians surveyed manage to cross the Kara River at high risk for their mobility needs.



Source: Map of the Kozah 1 municipality
Map 2: Bypass roads used by the populations of the study areas

On the whole, the populations of the south-eastern neighbourhoods are forced to pass by the river in order to access the southern parts of the city, even though they are close by (at most 2km), thus creating additional travel distances.

Comparisons of linear and bypassing distance data are illustrative (table 1).

Table 1 shows differences ranging from 1 to more than 5 km between the linear distances and those of bypasses. For a linear distance of 1.5 km from Tchintchinda College to University of Kara (South), an average bypassing distance of 7 km must be covered. The average bypassing distance between Bonne Fontaine and University of Kara (South) is 6 km, while the linear distance is only 1 km. The Tchintchinda market and the Agnarim dispensary are 2 km apart, whereas the average bypassing distance between these two districts is 5 km. These additional distances related to the bypassing increase travel

time and transport fares. Table 2 shows details of the costs according to the distances travelled by motorbike taxi.

TABLE 1: Data on linear and bypassing distances

Itineraries	Linear distance	Average bypassing distance	Difference between linear distance and contour distance
Tchintchinda College- Kara University (South)	1,5 km	7 km	5,5 km
Bonne Fontaine- Kara University (South)	1 km	6 km	5 km
Tchintchinda Market- Agnarim Dispensary	2 km	5 km	3 km
Tiwindè Cap - Agnarim Primary School	3 km	4 km	1 km

Source: Field surveys, October 2021

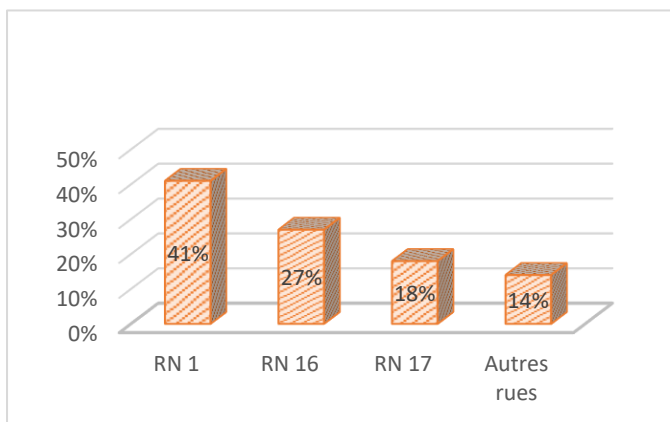
TABLE 2: Motorcycle taxi transport costs according to travel distance

Itineraries	Linear distance	Cost of travel in FCFA	Average bypassing distance	Cost of travel in FCFA	Difference in costs in FCFA
Tchintchinda College- Kara University (South)	1,5 km	150	7 km	400	250
Bonne Fontaine- Kara University (South)	1 km	100	6 km	350-400	250-300
Tchintchinda Market- Agnarim Dispensary	2 km	150	5 km	300	150
Tiwindè Cap - Agnarim Primary School	3 km	200	4 km	250	50

Source: Field surveys, October 2021

According to the analysis of table 2, transport costs by motorcycle taxi over average bypass distances are higher than those of linear journeys. The cost difference between linear distances and average bypass distances ranges from 50 to 300 FCFA. Other cases arise between districts separated by the river. The choice is clear for the naturally short linear routes over the more distant bypass routes.

All the routes taken are via the RN1 and the RN16. This situation multiplies the number of traffic jams, which are the vector of the traffic accidents observed on the main arterial roads (figure 2).



Source: Kara fire brigade, October 2021

Figure 2: Breakdown of traffic accidents on a few roads

According to the Kara fire brigade, an average of fifteen traffic accidents occur every day in the town of Kara. Figure 2 shows that 41%, 27% and 18% occur on the RN 1, RN 16 and RN 17 respectively. Even if the share of traffic accidents is low on the other roads, their contribution to the frequency of accident risks on the main roads is significant. In fact, the absence of connecting roads between neighbourhoods creates bypasses that lead to more than 90% of accidents on the RN 1 and RN 16. The bypasses influence the regulatory travel times. The example of travel times for pedestrians is revealing (table 3).

TABLE 3: Pedestrian travel times by distance travelled

Itineraries	Linear distance	Time used	Average bypassing distance	Time used
Tchintchinda College- Kara University (South)	1,5 km	22 min	7 km	1h45min
Bonne Fontaine- Kara University (South)	1 km	15 min	6 km	1h30min
Tchintchinda Market- Agnarim Dispensary	2 km	30 min	5 km	1h15min
Tiwindè Cap - Agnarim Primary School	3 km	45 min	4 km	1h

Source: Field surveys, October 2021

Table 3 shows the travel time on the different bypass routes. Pedestrians leaving Bonne Fontaine for the University of Kara (South) take an average of 1.5 hours over 6 km instead of 15

minutes if there was a direct route (1 km). From Tchintchinda College to the University of Kara (South), one spend 1h 45 min of walking over 7 km instead of 22 min on average if there was a linear route (1.5 km).

4.3. The need to develop Tiwindè -Kaoyèlè road

- Towards efficient urban mobility

The development and asphaltting of rue Tiwindè-Kaoyèlè is a necessity for opening up the districts of Tchintchinda, Eyéouda and Agrarim. This project will allow the decongestion of the National Road N°1 and the National Road N°16. For 78% of motorbike taxi drivers, the development and asphaltting of this road under study will enable them to serve the South-East districts of the city of Kara in all climatic seasons. All pedestrians find it necessary to build a bridge over the Kara River. This river, which remains a factor of isolation, is at the origin of the long bypassing that the populations make to travel. The effectiveness of the project will allow students from the Tchintchinda and Eyéouda districts to access the Kara University campus in record time. Transport costs will be reduced for the beneficiaries because the long bypassing will be abandoned in favour of linear distances.

- Towards the socio-economic well-being of the beneficiaries

The development and asphaltting work on Tiwindè-Kaoyèlè Street will lead to the temporary recruitment of workers made up of masonry, carpentry, reinforcement, electricity, plumbing and driving technicians. According to the municipality, the project will boost economic activities with the construction of shops and workshops. Also, access to training, health and leisure centres will be made easier for the population in all the districts studied. The neighbourhoods will be better supplied with drinking water and electricity.

- Towards a real reorganisation of the area served by the street under study

The planned development will make it possible to resize and rebuild new gutters on both sides of the street to make the water drainage system more fluid. The improvement of road drainage conditions will be effective. Erosive effects from water and wind will have less impact on adjacent streets. With the clearing of weeds and other rubbish obstructing the street, the urban landscape will be aerated. The reforestation of trees along the street to be landscaped can enhance the environmental heritage.

V. THE DISCUSSION

The mobility of people in African cities has been the focus of research by some urban geographers and specialists in economics transport. The strong demographic growth of these countries is a source of infrastructure and equipment problems, especially as some urban sites have significant natural obstacles. As this study shows, the Kara River is a factor in the isolation of several districts. Mobility difficulties in the districts of Tchintchinda, Eyéouda, and Agrarim are linked to the presence of this river. The streets are insufficiently developed and remain impassable. There is a lack of connecting infrastructure, which hampers the interactive movements of the population. In the view of H. Quénot-Suarez [5], the neighbourhoods of the cities of Abidjan and Lagos have discontinuous streets that make mobility difficult. The

development and asphaltting of streets with the construction of bridges could facilitate the flow of people and goods. According to a study by MTPT, the lagoons of Lome and Cotonou have created enclave neighbourhoods that require long detours for road users. Particularly in Lome, less than 10% of the road surface is paved [6]. This situation is very favourable to motorbike taxis, which are the only ones able to penetrate the neighbourhoods. In addition, the road surface is often damaged (erosion of the curbs, potholes, and erased road markings). There are significant flooding problems in the rainy season.

The situation is typical or even worse in the secondary towns in the interior where transport is crippled by natural and geotechnical determinants. According to Agbamaro and *al* [7], the roads in the peripheral areas of Kara's urban fabric are made of clay. The streets are difficult to pass in the rainy season, as they are prone to getting stuck and slipping. These streets (95%) are impassable during the heavy rains from July to October. In the same sense, A. Guézéré notes that the peri-urban area of Kara in relation to the city centre is undeveloped and without road infrastructures in good condition [8]. The author finds that the precariousness of the streets in the city of Kara, especially in its peripheral districts, causes mobility problems. In the city of Abomey-Calavi in Benin, the roads are few and far between. Only a few of the city's main roads have been paved over approximately 14.8 km and are counted by neighbourhood [9]. The typology of urban roads in Abomey-Calavi shows that 87% of the roads are made of earth and are in a very poor state of practicability, especially in the rainy season. The author notes that in 2000, there were only streets that were essentially made of earth, leaving no real spatial structuring.

Similar studies carried out by the Prefecture of Guyana reveal that the absence of a road connection on the axis of the coast has highlighted the isolation of seven Guyanese municipalities, said to be "isolated" or "inland", namely Grand -Santi, Papaïchton, Maripasoula, Saul, Saint-Elie, Camopi and Ouanary [10].

In the town of Notsé in Togo, the road system is in an advanced state of degradation with a predominance (85%) of dirt roads [11]. The inadequacy and lack of development of the rainwater drainage network in this city mean that the Zongo, Kpoto-Market and West Lomnava neighbourhoods are impacted by flooding in the rainy season. The poor state of urban roads in Africa, as shown in this research, is due to water erosion and above all to the deficient nature of street development and drainage. For I. Dandonougbo and *al*, heavy rains are a source of deterioration of the streets in the Attiégo district in Lome. In Attiégo, the movement of people in the rainy season is difficult because of the floods that last for several weeks [12].

M. Agbamaro and *al* point out that the rainwater creates mire, crippling the road traffic at times [7]. Thus, the mobility of people in the city of Kara is linked to the narrowness, the lack of culverts and the absence of pavements. This precarious road infrastructure explains the excessive transport prices and loss of time.

The case of the city of Abomey-Calavi noted by J. Gnélé is very explicit [9]. Indeed, due to the inadequacy and poor spatial distribution of the road network, users are often driven back to

the only roads that have been developed, thus causing traffic jams. As for the impassability of the roads, this results in traffic difficulties, complaints of back pain, general fatigue and aches and pains, and damage to vehicles. Finally, the unhealthy state of the roads results in an advanced degradation of the urban landscape and the loss of urban aesthetics.

In view of these consequences caused by the poor state of the roads in the Tchintchinda, Eyéouda and Agnarim neighbourhoods, a plan to asphalt and clean up the Tiwindè Cap –Kara University road is proposed. The realization of this project could contribute to the effectiveness of the fluidity of mobility. This is the point of view of K. Avouglu *et al* when he points out that the development of road infrastructures favours interactive movements between the neighbourhoods of a given city or even the opening up of regions or the interconnection between states [13].

According to J. Gnélé, the development of the urban road system in the city of Abomey-Calavi also gives the population greater opportunities to travel within the city [9]. Following the example of the city of Ouagadougou in Burkina Faso, the city of Abomey-Calavi will have taken small steps towards development [14]. The opening of new roads in Guyana could 'link' the geographical, social, cultural and economic enclaves to the coast [15]. Thus, various major road projects have in fact been envisaged in this country for a decade, particularly by the regional and departmental authorities.

VI. CONCLUSION

The present study has shown the difficulties of mobility faced by the users of Tiwindè-Kaoyèlè road. This road and its adjacent roads which structure the south-eastern districts of the city of Kara are precarious and undeveloped. In the rainy season, they are full of potholes that cause bogging down and slipping.

This study shows that only 13% of pedestrians manage to cross the Kara River for their mobility needs. The linear connection of the two banks of the river by motorcyclists and motorists is impossible. It is established through long bypassing due to the absence of a bridge over the Kara River.

It is in the spirit of overcoming these difficulties that this study proposes the development of road infrastructures in the study area. This development must be carried out as a priority through the asphaltting and sanitation of the Tiwindè-Kaoyèlè road with the building of a bridge over the Kara River. The project aims to improve transport and traffic conditions as well as the living environment of the populations of the city of Kara, particularly those of the Tchintchinda, Eyéouda and Agnarim districts.

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