Transport & DD

Urban Mobility in Haiti: A Diagnostic

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List of abbreviations

Cap	Cap-Haïtien
CBD	Central Business District
CDR	Call data records
HTG	Haitian gourdes (currency unit)
MAST	Ministry of Labor and Social Affairs (Ministère des Affaires Sociales et du Travail)
MEF	Ministry of Economy and Finance
MCI	Ministry of Commerce and Industry
MTPTC	Ministry of Public Works, Transport and Communication (Ministère des Travaux Publics, Transports et Communications)
NMT	Non-motorized transport
PAP	Port-au-Prince
PPHPD	Passengers per hour per direction
PPP	Purchasing Power Parity
RSA	Road Safety Audit

Executive summary

1. **Cities can drive development through economies of scale, but recent urbanization in Haiti has not been followed by economic growth.** To fulfill their roles as engines of national economic development, cities—especially primary cities—must function as aggregators of labor markets and deliver on providing the economies of scale that can boost economic growth. In Haiti, Port-au-Prince is not playing this function particularly well.

2. **Spatial fragmentation is limiting access to opportunities, a situation worsened by challenges in the urban transport systems in both Port-au-Prince and Cap-Haïtien.** In particular, the Port-au-Prince CBD, which was greatly damaged in the 2010 earthquake, has become more a barrier than a connection, as shown in Figure 1, inhibiting linkages between parts of the city, metropolis, and even country.

Figure 1. Market activity in the Port-au-Prince CBD spills over into the streets where it blocks pedestrians and other traffic

Photo credit: World Bank

3. **The spatial fragmentation is confirmed by very low urban mobility, with a large share of the population using walking as their main mode of transport.** Motorized mobility is muted; only 42 percent of the working-age population in Port-au-Prince work beyond a 1-kilometer radius of their house, according to the call data records (CDR) reviewed in Chapter 2. Patterns of daytime and nighttime population distributions across the Port-au-Prince metropolitan area also show little movement. Moreover, transport expenditures in Port-au-Prince are very low, suggesting large proportions of the population either predominantly or exclusively walk or do not travel at all.

4. **An analysis of accessibility shows only low shares of the population can reach specific places in the city within 60 minutes—underscoring the spatial fragmentation and suggesting current limitations of the public transport system.** Analysis showed that of four key centers (with important daytime populations as a proxy for employment centers) only three were accessible in less than 60 minutes to less than 10 percent of the metropolitan population; in other words: 90 percent of the population would need to travel more than an hour to access any of these sites. Moreover, only about half the population could get to central Port-au-Prince (CBD) in less than an hour.

This report focuses specifically on studies of urban mobility and accessibility

5. **Improving urban mobility can reduce fragmentation and help achieve agglomeration benefits.** Urban transport is only one aspect of a city's fragmentation—with urban transport both being affected by that fragmentation, as well as adding to it. Improvements in urban transport, however, can be a practical way to reduce this fragmentation. This report then focuses specifically on studies of urban mobility and accessibility for Port-au-Prince and Cap-Haïtien. It is expected that findings for other urban areas will be similar.

Urban public transport in Haiti

6. **Urban transport is dominated by the private sector and in particular by paratransit services using mostly converted pickup trucks from North America, known locally as "Tap Taps."** Haiti's public transport supply is entirely in private hands, and, compared to the situation in other countries where active unions and associations create a coherent operating structure, little internal organization is in place. In addition, regulatory mechanisms are light. Several ownership/operations models are in place, in particular for the operation of Tap Taps. Among all modes of motorized transport in urban contexts, Tap Taps are the most widely available.

7. **Tap Tap revenues vary substantially from one day to the next, depending on congestion conditions, which greatly impacts operator profitability.** The analysis for this report shows that as a result of congestion, operators cannot

always make the same number of runs in a day. In addition, congestion exacerbates the operators' incentives to engage in *court circuits* ("short circuits"), which means operating only a portion of a route and then turning around to again fill the vehicle with new paying customers. This not only adds to a poor functioning transport system and reduced accessibility and increased travel times, but it also increases user costs and thus affects affordability.

8. **Evidence suggests supply is not meeting demand because of congestion.** While calculations indicate that on paper the ratio of total bus seats to population is not low by international bench marks, in practice, demand is not being met by supply because of very slow operating speeds associated with congestion. Interviewees for example reported long wait times and crowded Tap Tap vehicles. Analysis in this report suggests that congestion constrains the ability of the system to deliver the number of seat-kilometers that current demand levels appear to require. Addressing congestion will be important to increase traffic flow and public transport supply, and thus increase accessibility and reduce operator costs.

Evidence suggests supply is not meeting demand because of congestion

9. **Congestion and risk likely prevent a market "correction" to better balance supply with demand.** Normally, when demand outstrips supply, it is expected that this is followed by an increase in supply until the balance is restored; in Haiti, however, such a rebalancing doesn't seem to occur, most likely because of congestion and risk. Individual operators can do nothing about congestion, and indeed any action they might take individually—provide more vehicles—would exacerbate congestion and therefore be a risky investment. Thus, the urban transport market remains in equilibrium, albeit one of very low quality and inadequate service; poor quality vehicles, Tap Taps mostly, offer no-frill services to a largely captive market, with little change in service quality over time. As is often the case with paratransit services, to keep costs low, operators rely on used vehicles with low capital requirements.

Walking and the pedestrian environment

10. **Large shares of the urban population predominantly use walking or exclusively walk as their means of getting around.** While walking is important for all segments of the population, it is especially so for households in poor quintiles as they rely exclusively on walking.

11. **Pedestrian conditions generally are sub-standard, which affects the urban poor and disabled especially.** The most common barriers to the walking environment in the main two cities include the lack of adequate sidewalk space for the volume of pedestrians; sidewalk and roads blocked by garbage (see Figure 2); market activity on streets and sidewalk; poor drainage resulting in flooded

streets; two-wheelers using and parking in pedestrian spaces; frequent sidewalk obstructions from poor object placement; frequent pedestrian/vehicle conflict points because of a lack of intersection control or poor street and intersection design and marking; and insecurity associated with gang violence. These factors contribute to a sense of fragmentation for pedestrians. Currently no one in the administrative structure of urban governance is tasked with looking after the needs of pedestrians.

Figure 2. Garbage on the streets blocks access in this typical street in the Port-au-Prince CBD

Photo credit: Roger Gorham

Addressing fragmentation by reducing congestion and increasing accessibility

12. **Analysis shows physical improvements are needed to address congestion and increase accessibility to economic and social opportunities.** Improvements will also reduce operator costs (by allowing Tap Tap operators to do more runs) and improve the user experience by reducing their waiting times and improving their walking experience. An effective strategy would both target urban public transport—to improve flow, reduce costs, and improve accessibility—as well as strengthen the urban public space and increase walkability, thus addressing an important mode of transport for all residents and in particular the urban poor.

13. **To improve urban public transport, measures can include physical interventions, an improved regulatory environment, and better governance.** Addressing congestion systematically means prioritizing corridors where improvement in travel speeds will have the most impact in creating accessibility for the largest number of people, thus facilitating the function of the city as aggregator of labor markets. In the Port-au-Prince metropolitan region, the analysis suggests that investments in the RN2 corridor through Carrefour would be the most effective in enhancing overall accessibility. A similar analysis for Cap-Haïtien could be carried out in the future.

14. **Analysis suggests that well-targeted measures in specific corridors can have an impact on overall accessibility.** While the precise package of measures would need more analysis, preliminary results indicate that well-targeted measures can make a difference. Possible interventions would include intersection improvements; drainage improvements, including inspection and maintenance of drains; improved solid waste management, especially refuse collection; improved public transport facilities (including reconfiguration of public transport staging areas); traffic management and control interventions; improved regulation and control of street space (for example for parking and vendors); and improved non-motorized transport (NMT) facilities (as access points to public transport). All the above measures—both to improve public transport and enhance the pedestrian experience—should be packaged in a coherent program of action over a four-year time frame, at least for a geographically specific area.

Measures to improve the urban public space and the pedestrian environment do not depend on large investments

15. **Improving the pedestrian experience relies on similar measures as those to improve urban public transport.** Measures to improve the urban public space and the pedestrian environment do not depend on large investments, but rather on a re-orientation of priorities driving public policy decisions along with institutional and procedural mechanisms to ensure they are delivered. These measures—similar to those to improve urban public transport—include re-invigorated attention to urban service delivery, improved procedures to manage urban development processes, and select catalytic investments, combined with improved governance.

Improving urban transport governance and establishing a lead authority

16. **A key challenge to implementing the interventions and changes in the transport sector in Haiti is the lack of a cohesive governance structure with the mandate and capacity to improve urban public transport.** A possible approach, for the longer term, would be to work toward the creation of a lead authority for urban transport, at least in the Port-au-Prince metropolitan area. This authority should eventually be autonomous from the national government,

but multi-jurisdictional to avoid administrative fragmentation. The authority could bring together functions such as long-term planning and investment programming; public transport oversight and regulation; traffic management; public transport improvements; oversight and development of pedestrian facilities; and road safety. In the short run, and as an interim measure, at the very least essential but currently missing functions in urban transport planning, regulation, and operation need to be enumerated and responsibility for their fulfilment assigned, at least on a temporary basis.

17. **Moving forward, breaking away from the current low-level equilibrium of services involves a combination of new strategies and actions.** Overall, steps forward included working toward (1) improved governance of the sector and more regulatory control, (2) targeted interventions to improve traffic flow and the pedestrian environment, and (3) generally improved urban management and urban service delivery. An overview of possible measures is provided in Table 1, while the specific steps are outlined in Chapter 3 (public transport), Chapter 4 (walking environment), and Chapter 5 (governance and regulatory measures); an overall summary is provided in Chapter 6.

Table 1. Recommendations to reduce congestion, improve the urban environment, and increase accessibility for Haitian cities (summary)

	Recommendations	Short Term Actions	Medium to Long Term Action
Urban transport physical interventions	Implement measures to improve traffic flow and urban environment Increase focus on the pedestrian environment	• Introduce a Road Management Strategy for different types of vehicles along specific arterial routes during peak periods • Redesign and manage primary intersections • Prioritize interventions in select corridors • Invest in select public transport facilities • Implement pedestrian safety and road safety audits (RSA); prioritize pedestrian safety investments • Require design review (with focus on pedestrian safety) for all new infrastructure projects • Undertake methodological walkability assessments • Based on assessments, improve the NMT environment (with sidewalks, rehabilitation of existing NMT infrastructure, and provision of pedestrian crossing facilities)	• Rehabilitate secondary access streets to improve accessibility to peripheral residential areas • Develop an effective highway maintenance program • Restore design features that encourage and facilitate walking in city CBDs • Develop design standards or guidelines for complete streets

	Recommendations	Short Term Actions	Medium to Long Term Action
Urban transport physical interventions Institutional strengthening	Introduce and strengthen regulatory measures	• Develop and enforce regulation for street vendors and motor vehicle operators • Clearly delineate between the highway, sidewalk, and area for commercial activity, and enforce regulations • Increase presence of traffic police at primary and secondary intersections • Regulate and control parking	• Develop a plan to rationalize the public transport routes along the main corridors and consider a transition to the use of larger, but fewer, vehicles
	Improve governance by working towards a cohesive governance structure with the mandate and capacity to address the broad range of challenges	• National government take lead in identifying and developing appropriate lead authorities for urban transport • Initiate additional technical work and public consultation to design strategy for urban transport governance development • Inventory capacity and resources at the local level; and increase capacity within MTPTC to act on strategic planning and regulatory functions in the short term • Ensure all relevant functions are assigned to existing departments/units and capacity is expanded or strengthened where needed	• Establish lead transport agencies on a metropolitan level • Consider the creation of an umbrella agency to coordinate long-term planning and investment programming, public transport oversight, among others • Assign responsibility for enhancing and maintaining the walking environment in cities • Engage with operators to begin building a cohesive interlocutor
Urban management	Improve delivery of urban public services, specifically solid waste collection and drainage	• Regularly inspect and maintain highway drainage, including periodic de-silting of drainage channels, specifically before and during the hurricane season • Improve garbage collection • Make siting decisions for government and other facilities with awareness of / attention to their potential impacts on urban transport outcomes	• Consider transport-specific infrastructure investments to alleviate impact of floods • Develop an extensive watershed management investment strategy and policies. • Introduce a robust and deliverable solid waste management strategy

Chapter 1. Introduction

1. **Haiti's geography, people, and history provide it with many opportunities.** The third largest Caribbean nation by area and population (10.4 million), Haiti shares the island of Hispaniola with the Dominican Republic. Haiti benefits from proximity and access to major markets with favorable trade agreements, a young labor force, a dynamic diaspora, and substantial geographic, historical, and cultural assets. The country possesses untapped markets and untapped potential for the private sector to explore, including agribusiness, light manufacturing, and tourism.

Haiti possesses untapped markets and untapped potential for the private sector to explore

2. **However, Haiti remains the poorest country in the Latin America and Caribbean (LAC) region and among the poorest in the world.** Haiti's growth over the past four decades has been very low, averaging about 1 percent per year, with gross domestic product (GDP) per capita falling by 0.7 percent a year on average between 1971 and 2013. As a result, the overall poverty headcount in 2012 included 58.5 percent of the population while 24.5 percent was living in extreme poverty,[1] meaning that almost 6.3 million Haitians could not meet their basic needs and among them 2.5 million could not even cover their food needs. Poverty is particularly pervasive in rural areas, with almost 75 percent of the rural population living below the poverty line and over 38 percent in extreme poverty. Furthermore, with a Gini coefficient of 0.6, Haiti has the highest income inequality in the region and ranks among the world's most unequal countries (Antoine et al. 2017).

3. **Access to the labor market and services is not evenly distributed, and evidence suggests this situation is not improving with urbanization.** A 2006 social resilience and state fragility paper notes the strong correlation between poverty in Haiti and lack of access to labor markets, infrastructure and services, and educational opportunities. Access to these factors can improve opportunities for income generation, but access is not evenly distributed, with substantial variation across and within regions and urban areas (Verner and Heinemann 2006). Moreover, while normally access is expected to improve with urbanization, evidence suggests that in Haiti it has not.

4. **Haiti's population is increasingly urbanized, with many people moving to the cities, especially after the 2010 earthquake.** The recently completed Haiti Urbanization Review (Gracia et al. 2018 *forthcoming*) shows that urbanization in

1 In this paper, "poverty" refers to the national definition, which considers a household poor when household consumption per capita is less than G 81 per day (US$ 2.42 PPP in 2005) and extremely poor when consumption is less than G 42 per day (US$)

Haiti has occurred more recently and more rapidly than in cities elsewhere in the Latin America and Caribbean region. In the first 15 years of the current century, Haiti's urban population grew 3.6 percentage points above the Caribbean average and doubled in size from about 3 to 6 million people. Moreover, when taking a more expansive definition of "urban" by considering population density within 10,000 square meter cells (instead of simply using the proportion of population living in jurisdictions identified as urban), the Urbanization Review shows that Haiti in 2015/2016 was the fourth most urbanized country in the region after Puerto Rico, Trinidad and Tobago, and Mexico.

5. **Most of this urbanization is occurring in the two largest cities–the Port-au-Prince metropolitan area and Cap-Haïtien.** The Port-au-Prince metropolitan area (sometimes referred to as PAP in this report) accounts for 2.5 million people or about 40 percent of the Haitian urban population. Both Port-au-Prince and Cap-Haïtien (abbreviated to Cap) are the subject of the present report. Other large cities include Gonaives, Port-de-Paix, Saint Marc, and Léogane. For the country in general, few people live where they were born. In particular after the 2010 earthquake people have moved to the urban areas to access jobs and other urban services.

After the 2010 earthquake people have moved to the urban areas to access jobs and other urban services

6. **Urbanization is usually positively correlated with economic growth and has been shown to be a causal factor.** The Haiti Urbanization Review notes that historical data for over 180 countries between 1986 and 2015 show incomes rising when the share of population living in urban areas increases. The explanatory factors are generally three-fold. First, density itself promotes productivity, by offering economies of "agglomeration," that is, the ability of productive sectors to benefit from proximity to firms producing similar or related outputs. Second, cities are efficient aggregators of labor, facilitating access to more diverse labor markets more efficiently than would be feasible in rural areas. Finally, social and infrastructure services can be rendered to urban dwellers at a substantially lower cost (because of economies of scale) than would be possible in rural areas. For these reasons, urbanization is usually associated with GDP growth.

7. **In Haiti, however, urbanization has not been followed by economic growth.** As summarized in the urbanization review:

> GDP per capita remained stagnant and even dropped from US$ 757 in 1996 to US$ 727 in 2013 even when urban levels increased drastically from 33 to 58 percent. Unlike similar countries in Latin America and the Caribbean (LAC), Haiti has not cashed in on the dividend from urbanization. Widespread fragility and costly natural disasters may have undermined the benefits of the urbanization process. (Gracia et. al. 2018, Pg. 3)

One particularly notable figure is that, in Haiti, urban areas have higher rates of unemployment and underemployment than rural areas: in 2006, 49 and 37 percent of populations in metropolitan and other urban areas, respectively, were un- or under-employed, compared to 36 percent in rural areas (Verner and Heinemann 2006). Nationally, unemployment has declined since 2001, from 27 percent in 2001 to 12 percent in 2012, but rural areas, not cities, have contributed the most to this fall in unemployment. In 2012, the probability of being employed was 20 percentage points higher in rural areas than in 2001, but over 4 percentage points lower in urban areas, which maintained an unemployment rate of around 40 percent.

In Haiti, urban areas have higher rates of unemployment and underemployment than rural areas

8. **Many factors including urban and metropolitan fragmentation contribute to the lack of economic growth following urbanization in Haiti.** The Haiti Urbanization Review explores in detail the many factors that contribute to this unexpected and counter-intuitive (though not unprecedented, as described in Lall et al. 2017) feature of Haitian urbanization. Contributing factors include Haiti's inherent vulnerability to various and frequent natural disasters, weak land administration and regulatory enforcement, information gaps, weak governance at all levels and particular at the sub-national level, and ongoing challenges with sustainable financing. The urbanization review particularly identifies urban and metropolitan fragmentation, especially in the PAP metropolitan area, as a key factor contributing to the mismatch between urbanization and national economic growth performance in Haiti.

9. **Urban mobility—the focus of this report—is one of many aspects that can add to, but also lessen—the fragmentation of Haitian cities.** This report—a diagnostic of urban mobility in Haiti—in particular, looks at the extent to which urban transport performance is affected by, and contributes to, the metropolitan-level fragmentation identified by the urbanization review. Through an analysis of available information and based on interviews and site visits, the objective is to identify the key challenges and solutions for improving urban transport services (in Haiti in general and in Port-au-Prince and Cap-Haïtien specifically), and so help reduce the fragmentation and enable Haitian cities to become the engines that power the country's economic growth.

10. **In the next chapters, first an overview of the spatial fragmentation of cities in Haiti—and Port-au-Prince specifically—is presented in Chapter 2, to provide the context for analysis in later parts of the report.** Chapter 3 and 4 then zoom in specifically on the provision of urban public transport services in Port-au-Prince and Cap-Haïtien (Chapter 3), as well as the condition of the pedestrian environment in both (Chapter 4). With both chapters identifying possible measures to improve urban public transport (including walking), Chapter 5 then looks at the identified challenges from a governance and regulation perspective. Final conclusions and an overview of key recommendations is provided in Chapter 6.

Chapter 2. Fragmentation and urban mobility challenges in Haitian cities

2.1 Introduction

11. **Fragmentation in Haitian cities is impacting economic growth.** As discussed in Chapter 1, Haiti's cities are increasingly urbanized, but this urbanization has not been matched by the economic growth that typically follows urbanization, the result of the economies of scale and the access to labor and opportunities that characterize most cities.

12. **The fragmentation of Haitian cities can be seen as both a *spatial* fragmentation as well as an *institutional* one.** The spatial fragmentation in Haiti links to a reduced ability for its urban population to access goods, services, and social interactions. The country's general urban fragmentation and that of Port-au-Prince specifically, has led to a situation in which the urban population, despite some local access to goods and services, has lost the kind of city-wide or metropolitan accessibility that enhances quality of life and brings the desired economies of scale so typical for the urban environment. Related, the institutional fragmentation refers to the lack of coherence in the allocation and integration of responsibilities for the planning and management of urban transport, including the fact that many of these responsibilities are not assigned or allocated at all.

13. **Factors contributing to this fragmentation and accessibility loss can be seen across a range of parameters typically used to characterize urban transport in cities or metropolitan areas, including mobility patterns, governance structures, the physical landscape of the city, and the transport options available.** As a result of these factors, as will be shown later in this chapter, accessibility in metropolitan Port-au-Prince is already highly constrained, while in Cap-Haïtien mobility is only functional because of the city's extreme mono-centricity and geographically limited urban area that has not yet overwhelmed the limited services available.

14. **The remainder of this chapter looks at various dimensions of fragmentation—as related to urban transport—that impact the effective functioning of Haiti's two main cities.** Section 2.2 examines the peculiar fragmenting effect of the central business district (CBD) in Port-au-Prince, an area where walkability has collapsed in spite of the fact that many people there need to, and do, walk. Section 2.3 demonstrates the fragmentation of Port-au-Prince by showing a very low level of mobility. Finally, section 2.4 shows the results of an analysis of transport accessibility for Port-au-Prince.

Haiti's cities are increasingly urbanized, but this urbanization has not been matched by the economic growth that typically follows urbanization

15. By looking at the existing fragmentation and mobility in Haiti in general and in Port-au-Prince and Cap-Haïtien specifically, this chapter sets the context for a more detailed look at both the challenges and opportunities in the public transport sector (chapter 3) and the pedestrian environment (chapter 4), to improve the so important and desired urban accessibility to opportunities.

2.2 Spatial fragmentation and barriers to mobility created by the Port-au-Prince CBD

The historic CBD location is strategic, as all road access between the South and Southwest and the rest of the country passes through this narrow plain

16. **The CBD in Port-au-Prince continues to function as a center for livelihoods and trading, but has also become a bottleneck in the mobility of the city, particularly since the 2010 earthquake.** The historic CBD, an area of around 200 hectares in a narrow and strategic area of the coastal plain between the port on Port-au-Prince Bay and the foothills of the Massif de la Selle range, sits at the center of metropolitan life in Port-au-Prince. Its location is strategic not only for the region, but for the country, as all road access between the South and Southwest and the rest of the country passes through this narrow plain. In the 2010 earthquake, however, the district was severely damaged, and a key factor in the city's spatial fragmentation has been the challenge in bringing back a well-functioning CBD. While it remains well connected to the entire metropolitan region, the district's devastation is such that it isolates and fragments other parts of the region, functioning more as a barrier than a link between parts of the city and even the country.

17. **Today, the CBD hardly functions as a *business* district at all.** Once the center of Haitian government administration, many government buildings were destroyed in the 2010 earthquake and private businesses left in the immediate aftermath and did not return. Shops in the traditional sense have also left. What did remain, however—and perhaps today more than ever—are various thriving markets. These include the Croix-des-Bossales (the largest market in Haiti), the Marché en Fer, the Marché du Port, and the Marché Hyppolite. Surrounding and linking these markets is a tremendous amount of intense commercial activity along the streets. While elites have largely stayed away from the historic center since the earthquake, these markets still constitute the center of daily life for the urban poor.[2] Indeed, the Croix-des-Bossales market handles about two-thirds of the food and manufactures consumed in the capital and is a major destination for traveling rural traders, the "Madam Saras," who make a profit by buying and

2 The markets also remain quite important for the lives of the metropolitan region's wealthier inhabitants. Bazabas et al. found that these CBD markets provide goods for other markets around the metropolitan area, as well as for bars, restaurants, and street merchants operating in all zones of the city.

selling in different markets. Various studies have underscored that agricultural product prices on most Haitian markets correlate strongly with the prices at the Croix-des-Bossales market in Port-au-Prince.[3]

18. **The CBD shows a disconnect between population density and economic investments. Despite its thriving markets, little investment is made in the CBD.** In this respect, the area demonstrates a phenomenon observed by Lall et al. (2017) for African cities, of a disconnect between population density and economic investment.

> A stark contrast emerges between patterns of downtown population density — in which Africa largely resembles other regions — and of economic density (as reflected in patterns visible from above that indicate capital investment). Africa's generally low levels of urban capital investment also appear in the assessed worth of building stock. For example, the total economic value of buildings in Dar es Salaam is estimated at around US$12 billion (Ishizawa and Gunasekera 2016), or just less than three times the city's share of GDP. Even lower are the estimated values for Nairobi, Kenya ($9 billion) and Kigali, Rwanda ($2 billion). Compared with cities in Central America, African cities have low replacement values for their built-up area, built-floor area, and population. Thus, Nairobi has the highest replacement value per square kilometer among the four African cities studied, yet it is just 60 percent of the value of Tegucigalpa, which has the lowest among six Central American cities. (Lall, Henderson et al. 2017, page 19)

It is likely that even before the earthquake Port-au-Prince shared this pattern of high density with lack of investment (or disinvestment, as the case may be), and this lack of investment in the CBD, set in the heart of Port-au-Prince, might even be a better example of those sub-Saharan African patterns of urbanization mentioned by Lall et al. The markets are there, the daytime densities are there, but the investment is not.

19. **The transport challenges of the CBD market zone are enormous.** The thriving markets and connected activities bring life to the CBD, but the sheer volume of activities and movements generates intense pedestrian flows that are in themselves a challenge to manage safely. Traders occupy what once would have been sidewalk zones, causing the pedestrian traffic to spill onto the streets (Figure 3). In addition to pedestrian flows, a constant volume of motorized and non-motorized vehicles passes through. Goods to the market come primarily from the interior of Haiti or the port, mostly by heavy or light trucks, but a substantial amount comes from the immediate hinterlands of Port-au-Prince,

Goods to the market come primarily from the interior of Haiti or the port

3 Fews net (2007) Haiti: A Rapid Assessment of Market Information Systems - A special report by the Famine Early Warning Systems Network (FEWS NET)

such as Kenskoff and Croix-des-Bouquets, much of it transported on trucks or Tap Taps (see Chapter 3). While goods deliveries are most intense between 4 and 7 am, the movement of trucks delivering goods occurs at all hours of the day (Neiburg, Sergo et al. 2012). These vehicles vie for street space, not only with pedestrians, but also with the many handcarts (brouettes) circulating in the market area (Figure 4). Finally, to service the market area, intercity and intra-city bus and Tap Tap terminals are located in the area, the largest being the Portail Léogane. These bus terminals operate both inside and outside the public space of the streets around them, further intensifying the area's flurry of activity.

Figure 3. Market activity in the Port-au-Prince CBD spills over into the streets where it blocks pedestrians and other traffic

Photo credit: Roger Gorham

Figure 4. Competition for street space among modes of transport in PAP CBD

Photo credit: Roger Gorham

20. **Piles of garbage, drainage problems, and criminality greatly reduce the area's maneuverability.** Mounds of garbage form a particular and specific barrier to pedestrian and other mobility in the CBD (Figure 5). In addition to its own generation of a substantial amount of debris and rubbish, of which an estimated 80 percent is bio-degradable, the CBD market area also ends up with garbage from other parts of the metropolitan area. Situated at the bottom of a basin into which many streams from around the metropolitan area flow—and because of the inadequacy of solid waste management in the CBD and other areas—the district has become a natural collection point for rubbish from all around. This rubbish often is piled into mounds that inhibit both pedestrian and vehicular traffic or clog the already inadequate drainage systems, creating pools of standing water. On top of this, criminality and gang activity in the historic city center—once more prominent in the outlying Bidonvilles—has made the city center a no-go area for many residents.

Figure 5. Garbage on the streets blocks access in this typical street in the Port-au-Prince CBD

Photo credit: Roger Gorham

21. **The low-quality environment and complex transport situation have transformed the CBD into more of a "barrier" to connectivity.** All elements—market traders, pedestrians, delivery trucks, street carts, Tap Taps, rubbish, drainage problems, and criminality—form the daily set of obstacles through which the country's principal north-south traffic must navigate, effectively making the CBD a barrier in the metropolitan region instead of its heart and key agglomeration area for opportunities (Figure 6). Movement between Carrefour and the rest of the metropolitan region, for example, is highly constrained, and movements between Turgeau, Pétion-Ville, Bois-Jalousie, or Canape Vert toward La Plaine that hope to avoid the historic city center, all require circuitous movements through Delmas. In the terminology of a gravity model, the traditional CBD exerts strong attraction to surrounding zones, but at the same time creates tremendous friction in the network for flows involving other Origin-Destination pairs.

Figure 6. Streets in the CBD that could otherwise be used for through traffic are nearly impassable

Source: World Bank

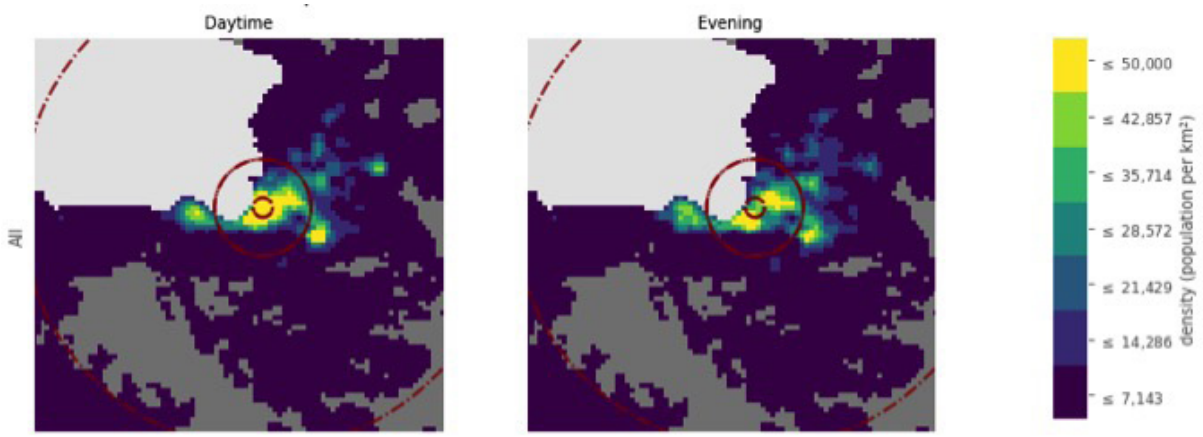
2.3 Low urban mobility confirming spatial fragmentation

22. **As described in the introduction to this chapter, one dimension of the urban fragmentation in Haiti is low mobility, with this mobility both *reflecting* the fragmentation as well as—through limited urban transport—*contributing* to it.** The causes underlying this fragmentation—both spatially and in terms of mobility—are too complex and intertwined to be able to meaningfully discuss in this paper, but improving mobility can provide a means to begin to address the consequences; for this reason, this paper focuses on urban mobility in particular. Using various sources of information, this section aims to paint an overview of this mobility, relying on the limited data available for Haitian cities. Analysis in this section as well as the next (2.4) builds on and complements the work done by the Haiti Urbanization Review (Gracia 2018 *forthcoming*), in particular its chapter on connectivity.

23. **Without available travel demand data, other sources of information need to be used to build a picture of urban transport in Port-au-Prince.** As detailed information on travel demand in Haiti is not readily available, an understanding of travel demand was created by triangulating various other pieces of information. These include direct observation of travelers, mobile phone call data records (CDRs)[4] to show basic commuting patterns, and the results of a 2012 consumer expenditure survey (the *Enquête sur les Conditions de Vie des Ménages après le Séisme* or ECVMAS (IHSI 2012)). In addition, an assessment of public transport in 2011 by Kopp and Prud'homme (2011) was used.

24. **Location information from mobile phone call data records was used as a proxy for major daytime movements that represent commuting behavior.** Building on the analysis of CDRs for the urbanization review, CDRs were analyzed to better understand people's daily movements for work. Figure 7 shows the location of the population during the day and in the evening in Port-au-Prince based on the CDRs, providing an indication of domestic locations and areas of activity during the day. The two plots in Figure 7 show a fairly similar pattern, which suggests relatively stable numbers of daytime and nighttime populations throughout the metropolitan area.

Figure 7. Population distribution in Port-au-Prince in daytime (left) and nighttime (right)

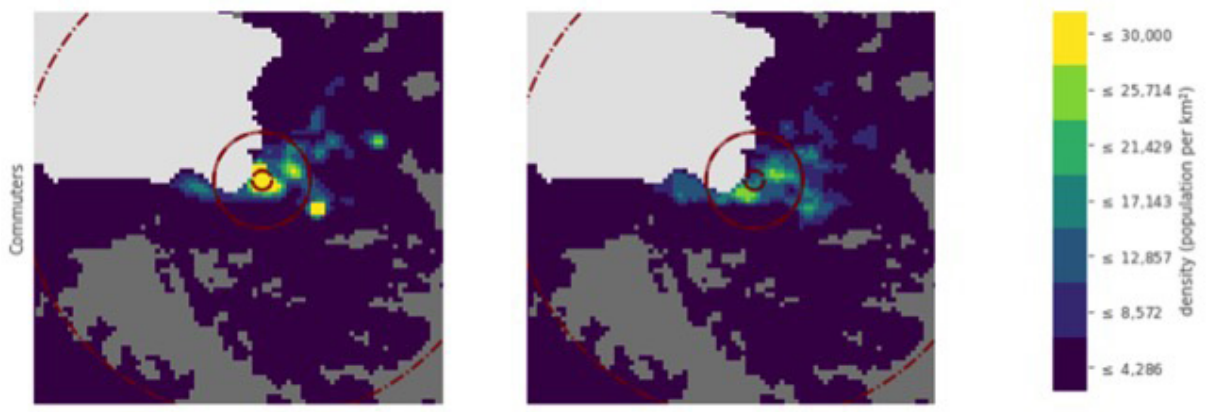


Source: Haiti Urbanization Review (Gracia 2018 forthcoming); Call data records were made available by Digicel and analyzed by Flowminder

4 CDRs were made available by the company Digicel and analyzed by FlowMinder.

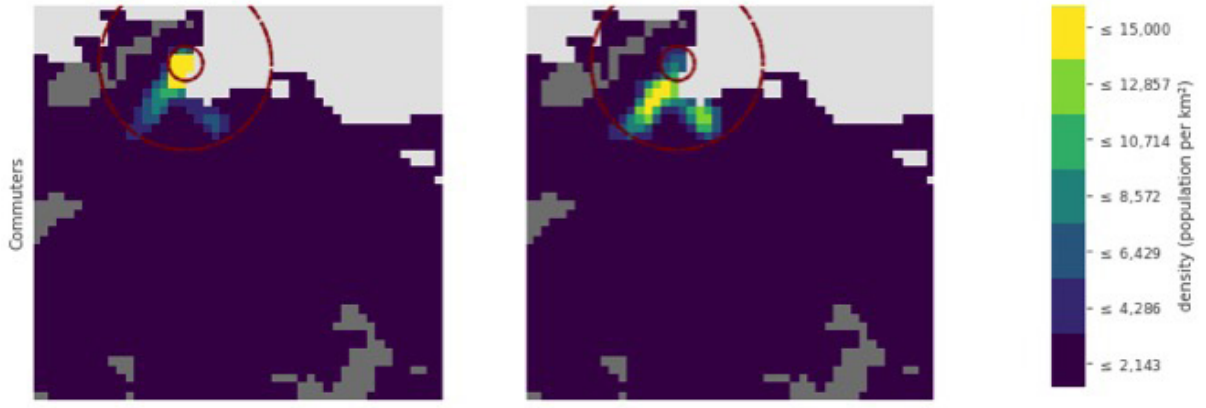
25. **Next, by pairing the daytime and evening records of people who did re-locate during the day, a picture of daily flows emerges.** Figure 8 shows the location of only those commuting beyond their evening location. The figure shows a predominant movement of commuters to the downtown area for work and related purposes (daytime), coming from all over the urban area (as pictured by the nighttime image). A similar figure for Cap-Haïtien shows the strong travel movements in the country's second city (Figure 9).

Figure 8. Distribution of commuters only during daytime (left) and nighttime (right) in Port-au-Prince



Source: Haiti Urbanization Review (Gracia 2018 forthcoming); Call data records were made available by Digicel and analyzed by Flowminder

Figure 9. Distribution of commuters during daytime (left) and evening (right) in Cap-Haïtien



Source: Haiti Urbanization Review (Gracia 2018 forthcoming); Call data records were made available by Digicel and analyzed by Flowminder

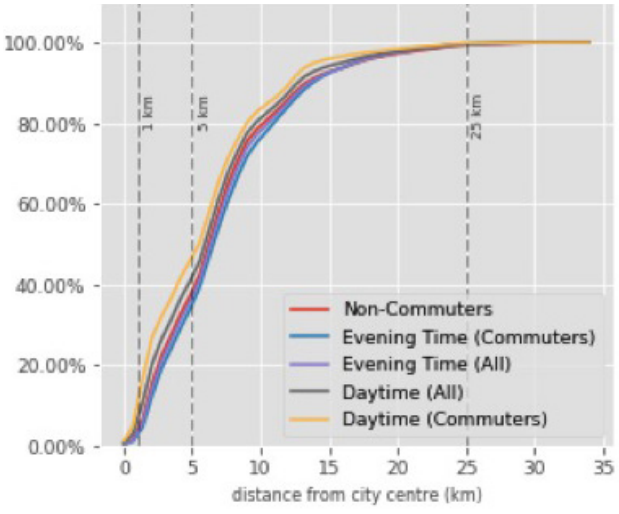
26. **Despite some level of commuting, urban mobility appears low and overall demand muted, compared to other countries.**[5] As shown in the figures, only a small share of people in Port-au-Prince travel a distance to work that can be

5 See for example Kung et al . Using CDR data from five countries / cities, they show 75 percent of all working-age cell phone subscribers have daily commute trips larger than 2.5 kilometers. These data include a low-income comparator, Ivory Coast.

picked up by the CDR. Using the CDR data, it was calculated that only respectively 42 and 40 percent of the populations in Port-au-Prince and Cap-Haïtien can even be considered to be "commuters," meaning that they travel beyond their home cluster[6] (1 kilometer radius). The remaining 58 and 60 percent respectively either do not work or do so from home or in its immediate vicinity.

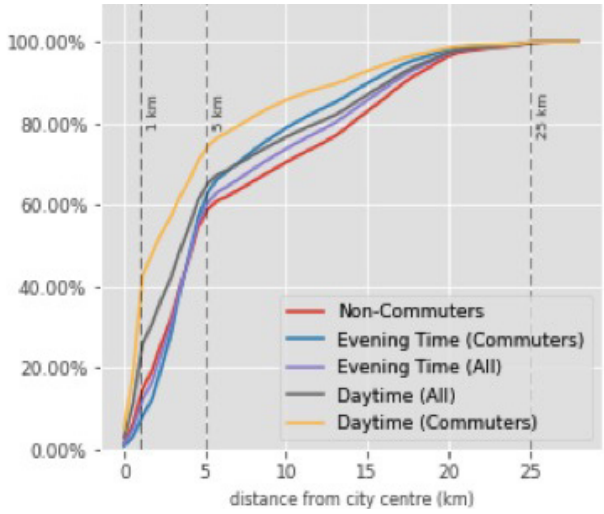
27. **Moreover, even when people do travel to work, commuting distances in Port-au-Prince and Cap-Haïtien are short, and the immobility in Port-au-Prince in particular is striking.** In Port-au-Prince, it is estimated that the median trip is 1.1 kilometer, or 3.1 kilometer if only commuters are considered. In Cap-Haïtien, the corresponding statistics are slightly higher at 1.6 kilometer and 3.3 kilometer. And while commuting is limited in Cap-Haïtien, when comparing the two cities, the relative immobility of Port-au-Prince is striking. Based again on CDR, Figure 10 and Figure 11 show the cumulative population distribution by distance from the city center for different classes of occupants for the two cities. In a typical monocentric city where mobility is good, patterns would be similar to those in Cap-Haïtien (Figure 11): fairly marked differences in daytime and nighttime occupancy patterns across the spatial distribution, with relatively higher daytime occupation closer to the city center. In Port-au-Prince (Figure 10), however, differences in daytime and nighttime populations are not nearly as marked, suggesting relatively little daily mobility.

Figure 10. Cumulative population distribution from city center Port-au-Prince



Source: Haiti Urbanization Review (Gracia 2018 forthcoming)

Figure 11. Cumulative population distribution from city center Cap-Haïtien



Source: Haiti Urbanization Review (Gracia 2018 forthcoming)

6 Because estimates are based on CDRs, the exact location of the home cannot be known; data can only be used to observe movements that are large enough to cause changes in the proportion of calls routed through different towers. Because of this, the term "home clusters" is used.

28. **The relative immobility of the Haitian urban population appears to be corroborated by household expenditure data.** The ECVMAS (2012) consumer expenditure survey (IHSI 2012) showed that in that year—two years after the earthquake—expenditures on day-to-day transport in Port-au-Prince were very low.[7] According to the survey, total household expenditure on rent and (daily) transport in the Port-au-Prince metropolitan region was on average about 12.5 percent of the total household budget in 2012. This percentage did not vary substantially across quintiles, with combined rent and transport accounting for 10.9 percent of household budgets in the lowest quintile and about 13 percent in the highest. By international benchmarks, this is extremely low. In Africa, for example, a 2012 study by the African Development Bank found that across 49 countries, combined housing and transport expenditures ranged from 10 to 53 percent, with an average of 22 percent. Only four countries (Botswana, Central African Republic, The Gambia, and Sierra Leone) had combined transport and housing expenditures lower than those observed in metropolitan Port-au-Prince as a proportion of total expenditures.

Total household expenditure on rent and (daily) transport in the Port-au-Prince metropolitan region is extremely low

29. One explanation for these relatively low expenditures for housing and transport in Port-au-Prince may be that in 2012 many of the surveyed residents in the Port-au-Prince area were still living in temporary housing associated with the aftermath of the 2010 earthquake and received rental subsides through international relief assistance that may not have been counted as "expenditure" in the study. In addition, in the relative chaos of the moment, it is possible that much of what would ordinarily be considered housing expense was actually accounted for in the category "current expenditures," in the form of informal payments to individuals or groups. Indeed, current expenditures was the single highest category of expenditure after food, accounting for 22 percent of all household expenditures.

30. **In the greater Port-au-Prince region, only about 3.1 percent of total household expenditures is used for transport.** When separating the housing expenditures from transport expenditures, results of the 2012 consumer survey show that in the greater Port-au-Prince region transport accounted for 27 percent of the total household expenditures on housing and transport combined, or about 3.1 percent of total household expenditures. One possible explanation for the very low share of transport (but not for the also low share of expenditures on combined housing and transport) could be that most households do not much use motorized transport services. Indeed, in the Port-au-Prince metropolitan area, only about 43 percent of households reported using regular transport services, while over 40 percent of households reported never using any kind of motorized transport services at all.

7 Because of sample size, expenditures on transport for Cap-Haïtien could not be isolated.

31. **Distances traveled by public transport, estimated based on weekly expenditures, are relatively short.** Without data on the average length of a public transport trip, a calculation of transport fares and expenditures was used to make an assessment. Based on the fares (an average of G 2.58 per kilometer, before the May 22 fare increase)[8] at the time of a 2017 study related to the fuel price increase (the ICIESA survey) and self-reported amounts of weekly expenditures by passengers interviewed, trip lengths were estimated. It was calculated, for 2017, that over half (56 percent) of public transport trips for commuting were below 7.75 kilometers, while about 34 percent were between 7.75 and 15.5 kilometers, and the remainder (around 10 percent) either for very long commutes or reflecting travel patterns of households that use public transport much more intensively than simply commuting to and from work.

Distances traveled by public transport, estimated based on weekly expenditures, are relatively short

32. **Overall, these CDR and survey data point to low mobility patterns in the Port-au-Prince metropolitan area.** The CDR data—as a proxy for daily commuting movements—and the low household expenditures on transport underscore an overall low mobility. In addition to these analysis findings, it should be said that the urban fragmentation is observed daily by residents and long-time inhabitants of Port-au-Prince. One of them, in an interview as part of this study, described the phenomenon as such: "People stay in their own corners of the metropolis. They no longer travel around the city. They don't know other neighborhoods, only their own." (Sheila Laplanche, personal communication, May 2017).

2.4 Low accessibility, stemming from a limited mobility system, adds to fragmentation

33. **Urban areas normally facilitate access to opportunities through better integration of land use and transportation systems, directly impacting urban well-being and human development.** In other words: the more efficient a city's access to opportunities such as jobs, medical and educational opportunities, and social activities, the greater the benefits achieved through economies of scale, agglomeration, and network effects. As part of this study, to better understand how the urban fragmentation and limited mobility is affecting this access to opportunities, the specific nature of accessibility in the Port-au-Prince metropolitan area was analyzed. The findings, described below, confirm the limited mobility and paint a picture of severely constrained access to services in Haiti's main metropolitan area, contributing to high urban unemployment and stagnant GDP growth, despite high urbanization rates.

8 On May 22 2017, the price of diesel at the pump increased by 20 percent, from G 149 to G 179, following the partial removal of a fuel subsidy. See also Box 2.

34. **An "Accessibility Tool" developed by the World Bank was used to analyze urban transport access.** Traditionally, the transport sector has focused on enhancing *mobility*, that is people's ability to move quickly and efficiently, rather than *accessibility*, which is the ease with which people reach opportunities. This emphasis on mobility has been driven at least partly by the lack of good data to measure access, with datasets often incomplete, of poor quality, or even obsolete due to rapid urban development. Currently, new analytical tools and data sets are helping address this challenge. The World Bank Accessibility Tool, for example, relies on geographic information, extracted from "big data," on the location of populations and opportunities to develop reliable measures of access. This tool was applied here to understand access levels in the Port-au-Prince metropolitan area overall, as well as by transport corridor. Details of the assessment are provided in the document by He He, 2017.

The World Bank Accessibility Tool, relies on geographic information, extracted from "big data," on the location of populations and opportunities to develop reliable measures of access.

35. **The Tool's "cumulative opportunities" approach is especially useful in situations where little data is available.** Using the cumulative opportunities approach, accessibility is defined as the cumulative count of opportunities (for example, employment, activities, or people) that can be reached by a person within a fixed amount of time using non-private modes of travel. The most commonly used time limit is 60 minutes of travel by transit and foot, which has been used as a limit in a number of studies including Avner and Lall (2016) and Peralta and Mehndiratta (2014). The 60-minute time frame represents a simple upper limit for how long people are willing to travel each way for work.

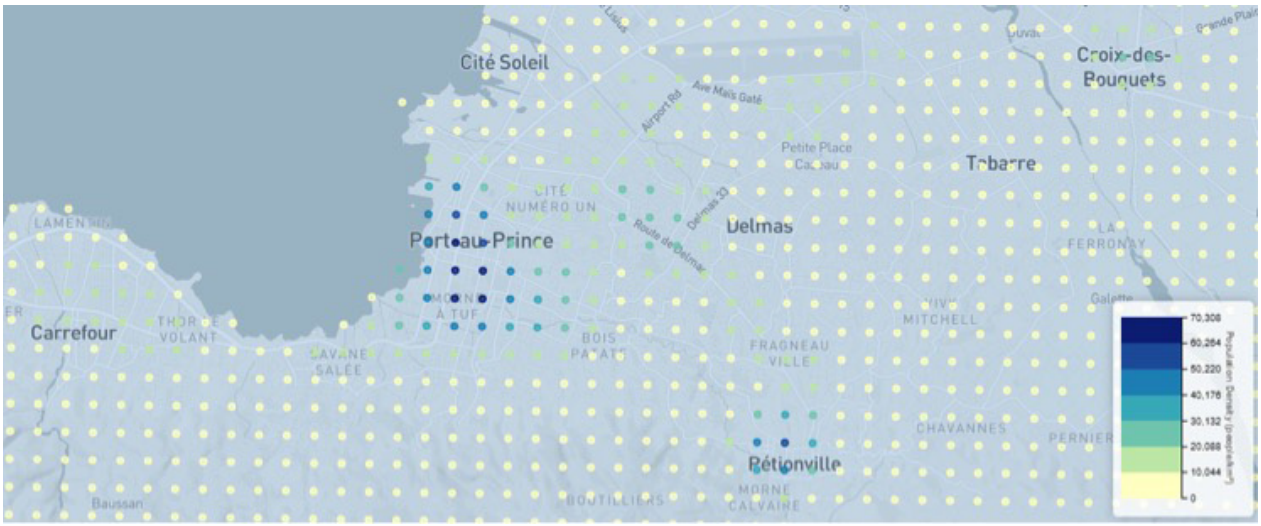
36. **For the actual analysis, three categories of data are required: (1) the spatial distribution of employment, (2) data on the transportation system, and (3) the spatial distribution of the population.** Data for the first two categories are shown in Figure 12 (highest daytime densities as a proxy for key employment centers across the metropolitan area) and Figure 13 (the transit network). Transit routes in Figure 13 are specified in accordance with official route maps, while assumptions about vehicle speeds, headways, dwell times, and stop spacing are based on previous work by Kopp and Prud'homme (2011) and the World Bank (2017).

37. **The third category of data used by the tool is the spatial distribution of population.** This information, taken from the 2015 spatial population distribution data for Haiti from WorldPop (2017)[9], is shown in Figure 14. The data is provided as number of people per hectare in a uniform 100 meter x 100-meter square grid. The density of population is indicated by the depth of the color—the stronger the color, the higher the density. The densest areas in Port-au-Prince are found south

9 The production of the WorldPop spatial datasets principally follows the random forest methodology to estimate the population density. The input data is the combination of traditional census data, survey and GIS data (including buildings, road networks, land use, remoteness, electrification, and topography). For Haiti specifically, the method for estimating the population can be found here: http://www.worldpop.org.uk/data/WorldPop_data/AllContinents/172_metadata.html

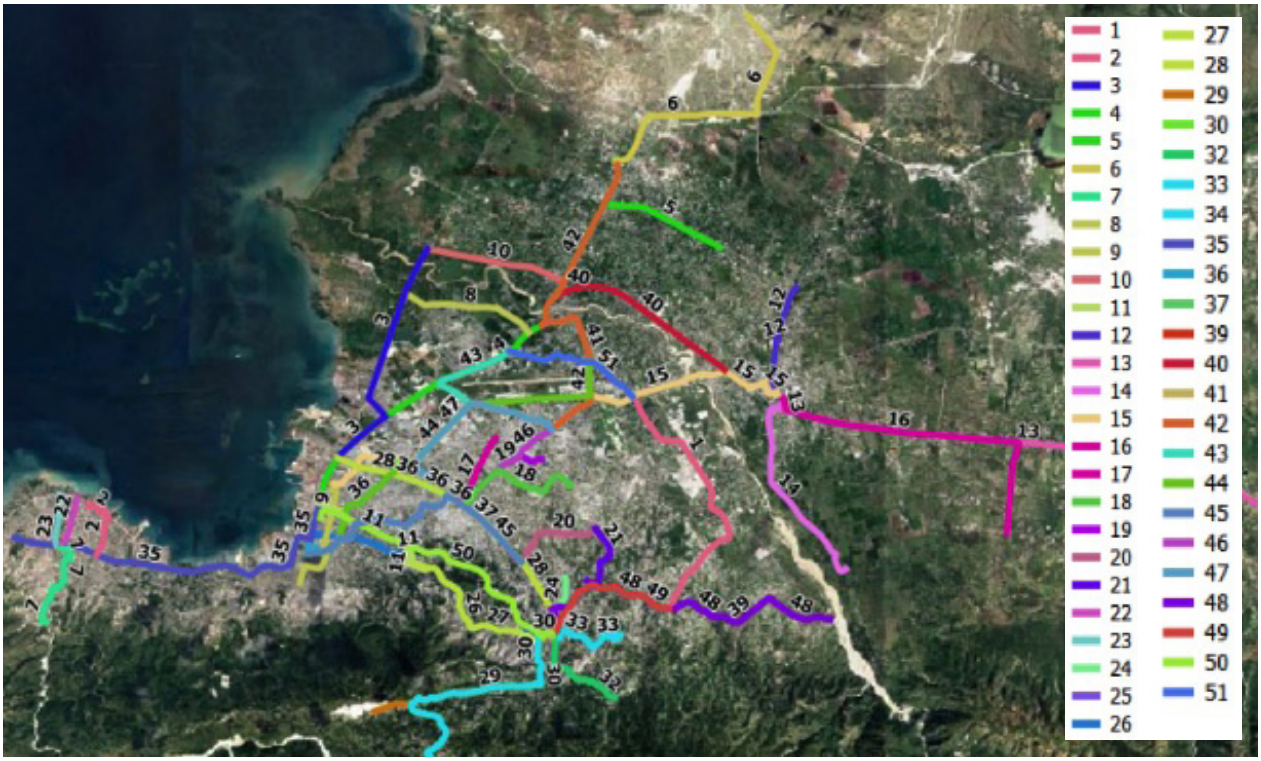
and southwest of the city center, near Route Nationale 2 towards Carrefour. The city center itself, Carrefour, the corridor along Avenue John Brown towards Pétion-Ville, and Cité Soleil north of the city center are also densely populated.

Figure 12. Areas with high daytime population densities



Source: Authors' calculations based on 2017 CDR data, using a data analysis tool provided by Flowminder for the Haiti Urban Review (Gracia 2018 forthcoming).

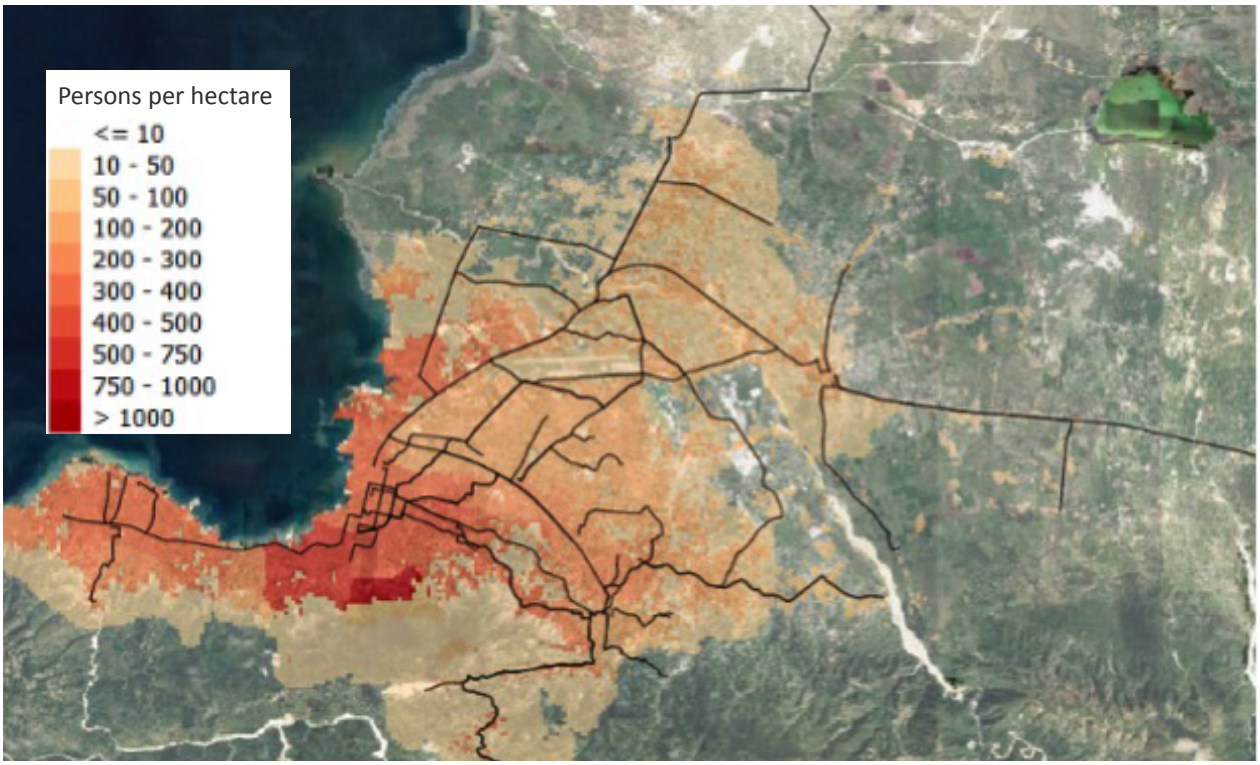
Figure 13. Port-au-Prince public transportation network



Source:

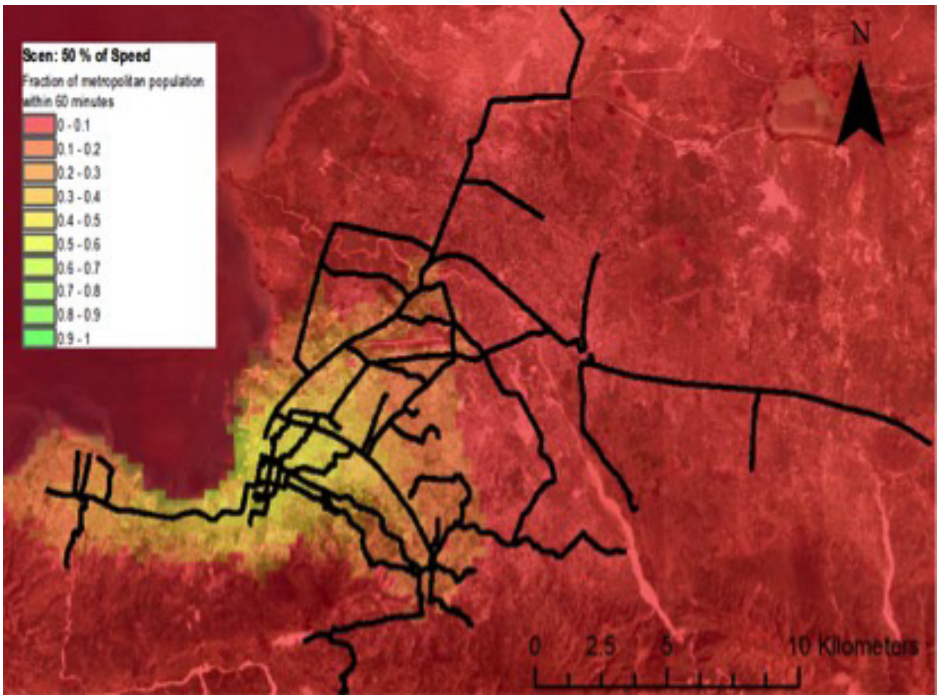
38. **Results of the accessibility analysis show that three of four major daytime population centers in Port-au-Prince have low accessibility.** Combining the three categories of data—the spatial distributions of employment and population and the transport system—Figure 15 presents the spatial distribution of locations across the Port-au-Prince metropolitan area accessible within 60 minutes by various shares of the urban population. The graph uses actual (observed) traffic speeds, which are frequently about half the regulatory speed. The figure shows that three of the regions' four major daytime population centers—Carrefour, Pétion-Ville, and Croix-des-Bouquets (shown in Figure 12 above) are accessible within 60 minutes to only a small portion of the regions' population. Even the fourth region, central Port-au-Prince itself, is mostly yellow, indicating that only about half of the regional population can access the historic CBD in less than 60 minutes.

Figure 14. Spatial distribution of the population in relation to the transit routes



Source: Authors' calculations based on WorldPop 2017

Figure 15. Baseline accessibility by public transport vehicles when traffic moves at 50 percent of the regulatory speed limits (current situation)



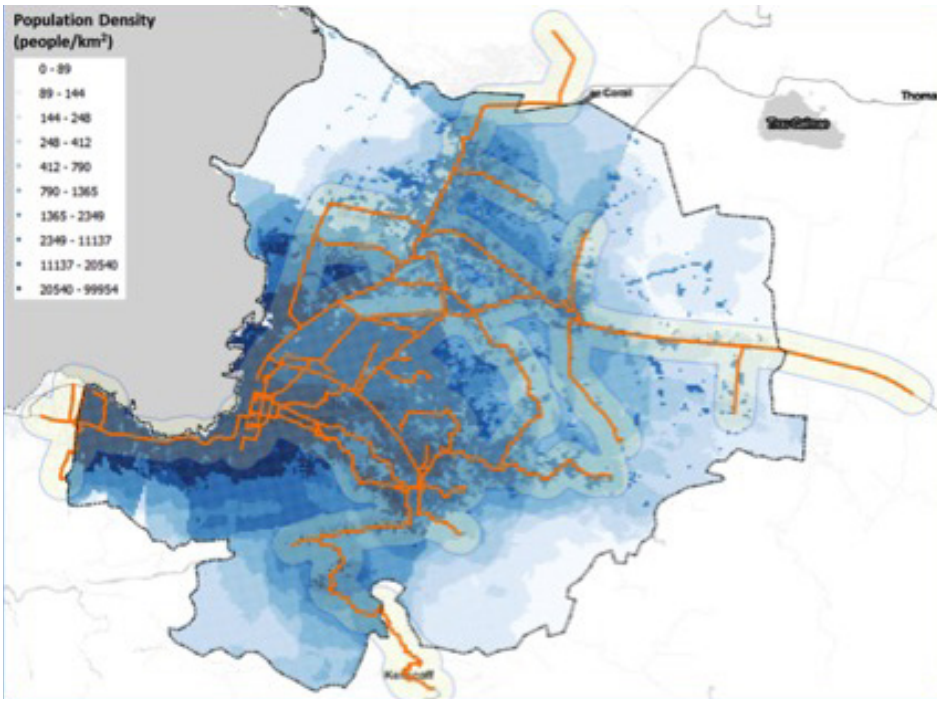
Source: Authors' calculations

Chapter 3. Analysis of urban public transport in Haiti

3.1 Introduction

39. **As described in Chapter 2, Haiti's mobility system is characterized by an overall low urban mobility and very low accessibility.** Analysis, however, also shows that nearly 80 percent (79.95 percent) of the population of the Port-au-Prince metropolitan area is within an 800-meter catchment area of the transit network (Figure 16). This section then takes a closer look at this urban public transport system in Haiti, and in particular Port-au-Prince, to better understand the public transport sector, its operators and business models, as well as key challenges and possible strategies for improvement.

Figure 16. Map of the Port-au-Prince metropolitan area showing population density, the transit network, and an 800-meter catchment area



Source: Authors' calculations

40. Data for this chapter comes from a variety of sources, with analyses based primarily on the data of a 2011 study by Kopp and Prud'homme (2011), a 2017 ICIESA survey among transport operators and users to study the impact of the fuel price increase,[10] and a series of interviews, site surveys, and observations by the World Bank mission team in 2017.

Tap Taps, as one of the key providers of transportation services in the country

41. After a general overview of urban public transport in Haiti and the particular role for informal or "paratransit" in the country and Port-au-Prince specifically (section 3.2), this chapter zooms in on the specific services and operations of the Tap Taps, as one of the key providers of transportation services in the country (section 3.3). Using data from interviews combined with fuel price information, calculations of revenue and costs will provide some insight into the operations of the Tap Taps, which is important for understanding and developing appropriate measures to support transport accessibility, profitability, and affordability of public transport for users of the system. Section 3.4 then addresses governance in the sector, pointing to overall weak governance and a lack of internal organization and regulatory control. Putting this information together, Section 3.5 talks about the current imbalance in the supply and demand of urban public transport, using calculations and observations to point to the fact that it likely is not a lack of actual *capacity* that is limiting supply, but in fact the severe *congestion* that is limiting the number of daily runs that can be made, thus reducing accessibility and increasing operator costs. The last two sections then respectively focus on the causes of congestion (Section 3.6) and possible approaches (Section 3.7) to improve public transport, by directly addressing congestion as well as providing more regulatory control. Both of these types of measures can lead to increased accessibility and lower operating costs.

3.2 Overview of urban public transport services

42. **Urban public transport services in Haiti are provided by highly fragmented, small-scale operations.** In this report, "urban public transport services" refers to transport services available to the general public for intra-urban movements on a fare-for-service basis. In Haiti, such services are, with few exceptions, provided by weakly regulated, private operators operating on fixed or semi-fixed routes, whose net income is not recorded or reported for tax purposes, and for whom capital accumulation and asset depreciation are not part

10 As the ICIESA study focused on the impact of the fuel price increase and did not collect additional information about traffic counts or other population numbers, the results are not population weighted; study findings are only indicative and cannot be scaled up to the population at-large.

of the core business model. The characteristics of such services are consistent with what Behrens et al. (2017) term "paratransit" and which Godard (2008) has referred to as "transport artisanal." Because nearly all services in Haiti function on this model, there is no need to distinguish paratransit from other types of public transport services. There are apparently two "formal" or state-owned bus companies in Port-au-Prince – Dignité and Service Plus – but their services are relatively insignificant, with a combined vehicle fleet of about 140 buses, only a portion of which are in operation.

43. **A wide range of public transport vehicles can be observed on the streets of the main cities in Haiti.** Public transport vehicles in Haiti range from large buses (for 40 or more people) and lorry-buses (lorries converted to carry 50-60 passengers), to midi-buses (18 people) and mini-buses (typically 14 persons), to the smallest public transport vehicles known as Tap Taps, converted pick-up trucks that can seat 10-14 people and often carry many more (Figure 17). Supplementing these vehicles are car-based taxis, denoted by a taxi sign on the roof of the vehicle, and large numbers of motorcycles, many of which operate as motorcycle taxis. The total size of the Haitian vehicle fleet is given in Table 2. Of the 66,151 registered public transport vehicles, more than 85 percent (at least 56,000 vehicles) are estimated to operate in Port-au-Prince and Cap-Haïtien.

Figure 17. Tap Tap on a typical street in the Port-au-Prince CBD

Photo credit: Roger Gorham

Table 2. Size of the vehicle fleet in Haiti

Vehicle type	Number of registered vehicles
Private	154,709
Public transport vehicles	66,151
Motorcycles	87,227
Goods vehicles	22,784
Other (e.g., state, United Nations, temporary registrations)	20,715
Total	**353,324**

Source: Vehicle registration data as of March 2017, provided by L'Office d'|Assurance des Véhicules (OAVCT)

44. **Beyond the commonality of fragmented, small-scale operations, there are a multiplicity of ways that those operations are structured.** Site surveys in Port-au-Prince and Cap-Haïtien identified various such arrangements, including entrepreneurial driver (driver-as-renter), driver-as-owner, owner as operator (using hired labor), and even some evidence of owner associations taking on salaried workers as drivers. Information from the IC-IESA study and interviews suggest that of the public transport vehicles in urban service in the two main cities, about 38 percent are owner-operated, while 56 percent are rented (usually on a daily basis) to an operator. In the remaining cases, the owner hires one or two drivers on a salaried basis. Of the 48 vehicle owners that provide intra-urban services and were interviewed, 69 percent owned only one vehicle, while 23 percent owned two. Only 6 percent said they owned more than two. Regardless of the number of vehicles owned, all indicated that their vehicles are in service at least six days per week.

45. **Most public transport is serviced by Tap Taps, with services developed spontaneously through private initiative.** Tap Taps dominate the motorized transport market in Port-au-Prince with nearly 57 percent of the motorized mode share, as shown in Table 3. As mentioned, Tap Taps are used trucks, imported from the United States and other countries, that are converted through the addition of covered benches on the flat bed, plus standing space at the rear of the vehicle. The name "Tap Taps" stems from the way the assistant signals the driver when passengers want to board or alight. Key advantages of the Tap Tap services are that they do not require direct government subsidies; they offer flexibility in terms of areas served, operating hours and frequencies; and they are demand responsive. Although the total number of Tap Taps in Port-au-Prince is unknown, a 2011 estimate suggested about 13,000 were in operation that year (Kopp and Prud'homme 2011), and it is likely the total number of Tap Taps has remained about the same.[11]

11 For 2017, data on total vehicle stock in Haiti shows about 66,000 public transport vehicles as shown in Table 2, but from this data it is unknown how many vehicles are operating in Port-au-Prince specifically and how many are Tap Taps. Assuming all those transport vehicles are in urban use, however, and allocating vehicles proportionally by population, an estimated 46 percent or 30,600 public transport vehicles would be operating in Port-au-Prince. As the 2011 estimate of 13,000 Tap Taps was based on a total metropolitan public transport fleet of 31,340 vehicles (including taxis and moto-taxis), and assuming the same relative shares, the total Tap Tap fleet in Port-au-Prince today would be slightly less than 12,700, suggesting the total number of Tap Taps in the metropolitan area has remained stagnant. In this report, we assume about 13,000 Tap Taps are operating in Port-au-Prince.

46. **In Haiti, as in other developing countries, small vehicle size and used vehicles are features of the paratransit nature of urban public transport services.** The choice of vehicle size in the public transport market is driven by operating conditions and the need for profitability. The desire to reduce fixed costs and ensure profitability also explains the large number of used vehicles in such operations, even though they are costlier to operate. To make a return on an expensive asset, such as a large or new vehicle, it would have to be used to its maximum extent. This means that if the number of runs that can be made is limited or demand is weak, then fixed costs must be kept to a minimum. The result of this need to limit fixed costs is the use of small vehicles, which take the form of jitneys in Southeast Asia or "trotros", "danfos" or "matatus" in Africa, all of which are transport solutions in a context of poor infrastructure and constrained profitability of large-capacity vehicles. To be sure, the topography and urban fabric of Port-au-Prince is such that certain parts of the network would probably be better served by vehicles the size of Tap Taps rather than medium or full-sized buses, but Tap Taps operate everywhere, even on routes where larger buses might be more optimal from the perspective of service provision.

Table 3. Calculated mode shares in Port-au-Prince metropolitan area

Mode	Share (%)
Bus	7.9
Minibus	24.4
Tap Tap	56.6
Taxi	0.4
Moto-taxi	3.7
Private car	6.6
Private motorcycle	0.4

Source: (Kopp and Prud'homme 2011)

47. **The same conditions that give rise to the use of small vehicles in urban transport operations in developing countries such as Tap Taps in Haiti also give rise to the use of old and sub-standard vehicles in the fleet.** Indeed, all Tap Taps in Haiti are fashioned out of used vehicles, and their life span depends on the availability of spare parts and local capacity to repair. Significant and frequent repairs may be necessary depending on the age of the vehicle, local driving conditions, overuse, and overloading, among others. To ensure returns on investment, drivers work long hours in hard conditions, increasing the need for maintenance. To keep costs down, owners turn to the informal sector for repairs and thereby help generate informal jobs. The local availability of spare parts and mechanics familiar with repair of the vehicles in use can sometimes create resistance to fleet renewal if it entails unfamiliar vehicle models requiring more expensive maintenance.

48. **Overall, paratransit operations are inherently risky, but profitable.** In the absence of direct government subsidies, paratransit operators rely entirely on passenger revenues to cover operating costs, which include wages, variable costs (fuel, parking, and minor repairs) and fixed costs (such as insurance and association membership). With few barriers to market entry or exit, operators also have to contend with varying levels of route competition, which impacts daily profitability. Operators thus are continually evaluating the profitability

of various routes and manage revenue risk through changing routes. Owners, meanwhile, manage risk through the daily or monthly rentals they charge, with their net income a function of insurance payments, maintenance and repair, and the number of days the vehicle is in operation. In addition, for both owners and operators, additional costs might be associated with the political economy of maintaining the vehicles or putting them into operation, which may be difficult for outsiders to observe. International experience suggests that more profitable routes are run by larger and more powerful operators in the market, leaving the less profitable routes to smaller players who tend to run smaller and older vehicles. The team, however, did not specifically observe this in Haiti, and more information is required to understand the local arrangements.

3.3 Tap Tap services and operations

49. **With Tap Taps as one of the main providers of urban transport, this section presents more detail on the functioning and business models for this sub-sector.** Understanding Tap Tap owner and driver motivations for their choice in routes and number of runs per day, as well as operations and maintenance, is relevant for understanding the quantity and quality of the offer of transport services in Haiti, and thus for addressing urban fragmentation and improving accessibility. Most of the data and information in this section comes from interviews with Tap Tap drivers.

In the absence of direct government subsidies, paratransit operators rely entirely on passenger revenues to cover operating costs

50. **Few institutional requirements exist for entering the Tap Tap market, either as owner or driver.** Apart from a requirement to buy insurance and register with a municipality, new entrants to the sector are free to choose the route they wish to operate. Indeed, during the interviews for this study, evidence emerged that drivers can easily change routes, which they may do based on traveler numbers, traffic conditions, and terrain, with certain routes exhibiting steep inclines or poor road conditions that make them unsuitable to some vehicles. In principle, however, Tap Taps have a set route or circuit, with the point of departure in the commune where they are incorporated. The route name is marked on the side of the vehicle, and the vehicles mainly operate on these set routes. Tap Tap fares, which are negotiated between the association and the government, apply to all journeys along a given route. In practice, however, operators commonly split the routes (locally called “court-circuits”), forcing travelers to alight and re-board, and thus pay a second fare.

51. **Tap Taps operate their own schedule and earn an estimated average, gross revenue of about G 3,750 per day.** Tap Tap operators (typically entrepreneurial drivers, but occasionally owners who drive their own vehicles or who

hire drivers on a wage basis) choose their own daily hours of operation. Typical operating hours are found to be in the range of 15 to 16 hours, often beginning quite early to accommodate the typical Haitian office hours of 8am to 4pm. The estimated, daily operational parameters are shown in Table 4, with associated financial parameters presented in Table 5.

Table 4. Tap Tap operating parameters

Passengers per day	Average operated route length	Average round trips per day	Average operating speed (daily)	Average fare (pre-May 22 fare increase)	Tap Tap capacity seating (max)	Average gross revenue per day
750	5 km	12	9 km/hour	G 5	14 (26)	G 3750

Source: Authors' estimate based on operator interviews.

52. **The driver's income is calculated net of vehicle rental, variable costs related to fuel and minor repairs, and wages for the conductor.** The vehicle owner's daily income is the vehicle rental less maintenance and insurance costs (pro-rated). Based on interviews, it was determined that typical vehicle rentals range from G 1,000 to 1,750 (US$17 to $30) per day. Meanwhile, the ICIESA survey found monthly revenues ranging from G 12,000 to G 49,500, which would correspond to daily revenues of G 460 to G 1,900 per day if the vehicles were used six days per week. Conductors accompany the driver and seem to be paid a daily wage between 200 and 500 gourdes (US$3.33 to $8.30), probably depending on the income of the day. Fuel is a large cost input for operators, and operators reported paying about G 1,250 (about US$20) for a full tank of diesel[13].

Table 5. Tap Tap operating parameters

Daily	Average	Low	High
Revenue	3,750	2,500	4,500
Vehicle rental	1,500	1,000	1,750
Fuel	1,250		
Conductor	300	200	500
Tires/maintenance	200		
Driver take-home	500		

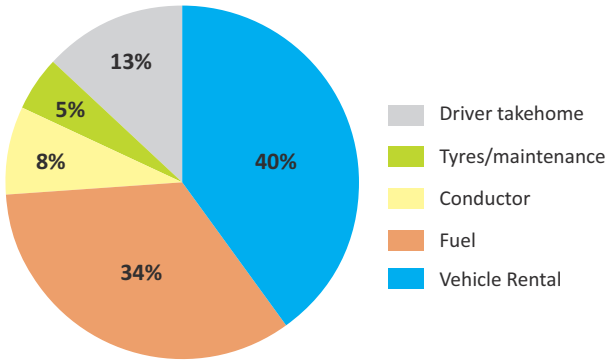
Source: Team calculations based on information from interviews.

53. **Maintenance is a critical cost.** Some of the drivers reported keeping mechanics on retainer, at a cost of G 1,500 (US$25) per month, even if no maintenance was actually needed. Actual maintenance costs range from G 2,000 (US$33) to G 6,000 (US$100) per month, depending on the age and condition of the vehicle.

12 During team interviews in May 2017, entrepreneurial drivers told us that basic and routine maintenance is handled by them, not the owners. Owners would cover major maintenance items such as engine overhauls.

13 At G 149 per gallon before the May 22, 2017 price increase, this suggests a tank size of 32 liters. Based on this information and surveyed routes, the team estimates average fuel efficiency of the Tap Tap fleet at about 25.3 liters per 100 kilometers.

Figure 18. Breakdown of daily revenue intake for Tap Taps in entrepreneurial driver model



Source: Authors' estimates, based on interviews.

54. **Tap Tap operations appear to be profitable.** Based on the information gathered in interviews, the largest part (40 percent) of daily revenues accrues to the vehicle owner, while the driver or operator keeps about 13 percent. Figure 18 shows the team's estimated breakdown of revenues from Tap Tap operations in Port-au-Prince and Cap-Haïtien combined.[14] The owner is responsible for major repairs and administrative fees including vehicle insurance, and the return on investment is calculated net of these charges. What is not known is whether additional payments ensuring the smooth ownership and operation of vehicles within the complex political economy of Haiti need to be made, and how much they would cost. Such payments could substantially reduce the 40 percent and 13 percent returns for the owners and operators, respectively. However, interview data and the ICIESA 2017 survey results indicate a net, monthly income in the range of US$550-US$800 for owners of Tap Taps, more than ten times the monthly per capita income in Haiti.[15] Considering the small size of the interviews and the sampling methodology for both surveys, additional work is strongly recommended to verify the numbers presented and conclusions drawn here.

55. **Despite profitability, the physical quality of Tap Taps is poor, and limited signs exist of vehicle fleet renewal.** Capital is needed when a paratransit owner first enters the market, when a vehicle is replaced, or when there is an opportunity to add another vehicle. By and large, initial capital is funded through personal or family savings, informal loans, or a combination of these sources. Once a vehicle is in the market, depreciation set-asides are another potential source of funds. In many paratransit markets with laissez-faire conditions, operators earn just enough to cover operational costs and earn normal profits. They often serve captive markets, that is, riders who must make trips but have few options at a quality and price they can afford. It appears to be the same in Haiti, and the seemingly high returns likely reflect only the higher risks facing private Tap Tap operators in Port-au-Prince and Cap-Haïtien.

56. **While positive returns on investment are necessary to attract capital in fragile and violence affected economies, investors may be looking to manage risk by limiting investments and exposure.** Owning and putting public transport vehicles into service is highly risky, even if, as will be discussed below, demand *per se* is not one of the riskier factors. Both the quantity of investment and quality

14 Separate estimates for the two cities could not be provided based on the available data.

15 Annual GDP per capita in Haiti in 2016 was US$739.60, following World Bank data.

(returns on investment) are sensitive to fragility and poor governance. Tap Tap operators bring a certain skill set – "situational awareness, sensitivity to the local context, and an appetite for high risk" (Global Agenda Council on Fragility 2016) that permits them to navigate the urban environment and turn profits. At the same time, they are all too aware of the risks of participating in this laissez-faire environment with few rules or institutional protections. The key to continued private participation is managing risk, for which a strategy is limiting exposure in the market. Consequently, investment appears to be limited to the minimum required, leading to a low-level equilibrium of poor quality vehicles offering no-frill services to a captive market.

57. **Poor access to formal credit facilities and the day-to-day cash management system of the market create barriers to entry and fleet renewal in an environment otherwise characterized by few institutional constraints.** The banking system in Haiti is conservative, with small businesses and micro enterprises facing serious challenges in accessing loans even if they are aware of the business opportunities. Personal savings or loans from personal networks appear to be the main source of capital for initial or replacement investment. (International Trade Administration 2017.) The size of this pool would likely be limited given that about 60 percent of the population lives below the poverty line. The reliance on a day-to-day, cash-based system of accounting contributes to the challenge of capital availability, as operators seldom consider depreciation as an operational expense and make no provision for it. Consequently, with almost no access to formal credit, limited access to informal credit, and no cash reserves on hand, owners and operators are unable to replace their vehicle when they reach an optimal age for doing so. Instead, they remain in use under conditions that are increasingly unsafe and not suitable for transport.

The banking system in Haiti is conservative, with small businesses and micro enterprises facing serious challenges in accessing loans

3.4 Weak structure, monitoring and enforcement in the Tap Tap system

58. **In general, the intra-city public transport sector in Haiti is not coordinated by a union or association.** While a number of unions and associations operate out of both Cap-Haïtien and Port-au-Prince, interviews and survey results suggest that they are more important for the intercity transport providers than for the intra-city providers; only 17 percent of intra-city route operators reported being member of a union, while 45 percent of intercity operators did so. In both the interviews and surveys, operators indicated that their primary reason for not joining the union was that they perceived no particular benefit from doing so. In other cities, route or operator associations often help to create order, seek a balance between supply and demand, reduce route and schedule

About 13,000 Tap Taps provide most of the public transport service to a metropolitan area that is home to 2.87 million people

duplication, and standardize fare structures. They may even help provide access to credit, group discounts on insurance and fuel, and other services. All of these functions serve to enhance job and income security for operators and help create conditions to improve the quantity and quality of the services offered. Because of the weakness of these types of associations in Haiti, they currently do not play this role in Port-au-Prince or Cap-Haïtien.[16]

59. **Government oversight in the public transport sector and Tap Tap industry is minimal.** No quality control requirements exist for Tap Taps, with requirements that used to exist in the 1980s now abandoned. Tap Taps are registered in a given commune, where they for a modest fee obtain a "plaque" (as a form of authorization) and a plate number. Also, as mentioned above, the allocation of routes is loosely enforced, with drivers changing routes with little difficulty. Insurance, however, is compulsory and actually largely enforced. It is reported that about 90 percent of Tap Taps are insured with OAVCT, the national insurance monopoly (Kopp and Prud'homme 2011).

3.5 Easing congestion would enhance accessibility and lower operator unit costs

60. **In the Port-au-Prince metropolitan area, public transport supply does not appear to be meeting demand.** As noted above, the team estimated that about 13,000 Tap Taps provide most of the public transport service to a metropolitan area that is home to 2.87 million people over an urbanized area of about 173 km2. With a capacity of about 14 seats per vehicle (though Tap Taps were observed to carry substantially more in overcrowded but real-world conditions), this is the equivalent capacity of just over 3,000 standard, 12-meter buses, corresponding to a ratio of about 0.7 or 0.8 buses per 1000 people depending on the assumption of bus capacity. According to the World Bank's Urban Bus Toolkit, this ratio is not particularly low as a benchmark. However, based on average speed data and official data on formal Tap Tap route structure, the average Tap Tap is estimated to provide only about 1,680 seat-kilometers per day, which, assuming 13,000 Tap Taps are operating in Port-au-Prince, would yield 17.5 million seat-kilometers.[17]

16 Notwithstanding relatively low participation rates in unions, this is not meant to imply that the transport unions in Haiti, including the urban transport union in Port-au-Prince, do not exercise substantial influence on government and policy making. Their ability to put in place blockages, usually adhered to by even non-union-member drivers, gives them substantial leverage.

17 Seat-kilometers is the measure of the aggregate number of "seats" or spaces in public transport vehicles and the number of kilometers in which they are placed in service over a given time period (e.g., one day).

61. **Moreover, most of these seat-kilometers would need to be delivered during periods of peak demand, for example the two hours in the morning peak and two hours in the evening peak.** Assuming that peak hour operational speeds would be 75 percent of average hourly operational speeds for the entire day, the team estimates an upper-bound of the number of seat kilometers that could be supplied with current traffic conditions and fleet configuration during peak periods at about 2.9 million. Using the relatively restrained characteristics of urban transport demand (see section 2.3) and assuming a walk mode share of 45 percent (section 4.3), about 4.1 million seat-kilometers would actually be needed to meet demand for commute trips. These figures, which need validation with more detailed study, suggest a supply deficit in the order of about 30 percent.

62. **This undersupply seems to manifest itself in Tap Tap fares and user experience.** In the ICIESA survey, 82 percent of respondents making intra-urban public transport trips indicate having experienced difficulties in finding a vehicle on the route they were taking, with half of them further indicating they have had to give up waiting for a bus with available space and take another mode instead. Among those who did take another mode, only 28 percent indicated they walked, while 62 percent reported taking a moto-taxi. This suggests not only inadequate supply of bus services, but also users' ability and willingness to pay more when faced with time constraints. In addition, 78 percent of respondents indicated that they have had to stand in Tap Tap vehicles, 83 percent reported having fought with other passengers to get into a Tap Tap, and 90 percent reported having traveled in vehicles that were filled over capacity. Site visits, with observations of Tap Tap use during boarding and alighting, confirmed that Tap Taps were consistently overcrowded, irrespective of the time of day or direction. Overcrowding of vehicles was observed to occur in all directions, including outbound during the morning peak and inbound during the evening peak, suggesting high revenues for the operators regardless of the direction.

Tap Taps are consistently overcrowded, irrespective of the time of day or direction

63. **Congestion is driven not by an excess of vehicles, but by constrained road space and operational conditions.** While vehicle overcrowding could reflect operators' collusion or organized self-regulation to adjust to demand, this seems unlikely in a sector with few barriers to entry and very low levels of union or association membership. Instead, low operating speeds that result from constrained road space rather than an excess of vehicles on the road, are substantially responsible for the disequilibrium between supply and demand of the urban public transport. The impact of lower speeds is illustrated by the analysis of the Rue 15 to Madeleine route, described in Box 1.

Box 1. Analysis of the impact of congestion on the Rue 15 to Madeleine route.

To understand the role of congestion in constraining accessibility and driver profit in public transport operations, the team studied one of the routes, Rue 15 to Madeleine in Cap-Haïtien, in more detail. Drivers on this route estimated their gross revenues ranging from G 2,500 on a "bad day" to G 4,500 on a "great day." Based on the prevailing tariff (pre-increase) on this route of 5 gourdes, the quoted revenues suggest that the number of travelers carried per day could reach as much as 900. This demonstrates extremely high daily loadings for a 14-seat vehicle that are not atypical of the daily load for a large bus in high demand urban operation.

Operators on Rue 15 also estimated that they made around 10 round trips per day, which would be equivalent to a daily revenue of G 3,000. Achieving the upper-end "good day" earnings then would require the carrying of 50 percent more passengers. Based on the observed load at the peak of 26 passengers, it is unlikely this could be materially exceeded, at least not by more than the occasional one or two passengers (5 percent). Seat turnover may also be higher on certain journeys, which would increase the revenue, but this depends on traveler trip making patterns and is outside the control of the operator.

The results suggest that, most likely, the difference between a "good day" and a normal day's earnings for most operators lies in the number of round trips they are able to achieve, depending on both congestion and operating hours. The round-trip times surveyed totaled 55 minutes, at an average operating speed of 10.5 km per hour in moderately congested conditions. Based on this round-trip time and the typical 15 or 16-hour operating period, it is quite possible for the number of round trips achievable to exceed 10. Operators, however, stated that congestion could be significantly worse in the peak period than was observed during the study.

64. **Most likely, an operator's revenue in a day depends on the number of runs they are able to make, which in turn depends on congestion conditions and operating hours.** As described in Box 1, most likely, the distinction between a "good day" and a normal day's earnings for most Tap Tap operators lies in the number of round trips they are able to achieve, either because of lower levels of prevailing congestion on particular days, or by extending operating hours to generate the extra revenue.

65. **Observations and interviews also suggest that congestion has an important impact on operator revenues and hence operational profitability.** Based on the high-end revenue estimates, it is clear that increased numbers of round trips translate directly into increased revenue, suggesting a suppressed demand that could be captured if operating conditions can be improved. In other words, today's Tap Tap ridership levels are a function of supply rather than

demand. That this disequilibrium in supply and demand is driven by congestion rather than public transport vehicle numbers *per se* is reflected in the vehicle capacity ratios cited above, which, as mentioned, are within expected international benchmarks. The already noted tendency of operators to engage in "court-circuit"—breaking routes into smaller pieces to maximize turnover and therefore increase the payment of fares—is exacerbated by congestion.

66. **Congestion and the risk of operations discussed above likely prevent a market "correction" to better balance supply with demand.** Ordinarily, where demand outstrips supply, we would expect to see an increase in supply until balance is restored; in Haiti, however, such a rebalancing does not appear to be occurring, most likely because of congestion and risk. Individual operators can do nothing about congestion, and indeed any action they might take individually – provide more vehicles – would exacerbate congestion and therefore be a risky investment. Thus, the urban transport market remains in equilibrium, albeit one of very low quality and inadequate service; poor quality vehicles, Tap Taps mostly, offer no-frill services to a largely captive market, with little change in service quality over time. As described before and as is often the case with paratransit services, to keep costs low, operators rely on used vehicles with low capital requirements.

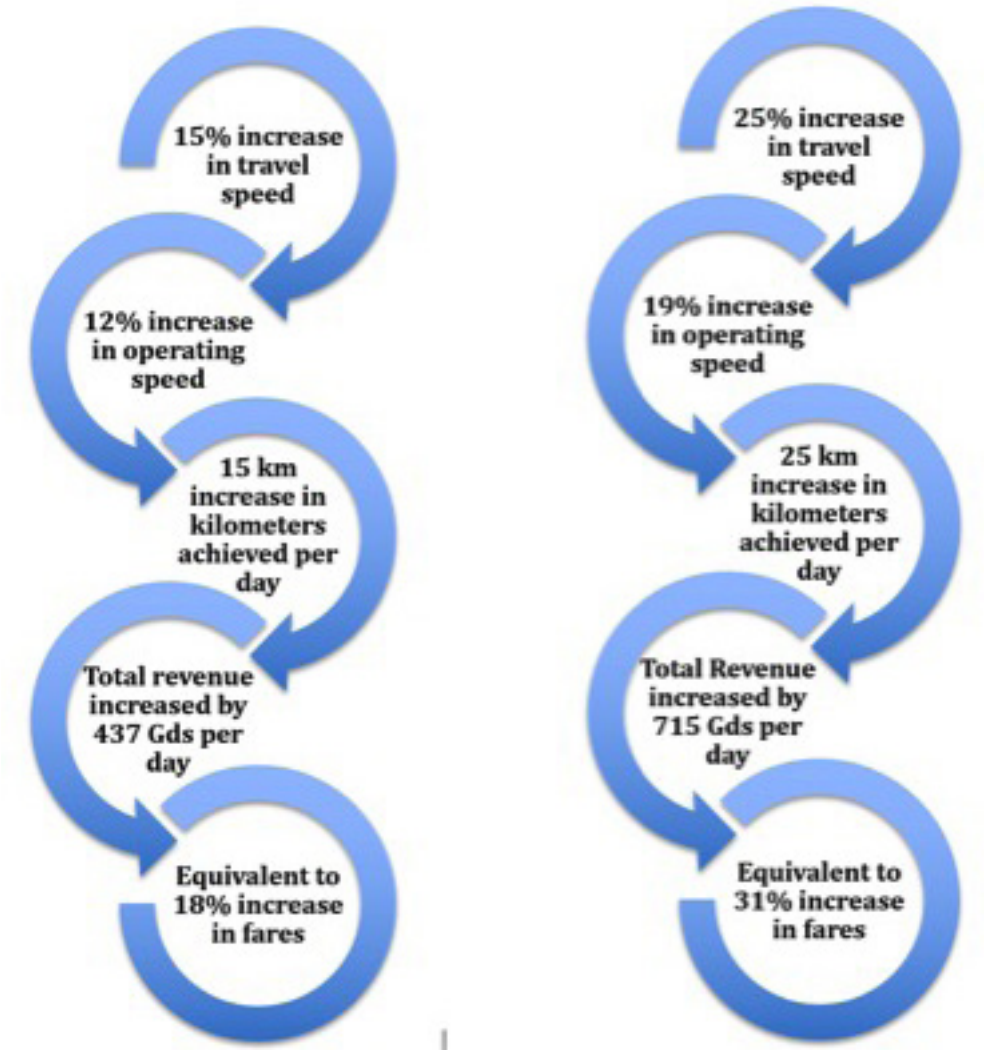
67. **This likely situation of suppressed demand driven by congestion means that a higher fare price and more Tap Taps on the road may not actually increase accessibility.** The situation of suppressed demand is important for discussions of both accessibility and affordability of public transport in Haiti. As discussed in Box 2, public transport fare adjustments made in May to mitigate impacts of an anticipated increase in the price of fuel resulted in an increase in net revenue per day to operators of about 11 percent by the team's calculations. This 11 percent net revenue increase makes operation of public transport services more attractive to potential entrepreneurs deciding among options. As the barriers to entry are mainly financial, the fare price increase may lead to a net increase in the number of vehicles, exacerbating congestion, increasing operator costs, and further reducing accessibility.

68. **Instead of raising the fare cost and attracting more Tap Taps to the road, operational improvements can help balance supply with demand and create a win-win situation.** Public policy measures that clear road space and improve the operational environment would bring affordability and accessibility for riders while growing profitability for operators, thus reducing the pressure to further raise transit fees. As noted above, the difference for an operator between a normal day's revenues and a good day's primarily results from the number of round trips the operator can make in a day's operation. For example, with respect to the May 22 fare increase, the team's analysis suggests that for a typical 24-minute, one-way journey time, increasing the overall operating speed by just 7 percent

Public policy measures that clear road space and improve the operational environment would bring affordability and accessibility for riders while growing profitability for operators

would have permitted the additional daily roundtrip necessary to generate sufficient revenue to offset the increased operating costs from the fuel price increase, without the need to raise fares. The specific mechanism by which this would occur is shown graphically in Figure 19, and the implications for understanding the impacts of the May 2017 fuel and fare increase are discussed in Box 2.

Figure 19. Mechanism for speed increase to improve bottom line in public transport operations



Box 2. Impacts of the May 2017 fuel price increase on public transport fares.

In May 2017, the partial removal of a fuel subsidy led to an increase in the pump price for diesel by 20 percent, from G 149 to G 179. The fuel price increase had a direct knock-on impact on fuel costs for Tap Tap operators, which would rise an estimated G 252 per day ($4), or 6.7 percent of operating costs, with these total operating costs including the entrepreneurial driver's take home amount that is currently about 13 percent of total costs. This means that the fuel price increase, without a commensurate increase in fare level and assuming all other input costs remain the same, would have halved the driver take-home salary.

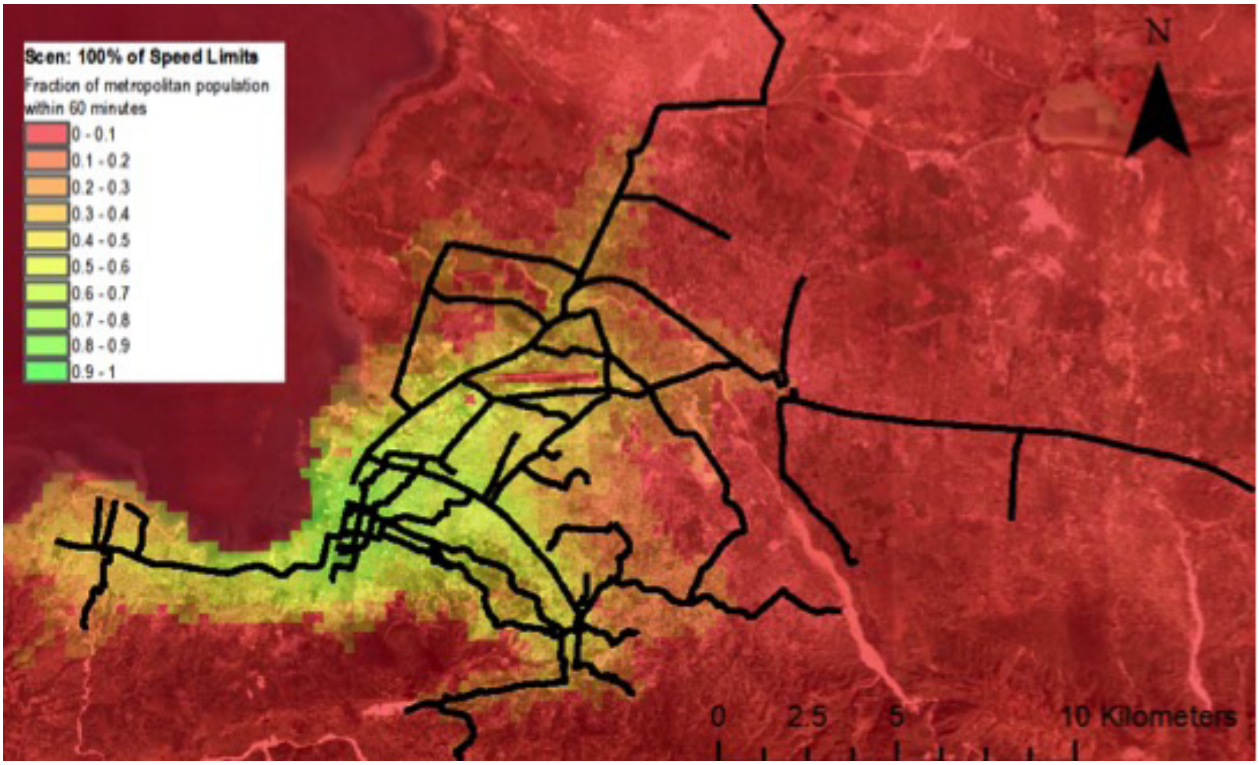
How much fare increase is required to enable the operators to break even, however, depends on an understanding of the cost structure of operations and the price elasticity of demand. Price elasticity is a measure of the extent to which demand for a product changes incrementally as the price changes incrementally. Worldwide, public transport fares are found to be fairly demand inelastic: one estimate based on a survey of developed countries found an elasticity of-0.3, meaning that a 1 percent increase in fare would cause demand to drop by 0.3 percent (Balcombe, Mackett et al. 2004). A fare elasticity of exactly-1 would imply full revenue neutrality. Assuming a price elasticity of-0.3, then, in order to offset the 6.7 percent of operating costs, fares would need to be increased by about 10 percent.

Under the May 22 fare agreement, however, fares were increased by about 30 percent on average, based on the team's assessment of routes and route structures, going from about G 2.58 per kilometer to G 3.49 per kilometer. This would result in a net increase in revenues to the operators of about 18 percent, once price elasticity of demand is factored in. Accounting for the increase in fuel prices, the May 22 fare agreement resulted in an increase of about 11 percent in net revenue per day for operators.

69. **Site surveys suggest a program of strategic, physical interventions can help facilitate Tap Tap and other public transport operations in Cap Haïtien and Port-au-Prince.** This program could both improve revenue streams for operators and increase public transport availability for passengers and potential passengers. As the analysis has shown, the supply of vehicles in Port-au-Prince is sufficient for the size of the population. Instead, it is the capacity of the available street network as it is today, to facilitate the movement of all the traffic on the street, that is creating the challenge. As such, addressing the lack of available seat-kilometers by increasing the number of public transport vehicles is expected to be counterproductive. Instead, the focus should be on addressing congestion by improving operations through better urban services, traffic management, and related interventions.

70. **Analysis confirms that increasing the flow in traffic can increase both accessibility and affordability.** Building on the map showing current accessibility to all areas of the city in sixty minutes (Figure 15), Figure 20 presents the same map but with traffic on four key corridors[18] flowing at the regulatory speed of travel, as intended in the design of the network. As shown by the map, accessibility doesn't improve everywhere, but it does improve substantially, with three of the four key employment centers now accessible to most of the population of the metropolitan area in less than 60 minutes.

Figure 20. Accessibility by public transport if traffic moved at the regulatory speed limit



Source: Authors' calculations

71. **Addressing the sources of congestion is a critical short-term measure to improve overall accessibility by public transport in Port-au-Prince and probably also Cap-Haïtien.** Moreover, less congestion will have other benefits as well, including reduced driver stress, increased affordability, and a reduced relative cost of petrol and diesel in the operating cost structure of public transport. The next two sections will look at the main causes (section 3.6) and possible interventions (3.7) for congestion in Haiti and its two main cities specifically.

18 The four key corridors are (1) Circuit 4: Bon Repos to Centre-Ville; (2) Circuit 15: Croix des Bouquets to Port-au-Prince; (3) Circuit 28: Pétion-Ville to Delmas 2; and (4) Circuit 35: Port-au-Prince to Paloma.

72. **Institutional changes that improve sector governance, monitoring, and oversight will yield sustainable improvements in public transport provisions.** The absence in Haiti of market order or ground rules, created either by route associations or public entities charged with managing the public transport sector, is resulting in a low-level, tenuous equilibrium with poor quality and a low level of service provision. To effect change, the government needs to create or empower existing institutions to enter the organizational vacuum in the public transport sector. It is important that the chosen agency creates and enforces rules and standards concerning operations and safety, and helps facilitate access to credit. The market should still be allowed to function, but within a structured and secure operational environment.

3.6 Drivers of congestion

73. **Observations and data suggest congestion in Haiti is driven by several factors.** These factors include: (1) the configuration of the street network and road space, (2) the substandard delivery of urban services, which reduces available road space, (3) street user behavior, and (4) the configuration of public transport vehicles.

74. ***Street network and road space.*** The Port-au-Prince city center was planned and developed in the 18th century based on a grid form with large streets. Around this core, a small number of radial roads connected the center to formerly independent communes (such as Pétion-Ville) that have since been connected into a continuous urban tissue. Because of topography and the density of land occupation, the number of radials extending from the center is limited, while outside the city center the opportunities to circumvent the main arterials are also limited, particularly in the hilly south side of the metropolitan area.

Because of topography and the density of land occupation, the number of radial roads extending from the center is limited

75. ***Substandard delivery of urban services.*** The delivery of urban services in Port-au-Prince and Cap-Haïtien is weak, and the poor or non-delivery of basic urban services—transport services and other—is hindering mobility.

Non-transport service delivery that is impacting movements includes:

- *Lack of proper solid waste collection.* The lack of solid-waste management leaves piles of trash on the street, which impacts not only transport and mobility, but also other services, such as drainage, and creates social and environmental concerns.

- *Poor drainage design and lack of infrastructure maintenance.* Poorly designed and maintained highway drainage results in flooding, a situation made worse by the lack of solid waste management both within the highway cross-section and the drainage channels and culverts that bisect the highway. Poor design, lack of maintenance, and poor solid waste removal greatly increase the impact of flooding along the corridor.

Weak urban service delivery related to transport includes:

- *Poor intersection control.* No formal urban traffic control system was observed. Although only few intersections in Port-au-Prince are operated by individual traffic signal controls, motorists were observed to be understanding and respecting the phasing of the signal control. All other intersections are uncontrolled, with only a few controlled by a traffic police officer.

- *Lack of highway maintenance and deteriorating pavement conditions.* No evidence was observed of an ongoing policy of strategic highway maintenance, although a number of small-scale interventions were observed. Moreover, while within the urban area road pavement condition was generally observed to be satisfactory, in various locations "Stage 1 deterioration" occurred, with pot-holes of various sizes and depths. Without rehabilitation and maintenance, this form of highway deterioration will continue. Observations also noted impact of climate conditions, as the combination of heavy and constant rainfall onto the local access roads results in large quantities of material (rubble, stone, and solid waste) being transported (by gradient) directly onto the main highway. Again, improved drainage and rehabilitation of local access roads would mitigate this issue, improving both vehicle journey speeds and the lifetime of the road pavement.

In many parts of the city, sidewalks are occupied by vendors and their customers, while in other parts, parked cars occupy scarce sidewalk space

76. ***Street user behavior.*** A third factor leading to congestion is the behavior of street-users (pedestrians, vehicle operators, and vendors) in the available road space. In many parts of the city, sidewalks are occupied by vendors and their customers, while in other parts, parked cars occupy scarce sidewalk space. As a result, pedestrians are often forced onto the street to simply move around. This pedestrian encroachment not only limits the road space for motorized traffic and creates frictions that reduce the effective speed of traffic, but also compromises safety, particularly for pedestrians and two-wheeler users.

77. Exacerbating this congestion caused by poor allocation and enforcement of street space use is the competitive and predatory behavior of Tap Tap and bus operators themselves. Tap Taps and buses stop often, usually on demand. This stop-and-go behavior limits a free flow and creates ripple effects as a result of the lag for trailing traffic to come back to speed. The competitive nature of the

system, where operators compete with each other for passengers, exacerbates the situation, as Tap Tap drivers, pressured by competition, do not always respect the basic rules of traffic behavior and fight to be closest to the passengers. In some locations, bus-loading zones can occupy two or even three lanes of what should be the running way in the road space. The result is the transformation of what may have nominally been of a four-lane road into a two-lane road—a fifty percent reduction in road space for through traffic.

78. ***Configuration of public transport vehicles.*** A fourth and final factor affecting congestion is the number of vehicles on the road. As mentioned earlier, Tap Taps dominate public transport services, and different providers use the same corridors. Over time, rationalization of public transport routes along the main corridors and other measures could allow the same number of seat-kilometers as provided by 14-seat Tap Taps today to be provided by larger, but fewer, vehicles.

3.7 Analysis of strategic interventions to address congestion in Haitian cities

79. In general, addressing congestion often involves physical interventions such as improved intersection designs or new infrastructure, as well as regulatory measures. In some cases, as in Haiti, also improvements in urban services—in the areas of transport as well as solid waste and drainage, will have an impact, by freeing up road space and improving the flow of traffic. Table 6 presents a general overview of possible strategic interventions in different areas.

Table 6. General overview of strategic interventions to reduce congestion

Strategic Intervention
Physical interventions to improve infrastructure: • Improved infrastructure for non-motorized transport (NMT), including provision of sidewalks, rehabilitation of existing NMT infrastructure, and provision of pedestrian crossing facilities (part of the intersection improvements). • Rehabilitation of secondary access streets that interface with the primary network, thus providing improved accessibility for motorized and non-motorized transport into peripheral residential areas. • Rehabilitation of highway pavement accompanied by a structured and deliverable maintenance program. • Redesign and management of primary intersections, to include: ◊ Prohibition for Tap Taps to use boarding or drop-off areas directly adjacent to an intersection, ensuring the exit lane on the intersection is not blocked to maximize vehicle through-put. ◊ Banning of U-turns. ◊ Removal of existing (unused) pedestrian footbridges, accompanied with improved at-grade pedestrian crossing facilities.

Strategic Intervention
Regulatory measures: • Clear delineation between the highway, sidewalk, and area for commercial activity. • Regulation and control of haphazard and unsafe parking. • Extended spatial deployment of, and monitoring by, traffic police at additional primary and secondary intersections.
Improvement of urban planning and services: • Introduction of a robust and deliverable solid waste management strategy. • Regulation and control of street vendors. • Regular inspections and maintenance of highway drainage, including periodic de-silting of drainage channels, most notably, before and during the hurricane season (June – November).
Improvement in traffic management • Introduction of a Road Management Strategy addressing, inter alia, a ban on certain types of vehicles (such as heavy goods vehicles – HGVs) along specific arterial routes during peak periods.

80. **The operation of junctions is in fact a notable source of roadway inefficiency in both Port-au-Prince and Cap-Haïtien.** The interactions between pedestrians, hawkers, and Tap Tap vehicles stopping in close proximity to the intersection arms lead to greatly reduced junction capacity. With the junctions considered to be the primary cause of congestion as opposed to highway capacity itself, improvement of the operation of the junctions should be of primary importance. As listed in Table 6, some specific measures could include prohibiting Tap Taps to use boarding or drop-off areas next to an intersection; banning U-turns; and implementing at-grade pedestrian crossing facilities.

81. **Improved junction designs include a separation between pedestrian activities and vehicles though curbside fencing at the junction arms.** These kinds of physical separations can yield significant benefits in terms of city center circulation, particularly when complemented by effective enforcement to avoid encroachment. As the current network inefficiencies greatly impact the day-to-day life of commuting inhabitants, the physical separation of modes at the critical junctions will benefit not only vehicles but society at large. Key points preliminarily identified for consideration of junction design improvements are shown in Annex 1.

3.8 Interventions for specific traffic situations in Port-au-Prince and Cap-Haïtien

82. **As part of this study, a number of customized measures were designed for specific locations in both Port-au-Prince and Cap-Haïtien.** The analysis, listed in detail in Annex 2, provides a preliminary idea of the kind of interventions–with objectives, a timescale, and estimated costs, that could be considered for both cities.

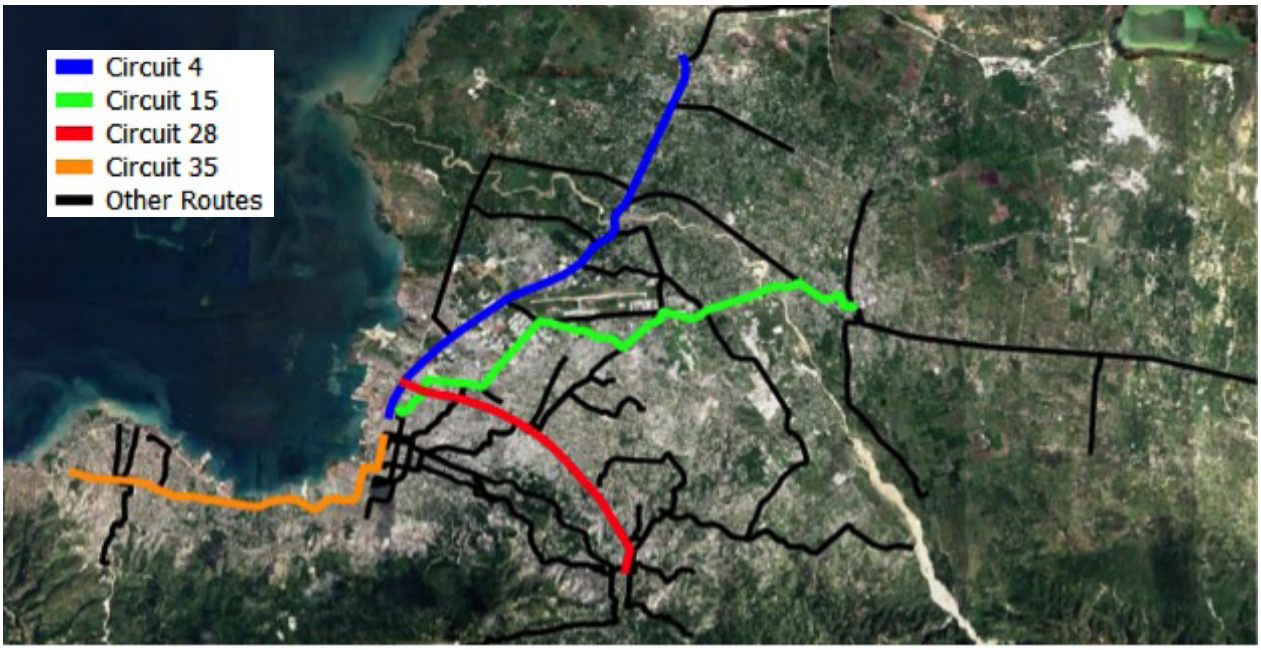
83. Possible interventions for Port-au-Prince include (1) intersection improvements (a strategic package to convert intersections to roundabout operation or implement traffic signal control and traffic officer management); (2) the adoption of a traffic/movement strategy for downtown Port-au-Prince, involving the regulation of street traders, intersection improvements, solid waste removal, creation of one-way streets, and use of traffic officers to control traffic at local intersections); (3) drainage channel improvements; (4) implementation of new Tap Tap interchanges; and (5) development and implementation of a strategy for solid waste management collection and disposal.

84. For Cap-Haïtien, the list of preliminary assessed interventions is as varied as (1) highway improvements on the approach road to a new road bridge; (2) the development of a Traffic Management Strategy for the city core (including banning heavy goods vehicles, using one-way streets, introducing pedestrian-only streets, and improving intersections); (3) measures to develop a one-way traffic movement into the city center from RN6; (4) design of new Tap Tap turnaround and interchange locations; (5) full construction of a southern bypass route; (6) the provision of a passenger ferry; (7) highway pavement improvement; (8) the relocation of Gare Routière or the improvement of management and operations of the existing facility; and (9) an improved Tap-Tap turnaround facility at Madeline (RN3). (See Annex 2)

85. **Next, to identify possible priorities for investment in Port-au-Prince, an accessibility analysis was combined with an assessment of relative improvements linked to specific interventions.** The analysis was conducted for Port-au-Prince only,[19] using the accessibility analysis from Chapter 2 and an assessment of the impact of speed improvements in four corridors linked to the four daytime activity centers, with the results thus indicating the likely cost-effectiveness of interventions. As shown in Figure 21, the specific corridors that were assessed included Circuit 4 (Bon Repos to Centre-Ville). Circuit 15 (Croix des Bouquets to Port-au-Prince), Circuit 28 (Pétion-Ville to Delmas 2), and Circuit 35 (Port-au-Prince to Paloma), the same four as analyzed for Figure 20.

19 Study resources did not allow for a accessibility-based prioritization exercise for Cap-Haïtien similar to the one for Port-au-Prince.

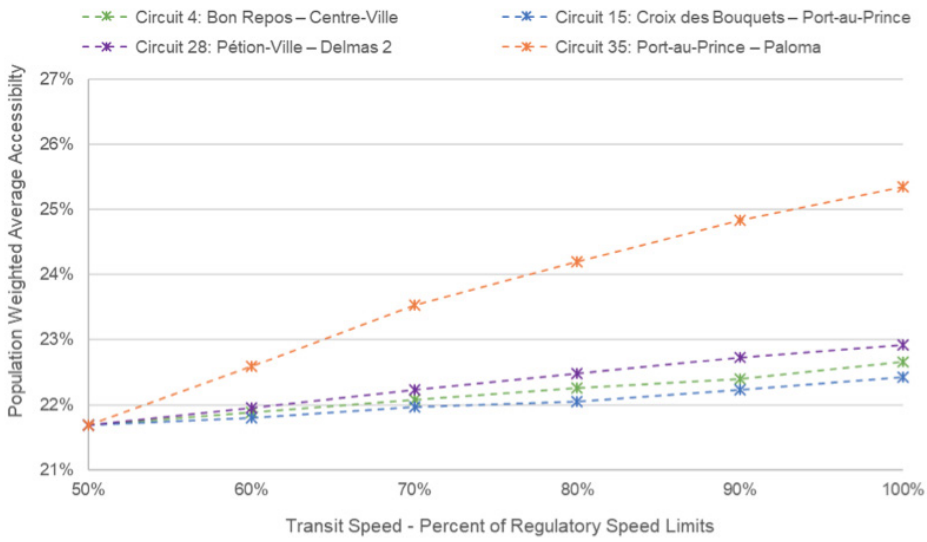
Figure 21. Public transport corridors assessed for speed improvements



86. Public transport speeds were assessed against incremental improvements, from 50 to 100 percent of regulatory speed limits, in 10 percent increments. The population-weighted results are shown in Figure 22, while the cumulative total employment pool growth at key employment centers are shown in Figure 23. The figures show the impact of increasing speeds on the average potential for social interaction and employment pools at key employment centers.

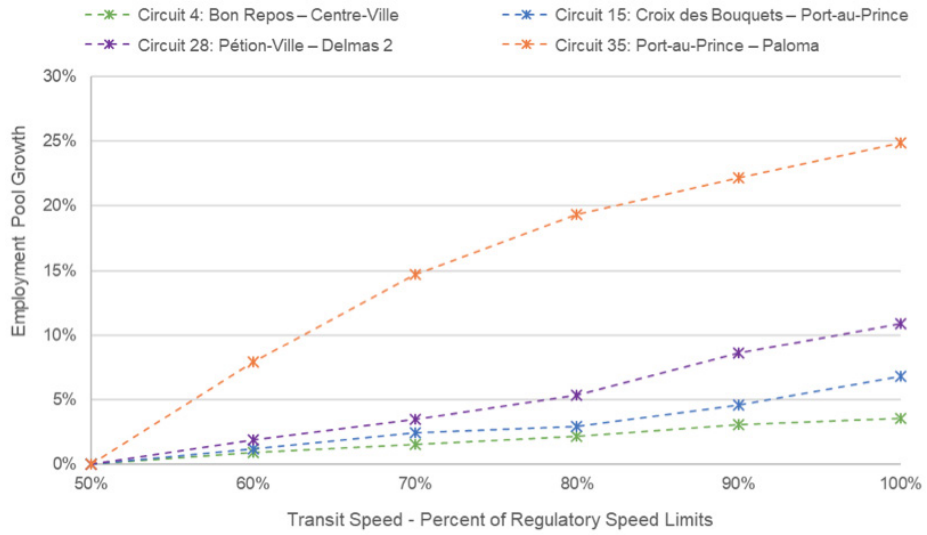
87. **The results show gains in overall accessibility and labor pool aggregation from the various measures to reduce congestion in all four corridors, but in particular substantial gains from investments in the Carrefour corridor in Port-Au-Prince.** This can be interpreted as a preliminary return-on-investment measure, suggesting that the Carrefour corridor should be a high priority for measures to improve accessibility. Figure 23 in particular suggests that improving travel speeds along the Carrefour corridor even by only 20 percent of the regulatory speed would grow the labor pool by nearly 15 percent. Low cost measures to deliver improvement in these corridors are discussed in Annex 2. How to determine whether more extensive investments than those identified in Annex 2 are worth consideration is briefly discussed in Box 3.

Figure 22. Population weighted average accessibility with increasing public transport speeds on selected corridors



Source: Authors' calculations

Figure 23. Cumulative total employment pool growth at key employment centers with increasing public transport speeds on selected corridors



Source: Authors' calculations

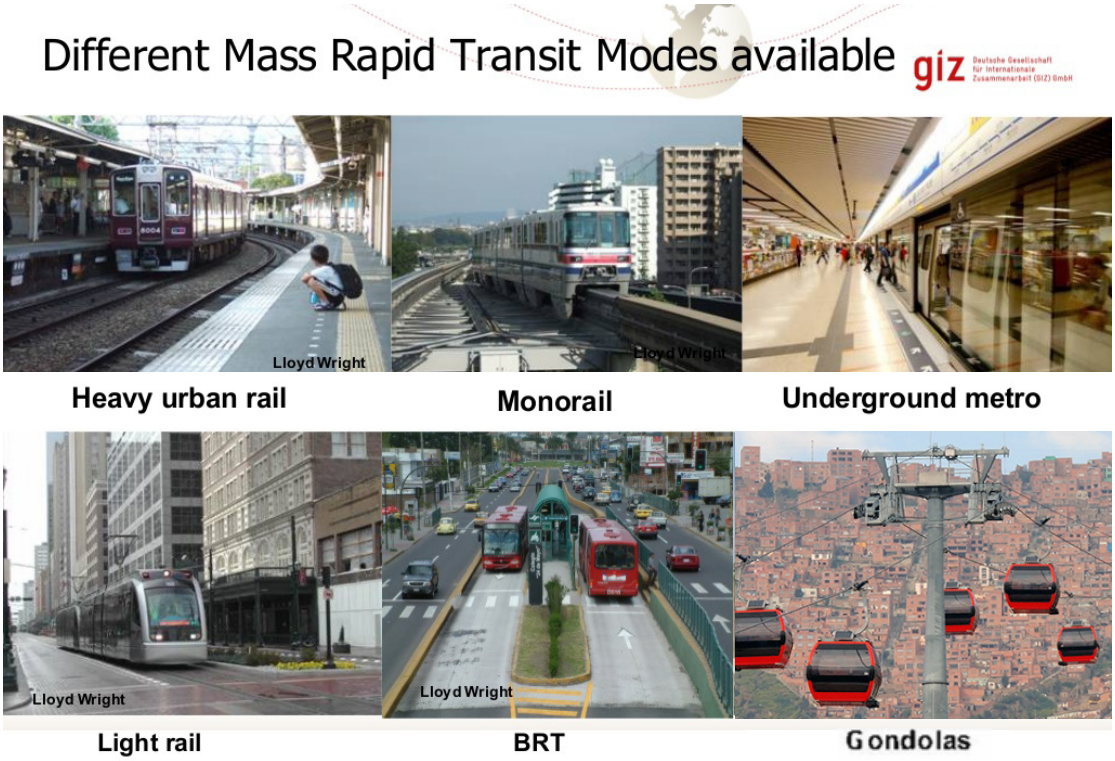
88. **Improved governance of the urban transport sector can yield many benefits for multiple stakeholders.** As shown in this chapter, better governance of the sector and improved management of road conditions can result in increased affordability for public transport users, more security of income for operators, and enhanced accessibility for Haitians. Any policy agenda to address urban public transport therefore should be focused on improving the internal organization of the sector, improving governance of operations across a range of topics (ranging

from traffic management to route allocation and enforcement), and addressing conditions that impede vehicular movements. Specific measures for doing so have been described in this chapter, and are included in more detail in Annex 2.

Box 3. Should mass transport options be considered?

Mass transit refers to modes which can move high volumes of people in peak directions at peak hours. Typical mass transit modes include light rail (tramway) transport, heavy rail transport, and bus rapid transport. Sometimes, mass transit can be used to refer to modes that do not move quite so many people, such as High-Levels Bus services, or gondolas. These modes are illustrated in Figure 24, adopted from GIZ.

Figure 24. Different Mass Transport Modes



Source: Manfred Breithaupt

Development of mass transit requires substantial upfront investment as well as sizeable annual operating expenditures which, based on global experience, are frequently not fully recovered by fare-box revenues. As there can be substantial benefits to society from development of mass transport services, serious consideration of mass transit options may be warranted when certain conditions are met. First, are there sufficient volumes to warrant the investment? Rule of thumb values are summarized in the table below and indicate the thresholds at which different mass transit operations may be worth considering.

Mass transit mode	Average observed PPHPD* per lane / track	Theoretical capacity PPHPD per lane/track&	Theoretical capacity utilization worldwide average
Light rail transport	3,280	11,000	.30
Bus rapid transport	4,880	11,000	.44
Heavy rail transport	22,209	36,000	.62

Authors' calculations, using values averaged over 88 transit systems worldwide compiled in ITDP 2017, comprising 14 Light Rail Transport systems, 17 Heavy Rail Transport systems, and 57 Bus Rapid Transit systems, as given in ITDP 2017.

* passengers per hour per direction
& theoretical capacity calculated by ITDP based on maximum vehicle capacities for configurations commercially available and operable in most contexts, at maximum frequency per hour, assuming 85% vehicle occupancy

Second, is sufficient road space available to provide the service to meet peak demand?

Third, is the contemplated service affordable? That is, can the fares levels and service quality compete with alternatives and attract sufficient riders to ensure robust ridership levels? If subsidies are required, are these sustainable over the long run? Closely linked to these considerations, are issues of last mile connectivity, – can people connect to the ultimate origin and destination points of the trip conveniently?

Fourth, are there institutions in place to manage the transition from the current service model to one which includes mass transport? This requires figuring out who will "own" the mass transport service, who will run it on a day-to-day basis, what role the existing operators will play, and how they can be induced to accept it, if not support it.

Finally, the mass transport service contemplated must be economically justified, meaning that the stream of costs and benefits from the service should be positive not just in comparison with the current situation, but also with other possible solutions that might improve accessibility in the metropolitan area.

Because of the above, the team believes that while consideration of development of mass transit services could be a long-run policy objective for the Government of Haiti for the PAP metropolitan area, in the short-run, other measures are likely to be more effective more quickly. Assuring the affordability, manageability, and economic value of mass transport development will take time to establish, even if mass-transport volumes in some corridors, such as Carrefour to CBD, could be determined with relatively simple traffic studies. In this situation, decision makers may wish to consider a sequential approach to improve urban mobility: tackle institutional issues immediately (possibly creating PT authority), review route networks to identify gaps in feeder routes, implement light traffic management measures to reduce congestion in key corridors, in the medium term, and finally, also in the medium term, study the possibility of introducing large capacity buses along these same corridors.

89. Adopting a corridor approach, therefore, the following sequence of actions might be plausible:

Short-term

- Creation of a regulatory entity
- Formal identification and early regulation of major corridors
- Shifting incentives for operators along these corridors with strategy to make shift toward larger and more efficient vehicles a logical business decision (including improvements to infrastructure)
- Mobility studies / alternatives analysis for interventions along the selected corridors

Long-term

- Corridor investment, potentially with mass transport solutions
- Creation of lead transport agency / body at metropolitan level

Chapter 4. Walking as mode of transport for all citizens

4.1 Introduction

90. **Walking is a key mode of transport in Haitian cities.** Walking is important not only for the urban poor, who may have no alternative, but also for all other income classes, who rely on walking to reach their destinations when using public transport. As no data is actually available about walking specifically for Haitian cities, this study relied on CDR data and other indirect ways to get an understanding of the use of walking as a mode of transport. Section 4.2 describes these approaches, with results underscoring the importance of walking. Subsequent sections then take a closer look at the pedestrian environment and the specific barriers to walking (4.3), as well as possible strategies and recommendations to revitalize the public space and enhance walking (4.4).

4.2 Walking as a key mode of transport

91. **Data about walking in Haitian cities is non-existent.** The most comprehensive study to date about urban transport in Port-au-Prince, a study for the Inter-American Development Bank from 2011, only included motorized trips (Kopp and Prud'homme 2011). Notwithstanding this lack of data, walking no doubt is an integral and dominant means of transport for most Haitians in cities. As mentioned in Chapter 2, the CDR data analysis for Port-au-Prince and Cap-Haïtien showed that 58 and 60 percent, respectively, of working age residents remain within the vicinity of their homes during the working day. An unknown portion of these are likely not working from home, but rather working from places near enough to their homes for their commute not to be reflected in the CDR data.[20] Those trips are likely to be made by walking.

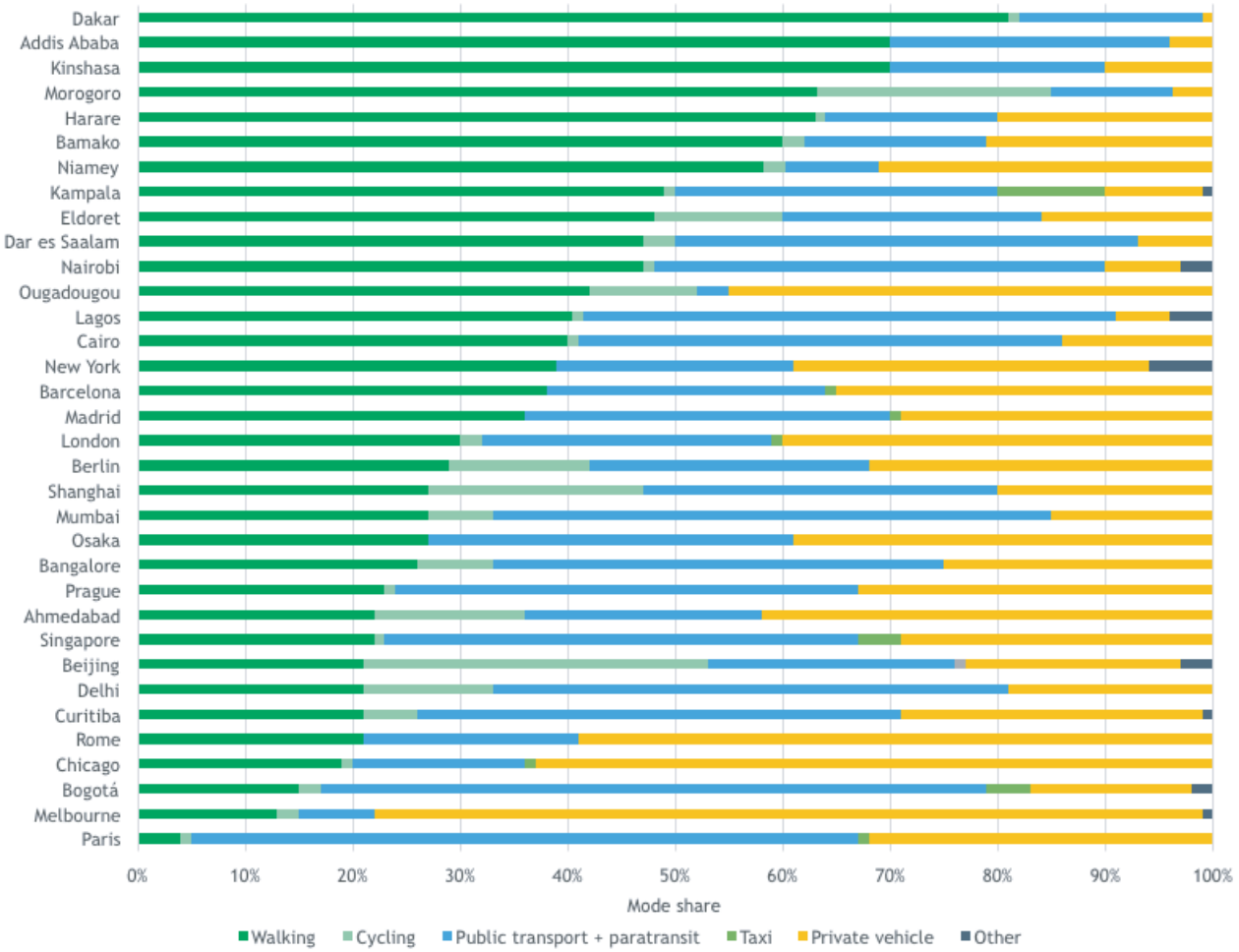
92. **International benchmarks suggest that at least 45 percent or more of trips in Port-au-Prince are likely to be made by walking alone.** While no data is available on the share of walking as a mode of transport in Port-au-Prince, a rough estimate can be derived by looking at international benchmarks. Babinard et al. (2017) provide a compilation of mode share data for 34 African

Walking is important not only for the urban poor, who may have no alternative, but also for all other income classes

20 For CDR data to show that a person works in a place different from their night time location, the mobile phone signal must be detected by a different tower in the daytime compared to the night time signal.

and international cities, as shown in Figure 25. They find that walking mode shares for complete trips (that is, trips made entirely by walking) range from 4 (Paris) to 81 percent (Dakar), with a median of 33 percent. To find out where Port-au-Prince might be on this range, GDP per capita data from the 26 different countries [21] represented by the 34 cities (2013, USD PPP for 2010 dollars) is used to calculate a Pearson correlation coefficient of-0.53 between GDP and the share of walking used for complete trips. Based on this correlation and Haiti's GDP, Port-au-Prince would then be expected to have a 45 percent walking mode share, putting it just shy of the 75th percentile for walking intensity in this list of cities. Given the very low motorization rates, the fragmentation observed in Chapter 2, and the apparent undersupply of public transport service as discussed in the previous chapter, it is likely that walking mode shares in Port-au-Prince are actually higher than 45 percent.

Figure 25. Mode shares in 34 selected cities (2011 – 2016 depending on city)



Source: Babinard et. al. 2017

21 Urban-level gross regional data is not available

93. **Transport expenditures by the poor confirm walking as the dominant means of transport.** As another way to estimate the use of walking as a mode of transport for the poor, transport expenditures are compared to the average fares on Tap Tap routes in 2012, at the time of the last household expenditure survey. Fares for those routes were about G 2.50 (US$0.06 in 2012 exchange rates) per kilometer or about G 12.90 for a 5-kilometer trip. Assuming a two-earner household (two roundtrips per day for a five-day work week), this would amount to about G 1,109.40 (US$26.38) per month, equivalent to 23, 14, and 9 percent of household expenditures for families in the poorest three quintiles, respectively, according to the survey results. The same survey, however, found that households in those quintiles actually spent, on average, only 0.9, 2.0, and 2.4 percent on transport respectively, which means walking must be their main means of transport. In fact, 42 percent of all households in the Port-au-Prince metropolitan area and respectively 80, 63, and 49 percent in the poorest three quintiles report having no monthly expenditures on ordinary transport at all. For these households, walking is the exclusive means of transport. (Authors' estimates based on ECVMAS 2012 data).

94. **Finally, in addition to being a key mode of transport for the urban poor, walking provides access and egress for all users of public transport.** Even for households that do have greater expenditures on daily commercial transport services, walking constitutes an important component of the overall trip, since the first and last segments of any public transport trip involves walking. In the Port-au-Prince metropolitan area, the importance of these access and egress segments are more important than in other cities as the city's topography limits the number of arterials that can accommodate public transport trips (see map in Annex 3). And even with population densities in the Port-au-Prince metropolitan area such that nearly 80 percent of the population is within 800 meters of an arterial with public transport services (Figure 14), to access the services, walking is required.

Even for households that do have greater expenditures on daily commercial transport services, walking constitutes an important component of the overall trip

4.3 Needs to improve the urban public space

95. With walking a key mode of transport for all segments of the population, the number and types of barriers to walking in Haiti are quite dramatic. Barriers include physical obstacles as well as other issues such as a lack of security—most notable in the Port-au-Prince CBD. As will be discussed, some of the causes for the challenges in the pedestrian environment overlap with those for urban public transport, such as the weak delivery of urban services for solid waste removal and drainage, as well as a lack of specific government oversight to the specific needs of this mode of non-motorized transit.

Substandard pedestrian conditions impact walking and last-mile access

96. **Observations in the Port-au-Prince metropolitan area and in Cap-Haïtien suggest that almost everywhere pedestrian conditions are substandard.** The nature and degree of the low standards vary substantially, even within cities.[22] Eight key obstacles to pedestrian movement in Haitian cities are presented in Table 7.

Table 7. Overview of key obstacles to pedestrian movements in Haitian cities

Strategic Intervention	Affected area(s)	Example
Lack of adequate sidewalk space for the volume of pedestrians	CBDs of Port-au-Prince and Cap-Haïtien	
Sidewalk and roads blocked by garbage	Port-au-Prince CBD and, to a lesser extent, Cap-Haïtien CBD	

22 The situation is likely the same in other Haitian cities but no first-hand observations were made.

Strategic Intervention	Affected area(s)	Example
Market activity on streets and sidewalk	CBDs of Port-au-Prince and Cap-Haïtien, as well as numerous other locations	
Poor drainage resulting in flooded streets	Port-au-Prince CBD, Carrefour, and numerous other locations	
Two-wheelers using and parking in pedestrian spaces	CBDs of Port-au-Prince and Cap-Haïtien	

23 In Port-au-Prince CBD, this is exacerbated by activities that used to occur inside buildings that today are no longer functional because of earthquake damage.

Strategic Intervention	Affected area(s)	Example
Sidewalk obstruction	Universal	
Frequent pedestrian / vehicle conflict points because of a lack of intersection control or poor street and intersection design and marking	Universal	

Photo credit: Roger Gorham

97. **Pedestrian conditions in the Port-au-Prince CBD are particularly bad.** While pedestrian conditions are a challenge in most parts of Haitian cities observed by the team, ironically, they appear to be poorest in the Port-au-Prince CBD, the district with the highest density of pedestrians in Port-au-Prince and likely the country. The Port-au-Prince CBD is afflicted by all of the above-listed challenges over a widespread area that nearly covers the entire CBD. While all observed obstacles also affect Cap-Haïtien, they are not nearly as intense or universal as in the Port-au-Prince CBD.

Figure 26. Hierarchy of pedestrian needs

Source: Michael Flynn, Sam Schwartz Engineering, as cited in Babinard et. al. 2017

98. Qualitatively, the nature of the pedestrian environment in the Port-au-Prince CBD can be assessed using a framework proposed by Flynn, as cited in Babinard et al. (2017). The framework uses a pyramid structure to rank the pedestrian experience from “passable” to “enjoyable” (Figure 26).

Conditions observed throughout the Port-au-Prince CBD, such as those listed in Table 7 show many areas that could be characterized as little more than "Passable," with even parts of the CBD that could not even be characterized as that, such as for example the situation displayed in Figure 27.

Figure 27. A mound of garbage creating an impassable obstruction on a dense area of pedestrian activity in the Port-au-Prince CBD

Source: Roger Gorham

99. **A more quantitative assessment of walkability will be needed to identify the key challenges and identify solutions.** As the assessment of pedestrian conditions in the Port-au-Prince and Cap-Haïtien metropolitan areas is only anecdotal and qualitative, a more objective and quantitative assessment of walkability is required to not only diagnose the key problems, but also—and importantly—prioritize potential solutions.

Security challenges and lack of government oversight

Gang activity and violence amplify fragmentation by limiting the ability of people to move freely throughout the metropolitan area

100. **Gang violence in cities greatly reduces security and adds to a place's spatial fragmentation by limiting people's ability to move around freely.** Gang violence in urban Haiti, particularly Port-au-Prince, is well known, not only as an urban reflection of poverty, but also as an instrument of state and para-statal power; see for example Dziedzic and Perito (2008) or Leth and Loncarevic (2006). At very local levels, gang activity and violence amplify fragmentation by limiting the ability of people to move freely throughout the metropolitan area; people's movements are constrained by group affiliations, much in the way that movements in pre-statal societies were limited (Diamond 2012). Even within the relative geographic constraints of the central market area, where murder of market leaders is a constant threat as a means of resolving conflict, gang and group affiliations can influence spatial constraints (Neiburg, Sergo et al. 2012). Such conditions do not facilitate pedestrian movements, especially at night.

101. **Finally, existing spatial fragmentation is worsened by the institutional fragmentation and lack of oversight.** Currently, no individuals or entities at the municipal or national levels are tasked with maintaining and developing the physical assets that enhance the pedestrian environment. If pedestrian assets are addressed at all, this occurs as an ancillary activity to the enhancement of running ways for motorized transport. As a result, quality and quantity of pedestrian facilities is lacking.

4.4 Specific strategies to revitalize the public space and enhance walking in Haitian cities

102. **Public spaces that are safe and accessible are critical to the viability of urban transport.** Urban transport can be a factor in creating public spaces that enhance the quality of urban life, while also relying—for public transport, walking, as well as private transport—on having secure and accessible public spaces. If the walking environment is unpleasant or unsafe or if public street space is poorly organized or managed, urban transport is affected through for example increased pressure for on-site parking or other negative consequences. This pressure can have adverse impacts on property development and housing affordability, a critical factor for a country where almost a quarter of the population lives in extreme poverty.

103. **Improving the pedestrian environment and enhancing public spaces builds on similar measures and approaches used to improve urban public transport.** They include measures to improve governance, actions to improve other urban services such as solid waste collection and drainage, as well as specific transport measures with a focus on the pedestrian environment. The latter can include catalytic investments, such as new public transport terminals, or smaller actions. Interventions to enhance public spaces and in fact build an inclusive social space (Box 4) do this by focusing on walking rather than private car use, to bring about a "virtuous circle" of investments that improve not only road safety and personal security, but also result in social equity (including gender equity and equity for the disabled), economic vitality, and increased ecological and public health.

Box 4. Sample measures for developing inclusive social space in cities

The literature on development of inclusive social space in cities goes back several decades (see, for example, Jacobs 1961, Whyte 1980, or Bently et al. 1985.), but the concept is only now entering mainstream, following the urban revival in developed countries in the last decade.

Elements that define inclusiveness range from micro-design of specific buildings to broad concepts affecting land use and transport networks. The following list, drawn from a cross-section of the literature, gives an overview of the type of interventions that cities might consider to implement.

- Ample sidewalks, free of obstructions
- Provision of well lighted and visible staircases to enhance accessibility in hillside neighborhoods
- Safe crosswalks / intersections, facilitating as direct routing for pedestrians as feasible. This means avoidance of foot-over bridges in most cases.
- Universal access, including facilities for visually, audibly, and mobility impaired
- Measures to limit speeds of traffic and to provide buffer spaces between pedestrians and fast traffic / heavy traffic
- Minimal curb cuts to reduce interruption of pedestrian flow
- Reduced carriageway lane widths to control speeds and minimize road crossing distances
- Shade and shelter from rain in hot and rainy climates
- Ample lighting
- Ample and well-designed seating in open spaces
- Adequate maintenance of pedestrian areas
- Visually active building frontage

- Physically permeable building frontage
- Minimization of gaps in building frontage
- Small blocks to facilitate pedestrian movements
- Integration of public space with public transport
- Mixed primary uses
- Proportionate building heights relative to street width
- Articulated density creating compact urban nodes
- Decentralization of public-facing governmental service facilities and provision in accessible environments

Source: Jacobs 1962, Whyte 1980, Bently et al. 1985, Abu Dhabi Planning Council 2010, Chicago DOT 2013, TFL 2016, NATCO 2016, and CEREMA 2016.

104. In Haiti, enhancing walking and the pedestrian environment can result from a combination of measures. These can be either short or long-term and can be categorized as better delivery of urban services, improved processes of managing urban development, and targeted investments and interventions on the ground. All three categories clearly link or overlap with measures listed already in Chapter 3 for improvements in urban public transport overall.

Improving delivery of urban services other than transport

105. ***Improving solid waste management and in particularly garbage collection (short-term).*** The most common challenge to walking in Haitian cities is the accumulation of solid-waste in streets and sidewalks, especially in and around markets. The trash impedes the flow of pedestrians and exacerbates pedestrian/vehicle conflicts. In the Port-au-Prince CBD, this situation is even worse with the trash, brought in by streams, collecting in the city core (see Chapter 3). While developing a sustainable solid waste management system to address waste reduction, reuse, and management will require substantial time and resources, in the short term at least improving garbage collection must be a priority to enhance walkability and decrease this public health issue.

106. ***Addressing drainage and watershed management issues (long term).*** As described in Chapter 3, poor drainage leads to pools of accumulated water, which again impedes pedestrian movements and increases pedestrian/vehicular conflicts as both compete for limited dry space. In the case of the Carrefour area in Port-au-Prince, site visits revealed that poor drainage appears to be linked

to the management of watersheds in the hillsides above Carrefour, an area characterized by encroachment on drainage channels and unimproved surfaces that lead to erosion. Drainage problems elsewhere in the Port-au-Prince metropolitan area and possibly Cap-Haïtien may have similar causes. Addressing these challenges comprehensively may require extensive watershed management investments and policies. In addition, however, transport-specific infrastructure investments might already substantially alleviate the inconveniences and hazards caused by the flooding, such as with elevated road and pedestrian facilities, including stairway and ramp access. If designed well, these facilities could also form part of the water channelization infrastructure during flooding events.

Improving urban development planning and processes

107. ***Conducting pedestrian safety and Road Safety Audits (RSAs) to identify and prioritize immediate pedestrian safety investments (short-term).*** An RSA is a structured process to identify road hazards for both vehicle occupants and other road users. When applied in urban areas, focus is often on vulnerable users such as pedestrians and cyclists. The RSAs could be implemented in Cap-Haïtien, Port-au-Prince, and perhaps other cities. An RSA usually involves a team of one to about six experts to carry out on-road surveys of safety conditions for existing parts of the road and street network, and the team may also review concepts or detailed designs for roads under development. The purpose of an RSA is not to determine compliance with existing code, but rather to observe conditions, identify hazards, and recommend solutions to improve pedestrian safety. An RSA of an entire city is probably not practicable, but a program of RSAs prioritized by vehicular or pedestrian volumes could be systematically developed, with the results feeding into a program of near-term investments in pedestrian enhancements.

The purpose of an RSA is not to determine compliance with existing code, but rather to observe conditions, identify hazards, and recommend solutions to improve pedestrian safety

108. ***Requiring design review (including RSAs that take into account vulnerable users) for all new infrastructure projects (short-term).*** A related initiative to the conducting of pedestrian and road safety audits is the required submission of designs for new transport infrastructure projects for a review specifically from the point of view of ensuring pedestrian safety. Administratively, such a requirement could simply require that all detailed designs are accompanied by an independent RSA report, including a written response by the project sponsor.

109. ***Undertaking methodological walkability assessments aimed at establishing longer-term priorities for policy and investment actions in Haitian cities (short-term).*** The previous sections reviewed challenges to walking based on observations of urban transport specialists during preliminary diagnostic field visits. However, a much more extensive and structured assessment of walkability as a distinct subject of study could help clarify the policy priorities in

a more structured and objective way. The World Bank has recently developed a streamlined walkability assessment tool for developing country cities, oriented around 17 indicators in four categories: street design, building design, land-use, and street network design. Details of the methodology are included in Annex 4.

110. ***Restoring design features that encourage and facilitate walking in CBDs of cities that have suffered destruction from past natural disasters (long-term).*** Applying specifically to the Port-au-Prince CBD, this measure would relate to such street and building design elements as sidewalk continuity, building frontage and setback, provision of arcades to protect against rain and heat, permeability of buildings to facilitate entry, small block size to facilitate redundancy in pedestrian movements, and other features that traditionally characterized the Port-au-Prince city center.

111. ***Developing design standards or guidelines for "Complete Streets" (long-term).*** The "Complete Streets" concept refers to the ability of urban street networks to meet the needs of all users, including pedestrians, bicyclists, motorists, and public transport riders of all ages and abilities. Typically, such standards or guidelines are oriented toward two audiences: (1) public departments of public works or infrastructure (at municipal, regional, and national levels, depending on jurisdictional responsibility for urban roads and streets) to provide guidance on the public rights-of-way in urban areas, and (2) private developers and their architects, to provide guidance on orientation, setbacks, and design features of buildings fronting streets designated as requiring a "complete streets" treatment. With respect to the former, the approach is proactive; rather than accommodating pedestrian and bicycle-friendly uses within predominantly motor-vehicle-centric designs, the guidelines provide for assessment of all road users in the fundamental right-of-way design. Broad ranges of exemplary guidelines already exist, including those of the US National Association of City Transportation Officials [24] or the French Center for Studies and Expertise on Risks, the Environment, Mobility and Development. [25] Such guidelines should be complemented with separate design guidelines for private developers seeking to develop properties along such "complete streets."

24 https://nacto.org/publication/urban-street-design-guide/

25 http://www.certu-catalogue.fr/voirie-urbaine-guide-d-amenagement.html

Implementing catalytic investments that demonstrate impact

112. ***Building demonstration projects by developing public transport terminals and transfer facilities in key locations to enhance pedestrian safety and create dignified walking environments in key points of access to public transport (short-term).*** Example locations include those in Portail Léogane, Croix-des-Bouquets, and Petionville. Public transport terminals in the Port-au-Prince metropolitan area and in Cap-Haïtien currently exist out of necessity, but they are conducive to neither pedestrian nor public transport movements and in fact contribute to a substantial amount of vehicular/pedestrian conflict as a result of the near absence of channelization of vehicular or pedestrian flows in or near terminals. Development of proper public transport terminals would not only help improve pedestrian conditions in and around the terminal itself, but also might function as a catalytic invest that spurs further investment in the surrounding area, in turn possibly further improving pedestrian conditions.

Development of proper public transport terminals will further improving pedestrian conditions

Improving governance

113. ***Assigning responsibility for enhancing and maintaining the walking environment in cities through governance arrangements of urban transport (long-term).*** Building on recommendations discussed to improve urban public transport, new institutional arrangements must ensure needs of pedestrians are also specifically covered and not lost in the organizational structure. Specifically, responsibility for maintenance and development of the walking environment and facilities should be explicitly assigned within the urban transport administrative structure established (ideally with an enumerated funding source). This may or may not mean identifying a specific unit within the administrative hierarchy to be responsible for maintenance and development of pedestrian infrastructure and ensuring pedestrian safety, but at the very least, the tasks should be written into the job descriptions of specific individuals where appropriate.

Chapter 5. Governance and institutional arrangements for urban transport

5.1 Overview of institutions involved with urban public transport

114. **In Haiti, fragmentation is not only physical, but also institutional.** The fragmentation of urban life in Haiti discussed in the Haiti Urbanization Review and Chapter 2 of this report is not just a physical phenomenon, but also an institutional one. As noted for example by Lombart et al. (2014), the creation in the 1970s and 1980s of increasingly smaller units of government (which reduced the role of the national government without necessarily creating the competence or coordination mechanisms at lower levels to fill the void) combined with the rapid increase in project-based aid in the aftermath of hurricanes, floods, and the earthquake, was critical in contributing to the sense of a fragmented city.

115. **No clear framework exists for the planning, management, and regulation of the urban transport sector in Haiti and Port-au-Prince.** In urban transport specifically, fragmentation of governance is notable, as much from an absence of coherence as from a splintering of responsibilities. No clear institutional framework currently exists for the *urban* transport sector in Haiti, though responsibilities for transport generally sit with entities at the national level – the Ministry of Labor and Social Affairs (MAST by its abbreviation in French) and the Ministry of Public Works, Transport, and Communications (MTPTC by its abbreviation in French). Their roles in urban public transport, however, are quite limited, while their overall mandates are substantially larger than urban transport alone, leading to this sector being frequently neglected. Key tasks for the two ministries are as follows:

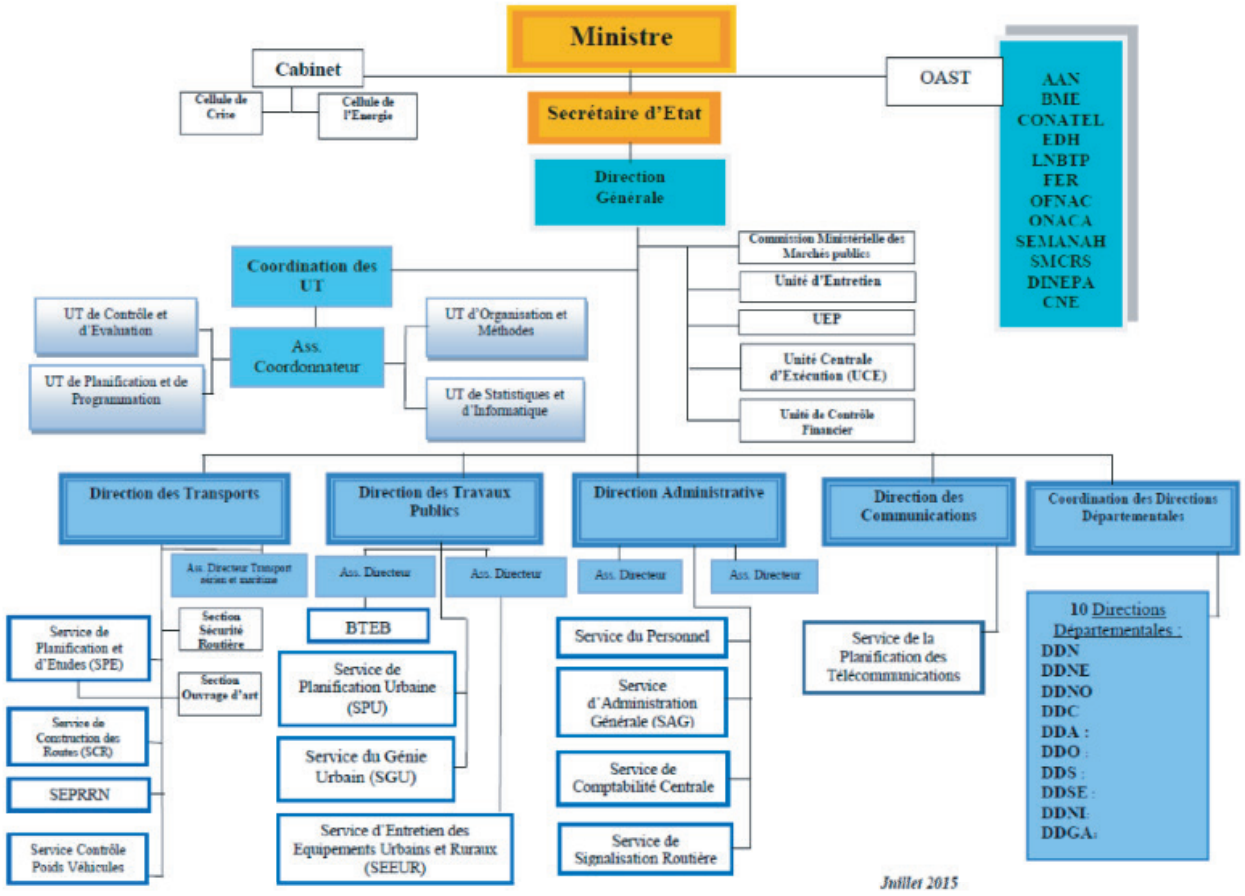
No clear institutional framework currently exists for the urban transport sector in Haiti

- MAST. The ministry is responsible for setting the public transportation fares, and oversees one of the few regulations placed on public transport operators.
- MTPTC. This ministry has the combined responsibilities of public works, transport (maritime, roads, and air), and communications and provides the following services: (1) distribution of drinking water, (2) regulation of telecoms operator, (3) maintenance of highways, (4) control of building and construction standards, and (5) management and exploitation of mineral and energy resources. The current organigram of the MTPTC is shown in Figure 28.

MEF (Ministry of Economy and Finance) and MCI (Ministry of Commerce and Industry) also play an important *de facto* role in the regulation of the sector and in setting transport fares, as they oversee prices for petroleum products and associated fiscal revenue.

116. It is not entirely clear what, if any, role is mandated for local governments with respect to urban transport. Until recently, few local governments had the necessary leadership or capacity to manage urban transport, but with the election in 2016 of mayors for all local governments across the country (for the first time in a decade) this situation has changed. In addition, the Strategic Plan for Development of Haiti (PSDH) identifies balanced development as an objective, with other government initiatives aiming to strengthen staffing at the local government level and expand revenue mobilization. These developments provide an opportunity to deepen the capacity of the state to deliver services at the local level and strengthen the social contract between the state and its citizens. They also offer an opportunity to start a discussion on the appropriate institutional structure for urban transport that extends beyond the national government.

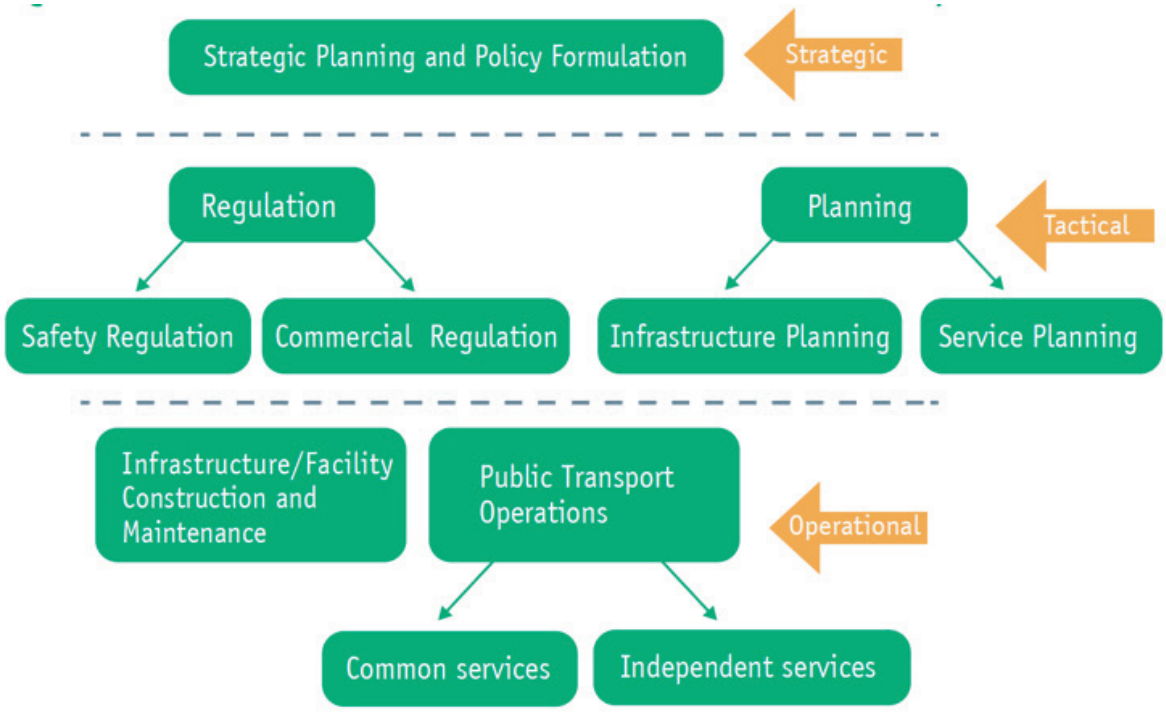
Figure 28. Sample measures for developing inclusive social space in cities



Source: MTPTC

117. Even more important than the question of who has a mandate to act on urban transport issues, however, is the question of what functions need to be mandated. Currently, a comprehensive understanding of, let alone approach to, what needs to be accounted for in the overall governance of the urban transport sector in Haiti is lacking. Kumar and Agarwal (2013) have proposed a three-tiered model of understanding urban transport governance, which can help clarify the challenges facing urban transport governance in the country. According to their model, the key functions needing to be performed to provide urban transport services can be divided into three distinct levels—strategic, tactical, and operational—as shown in Figure 29.

Figure 29. Functions to be performed in provision of urban transport services



Source: Kumar and Agarwal 2013

118. *Strategic.* At the strategic tier, strategic planning functions typically include a "long-range major infrastructure investment needs assessment reflecting future growth, [and] long range financial analysis and planning," while policy formulation functions involve establishment of "safety standards, how investments and operations are to be financed, how much of the costs should be recovered from fares and how much should derive from other sources, the role of the private sector, performance standards to be met, network coverage and other matters." (Kumar and Agarwal 2013) At present, none of these functions are being performed in Haiti.

119. *Tactical.* At the tactical level, two key functions include regulation and (tactical) planning of services, with regulatory functions involving both safety and commercial regulation. In Haiti at present, safety regulations only address that vehicles must be registered for commercial services and certified as roadworthy, while commercial regulation (involving for example efforts to ensure that supply and demand are equilibrated and pricing occurs equitably) in Haiti is weak and not carried out in full. Fares are set by the public sector, but no mechanism exists, as Kumar and Agarwal describe, "to avoid oversupply of service on some routes and undersupply on others." In addition, even though fares are *de jure* set by regulation, the fares riders actually pay *(de facto)* are determined by the route structures that operators choose to operate. Similarly, tactical planning—either infrastructure or service planning—is not carried out for urban public transport services in Haiti.

120. *Operational.* Finally, at the operational level, only one of three services mentioned earlier is carried out. This is the actual operation of independent services, which is carried out by Tap Tap operators in Port-au-Prince, Cap-Haïtien, and other cities. Other services at the operational level, however, are not fulfilled, such as infrastructure and facility construction, management, and maintenance (indeed, even the public transport "terminals" located in the two main cities are simply staging areas on streets and dirt lots), as well as common operational services including fare collection and revenue sharing for intermodal operations, security, and dispute resolution.

121. When comparing the urban transport functions that Kumar and Agarwal argue need to be covered (Figure 28) with the organization of MTPTC, a picture emerges of a sector that is largely ungoverned, with only a few of the key functions identified by Kumar and Agarwal being formally allocated, and even then, only executed in a weak manner. Currently no authority in Haiti is mandated with the planning, oversight, or enforcement of regulation of the public transport services in the country.

In Haiti at present, safety regulations only address that vehicles must be registered for commercial services and certified as roadworthy

5.2 Steps to strengthen urban transport management

122. To implement the specific interventions described in Chapters 3 and 4, improved governance for urban planning and urban services in general, and for urban transport management specifically will be needed.

123. **A role exists for the national government to strengthen urban transport management.** One common approach adopted by large cities to address gaps in governance of urban transport is to develop a lead authority for urban transport. Various options exist for setting up such a lead authority (for example as an independent authority or as an existing agency within national, provincial or city governments), and the specific form will depend on a country's political history and institutional framework. Urban transport is normally seen as a local government responsibility, and although examples exist where urban transport is managed differently (for example in fragile environments when government legitimacy is weak), the role of the local governments is important for long-term success of sector reform. At the same time, it must be recognized that in Haiti, capacity and resources at the local government level are at present vastly insufficient to take on such a responsibility. In the short term, therefore, the national government should take the lead in identifying and developing this lead authority.

The role of the local governments is important for long-term success of sector reform

124. **In the long run, lead transport agencies should be established and operate on a metropolitan level for each city.** Although at first the national government may need to take the lead to develop metropolitan-scale lead transport agencies, in the longer run, such agencies should be autonomous from the national government and metropolitan in scale. This would avoid an administrative fragmentation of their functions that could occur if operating at a more local level than the metropolitan scale. While local governments should be part of the governance structure from the very beginning, administrative fragmentation could exacerbate, rather than address, the challenges of spatial fragmentation discussed in Chapter 2 of this report. Because smaller administrative units have a greater chance of social homogeneity, the risks to regional inequality can be large, especially if municipalities use own tax revenue or receive transfers proportional to their economic strength to provide public services and infrastructure, which could lead to poorer neighborhoods having lower public service provision and infrastructure. Administrative fragmentation and the resulting split into wealthy and poor neighborhoods can also increase social exclusion and patterns of spatial separation. For this reason, it is important to conceive of the lead transport agency as metropolitan in scope.

125. **An umbrella agency, such as a Metropolitan Transport Authority, could be created, with representation from local governments, relevant ministries, operators, civil society, and other stakeholders.** This authority would bring together functions including long-term planning and investment programming, public transport oversight, traffic management, public transport improvements, oversight and development of pedestrian facilities, and road safety measures, among other responsibilities. Such an entity could also play a central role in executing investment projects to enhance public transport and non-motorized transport conditions. Experience suggests, however, for such an agency to be successful in that role, it needs to have (1) clearly delineated and dedicated sources of funding that span several budget years; (2) hiring and firing capacities that are free from the typical employment constraints imposed by civil service rules (that is, being able to compete in the marketplace to attract qualified candidates, including from the diaspora, and able to fire employees who are not delivering); and (3) a governance structure insulated from political interference (Mobereola 2009).

126. **Further technical work, public consultations, and a thorough understanding of the local context is needed to develop the structure most appropriate for Haiti.** This implies that attempts to formalize the sector must proceed gradually, developing key legislation through a consultative process that seeks to build coalitions. In the meantime, it would be important to get started with understanding the role of local governments in urban transport as currently envisioned and develop an inventory of capacity and resources at the local level to support the transport functions allocated to them. Given the importance of the public transport sector operations to residents and to the economy, a clear short-term need exists to increase capacity within the MTPTC as well, to allow it to take on the responsibility for overseeing the sector and act on strategic planning and regulatory functions in the short-run.

127. **In the longer run, improvements in public transport services in Haitian cities generally and in Port-au-Prince in particular could include a transition to larger vehicles along appropriate corridors.** While the current public transport offering is dominated by Tap Taps, over time the use of large vehicles might be considered as a long-term objective to provide improved services. However, as argued in Chapter 4, trying to do so under the wrong conditions could be counterproductive, potentially exacerbating rather than alleviating congestion. The conditions under which such an objective might be beneficial would include a well-managed program of vehicle scrappage to ensure replacement of, not addition to, the existing vehicle fleet; a change in the structure of public transport delivery to enable private operators to enhance ownership, credit, and pooled risks; along with a system that can ensure that neither side takes advantage of numerous avenues of corruption that such an effort would open up. While no easy answers exist, governance should be addressed early on in any process of

Over time the use of large vehicles might be considered as a long-term objective to provide improved services

trying to improve urban transport in Haiti, as governance capacity is necessary to make the downstream reforms possible.

128. **Developing the required governance capacity is key, but more challenging than any of the individual measures.** While developing governance capacity is a long-term effort, some measures should be taken in the short term, to start developing conditions to support the other key interventions outlined in other chapters. To establish the required government capacity, the long-term process for it would likely involve a combination of the following:

- Developing a core team within MTPTC to take on the initial functions outlined above, drawing on the Haitian diaspora where possible.
- Producing a series of small but catalytic successful engagements and investments that influences the public perception of the value of urban transport governance improvements.
- Engaging with operators to begin building trust and a cohesive dialogue.
- Developing a sector strategy through a consultative process that seeks to build coalitions.

5.3 Impact of government facility siting and land-use on urban transport

129. Notwithstanding that there is a dearth of active responsibility for urban transport at all levels of government in Haiti, it is important to note that decisions taken by other parts of government can affect urban transport both positively and negatively; even if development of a lead agency for urban transport may take some time, mindfulness in decisions related to land-use – particularly where and how to site key facilities – can already begin to make an impact on the urban transport system, by structuring where and when demand for urban transport services would materialize.

130. Key facilities which tend to be important *generators* of travel demand include:

- Major housing developments;
- Primary, secondary, and tertiary education facilities;
- Hospitals;

- Public-facing government facilities, such as licensing and permitting offices; and

- Large-scale retail developments such as shopping malls.

Government at different levels can often be involved in key decisions determining where such facilities should go, sometimes as the key actor (in the case of siting of government facilities) and sometimes in a regulatory role authorizing construction or utilization. The opportunities for government to shape land-uses in a city in ways that can profoundly affect transport, therefore, should not be underestimated.

131. Two ways that such decisions can affect the transport system and accessibility are in fostering mixed primary uses and in ensuring temporal balance in trip generation. Mixed primary uses means trying to ensure that the above primary generators of demand are not segregated into different, single-use zones of the city, but rather are sited in proximity to one another (even vertically in the same building, if appropriate), so as to foster complementarities. Temporal balance is a related concept that tries to ensure that the generation of demand occurs in a balanced way throughout the day – that is, trips produced from and attracted to a zone should ideally be distributed throughout the day, through careful mix of the primary uses. Temporal balance not only ensures that key neighborhoods are animated day and night – which can be important to reduce criminality and gang activity – but it also helps reduce the costs of transport investment over time, because passenger flows are more evenly distributed throughout the day, thereby enabling operators to amortize their capital investments faster.

132. In the case of the PAP CBD, for example, a policy of mixed primary use and temporal balance would imply that rebuilding the CBD would encompass development of not only retail, commercial, and government facilities, but also housing. In the case of Cap, given that substantial population centers exist Southeast and Southwest of the CBD, there is a strong need to develop school facilities in these areas (so that people do not need to bring their children to the Cap CBD in order to educate them). As the Cap metropolitan area grows, there will be an increasing need to shape a polycentric metropolitan area by creating new sub-centers of commercial, office, government, and housing outside of the existing CBD, while not scattering them across the metropolitan landscape or challenging the primacy of the Cap traditional city center.

Chapter 6. Conclusions and key recommendations

133. **As described in this report, the urban environment in Haiti generally, and in Port-au-Prince in particular, is characterized by spatial and institutional fragmentation.** Poor accessibility—to jobs, services, and social opportunities—is both a result and a symptom of this extreme fragmentation. The situation reflects that the sector is not governed well and that the network is not operationally efficient. As discussed in Chapter 3, numerous impediments to movement not only decrease accessibility for public transport passengers, but also increase operational cost for urban transport providers and decrease their expected returns on risk. The alternative to public transport use is walking, and, as discussed in Chapter 4, the conditions for pedestrians in the two cities examined are poor, particularly—and ironically—in the part of the country with the highest concentration of pedestrians, namely the traditional center of Port-au-Prince.

Poor accessibility to jobs, services, and social opportunities—is both a result and a symptom of this extreme fragmentation

134. **Services are currently provided in the context of a "low-level equilibrium" with poor quality services provided.** Importantly, the analysis in this report showed that urban transport in Haitian cities in general and Port-au-Prince specifically is characterized by a suppressed demand. This demand could be captured if operating conditions improved and Tap Taps could make more runs per day, meaning that, under current conditions, a higher fare price and more Tap Taps on the road would not increase accessibility and only further reduce affordability. To break away from this situation, this report has proposed various interventions that, taken as a whole, address fragmentation through urban transport policy, with emphasis on improving the pedestrian experience and improving urban transport throughput by targeted measures addressing the underlying causes of public transport congestion.

135. **Based on the analysis in this report, a number of overall recommendations have emerged.** These include (1) improving operational travel speeds along key corridors by addressing delivery of urban public services and implementing targeted physical interventions aimed at some key causes of congestion, (2) implementing targeted physical interventions to improve the walking environment, (3) taking measures to better regulate the sector, and (4) working towards a cohesive government structure with the appropriate mandate and capacity. An overview of these 4 recommendations is presented here, while specific steps were outlined in Chapter 3 (public transport), Chapter 4 (walking environment), and Chapter 5 (governance and regulatory measures); an overview of key challenges and recommendations is provided in Table 8.

136. In sum, actions in the four listed areas include:

1. **Improving operational travel speeds along key corridors by addressing delivery of urban public services and implementing targeted physical interventions aimed at some key causes of congestion. In the short run, this can include**

   a. Improving the delivery of urban public services, including addressing solid waste collection and drainage. (While not specifically transport-oriented, this recommendation is relevant for improving the walking environmental and public transport functioning in both Haitian cities, as described in chapters 3 and 4);

   b. Introducing a Traffic Management Strategy addressing the usage of different types of vehicles (for example heavy goods vehicles) along specific arterial routes during peak periods;

   c. Redesigning and managing primary intersections, to include:

      - Prohibition for Tap Taps to use boarding or drop-off areas directly adjacent to an intersection, ensuring the exit lane on the intersection is not blocked to maximize vehicle through-put;
      - Banning of U-turns; and
      - Removal of existing (unused) pedestrian footbridges, accompanied with improved at-grade pedestrian crossing facilities.

   In the medium to longer term, such interventions might also include the following:

   a. Rehabilitating secondary access streets that interface with the primary network, thus providing improved accessibility for motorized and non-motorized transport into peripheral residential areas.

   b. Rehabilitating highway pavement accompanied by a structured and deliverable maintenance program.

   c. Consider development of alternatives for provision of public transport services along key corridors, such as Carrefour – CBD. It is particularly recommended to carry out an alternatives analysis of this corridor to better understand what transport options – including mass transport and larger buses – might be appropriate and feasible to consider for further development.

2. **Exploring and implementing targeted physical interventions to improve the walking environment. In the short term, this could include:**
   a. Developing demonstration projects through catalytic investments in select public transport facilities, such as Portail Léogane, Croix-des-Bouquets, or other locations.
   b. Conducting pedestrian safety and road safety audits (RSAs) to identify and prioritize immediate pedestrian safety investments.
   c. Requiring design review from a pedestrian safety point of view for all new infrastructure projects.
   d. Undertaking methodological walkability assessments, to prioritize measures to improve infrastructure for non-motorized transport, including provision of sidewalks, rehabilitation of existing non-motorized transport infrastructure, and provision of pedestrian crossing facilities.

   In the longer term, such interventions might also include the following:

   a. Ensuring restoration of design features that encourage and facilitate walking in CBDs of cities that have suffered destruction from past natural disasters.
   b. Developing design standards or guidelines for complete streets.

3. **Implementing measures to better regulate the sector.** Measures that can be initiated in the short term might include:
   a. Better regulation and enforcement of street vendors and motor vehicle operators.
   b. Extended spatial deployment of traffic police at primary and secondary intersections.

4. **Working towards a cohesive governance structure with the mandate and capacity to address a broad set of issues.** This includes working toward ensuring that strategic planning and policy formulation, regulatory and operational planning functions, and infrastructure facility development and maintenance functions are all accounted for in a functional governance structure. In the long run, efforts might focus on development of a lead agency such as a transport authority—for Port-au-Prince initially, for example—but in the shorter run, additional functions as discussed in Chapter 5 could be assigned to existing departments or units whose mandate could be expanded and capacity strengthened, and more awareness of the impacts of citing decisions by government actors on urban transport outcomes can be brought to bear. A more detailed study of a governance development strategy to guide such actions is recommended.

5. **Actively consider the impact of land use decisions on demand and supply for urban transport.** Government at different levels is often involved in key decisions determining where facilities such as hospitals, schools, government and commercial office spaces, and shopping malls are located, sometimes as the key actor and sometimes in a regulatory role authorizing construction or utilization. Such spatial decisions offer an opportunity to affect the transport system and accessibility by fostering mixed primary uses and ensuring temporal balance in trip generation. As explained in Chapter 5, there may be ongoing opportunities for government to shape land-uses in a city and, through these decisions affect, transport. The cumulative influence of such actions on congestion and accessibility should not be underestimated. Not only can good spatial planning ensure that key neighborhoods are animated day and night but it can also help reduce the costs of transport investment over time.

137. **Addressing urban transport in Haiti can be a tangible way to address the fragmentation of its cities.** The fragmentation of Haitian cities is having a big effect on economic development. While addressing urban mobility and improving urban transport is only one of several factors, analysis from this report suggests it may be an effective and tangible way for public policy to begin to address it.

Table 8. Overall recommendations to reduce congestion, improve the urban environment, and increase accessibility for Haitian cities

	Challenges	Recommendations/ Strategic steps	Short Term Actions	Medium to Long Term Action
Urban transport physical interventions	Congestion reduces accessibility and suppresses demand for public transport Intersection control is weak or absent; poorly designed interactions increase pedestrian/vehicle conflicts Highway maintenance is weak/absent and a maintenance strategy is lacking; highway pavement conditions are deteriorating Pedestrian environment is severely substandard and not conducive to walking	Implement measures to improve traffic flow and urban environment Implement measures to improve traffic flow and urban environment	Introduce a Road Management Strategy for different types of vehicles along specific arterial routes during peak periods Redesign and manage primary intersections (e.g., managing Tap Tap boarding, banning U-turns, and improving at-grade pedestrian crossings) Prioritize interventions in select corridors (For PAP, possibly the RN2 corridor through Carrefour) Invest in select public transport facilities (e.g., Portail Léogane and Croix-des-Bouquets) to demonstrate possible impact (catalytic investments) Implement pedestrian safety and road safety audits (RSA); prioritize pedestrian safety investments Require design review (with focus on pedestrian safety) for all new infrastructure projects Undertake methodological walkability assessments Based on assessments, improve the NMT environment (with sidewalks, rehabilitation of existing non-motorized transport infrastructure, and provision of at-grade pedestrian crossing facilities)	Rehabilitate secondary access streets to improve accessibility to peripheral residential areas Develop an effective highway maintenance program Restore design features that encourage and facilitate walking in city CBDs Develop design standards or guidelines for complete streets

	Challenges	Recommendations/ Strategic steps	Short Term Actions	Medium to Long Term Action
Urban management	Floods and garbage limit available pedestrian space and force pedestrians into motorized traffic lanes	Improve delivery of urban public services, specifically solid waste collection and drainage	Regularly inspect and maintain highway drainage, including periodic de-silting of drainage channels, specifically before and during the hurricane season Improve garbage collection Make siting decisions for government and other facilities with awareness of / attention to their potential impacts on urban transport outcomes	Consider transport-specific infrastructure investments to alleviate impact of floods (e.g., elevated road and pedestrian facilities, including stairway and ramp access) Develop an extensive watershed management investment strategy and policies Introduce a robust and deliverable solid waste management strategy

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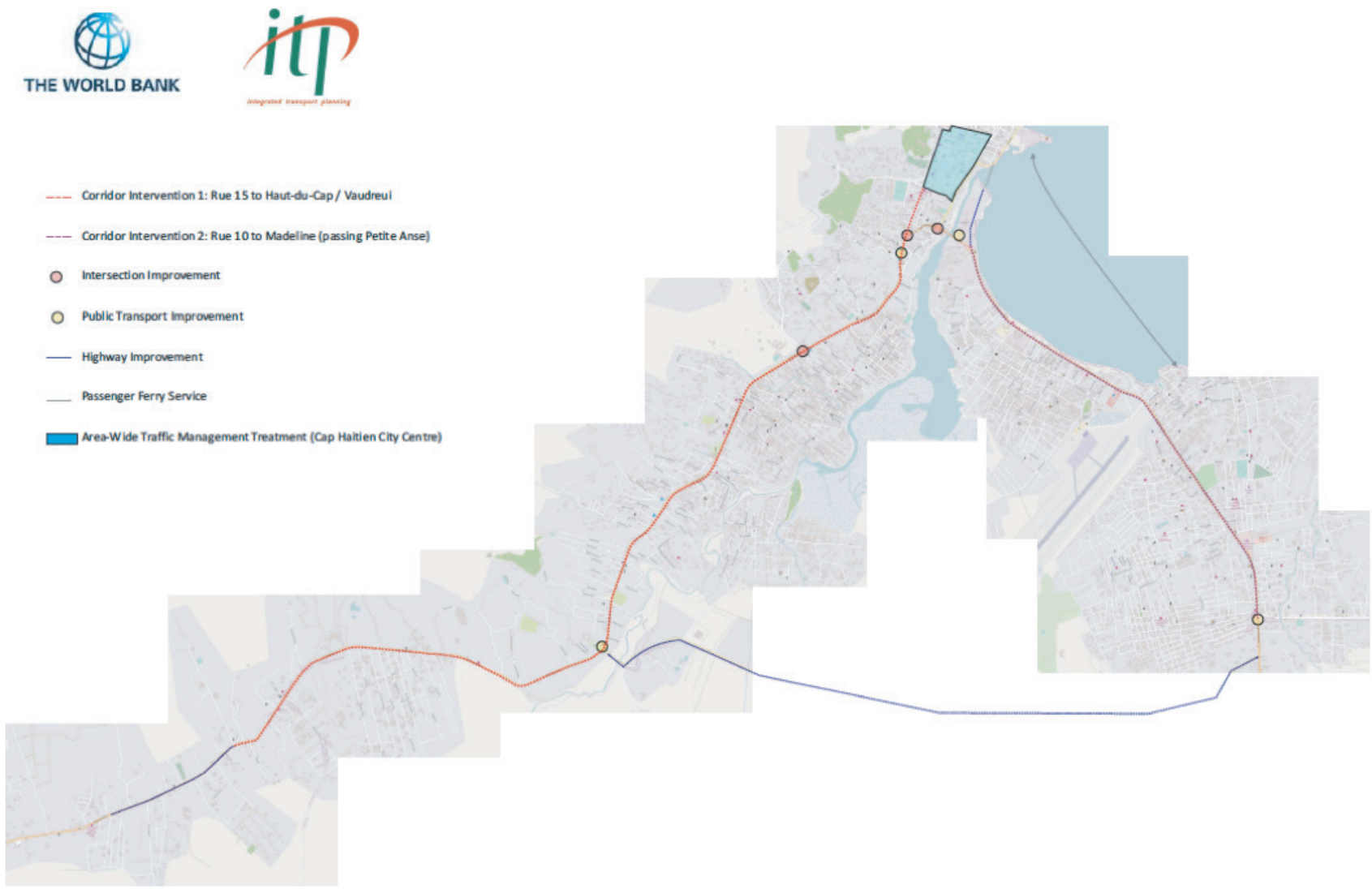
Annex 1: Identified locations for possible intersection interventions and other treatments

Please see next page.


THE WORLD BANK
Corridor Intervention 1: National Road 2: Mariani to Centre Ville, through Carrefour
Corridor Intervention 2: Centre Ville PAP Croix des Bouquets, via Delmas
Corridor Intervention 3: Route de Delmas from Fort Dimanche to Petionville
Corridor Intervention 4: National Road 1: Croix des Bossales to Canaan Junction
Intersection Improvement
Public Transport Improvement
Highway Improvement
Area-Wide Traffic Management Treatment


THE WORLD BANK
itp
integrated transport planning
Corridor Intervention 1: Rue 15 to Haut-du-Cap / Vaudreuil
Corridor Intervention 2: Rue 10 to Madeline (passing Petite Anse)
Intersection Improvement
Public Transport Improvement
Highway Improvement
Passenger Ferry Service
Area-Wide Traffic Management Treatment (Cap Haitien City Centre)

Annex 2: Specific interventions to improve traffic flow and urban public transport in Port-au-Prince and Cap-Haïtien

Tables in this annex identify a range of customized measures for specific locations within the Port-au-Prince metropolitan area and in Cap-Haïtien.

Table 9. Site-specific operational improvements for Port-au-Prince for further consideration

Operational improvement	Objective	Timescale	Cost
Intersection improvements a strategic package to convert intersections to roundabout operation or implement traffic signal control and traffic officer management. Specific locations for this intervention include the intersections of: • Route de Delmas / Delmas 33 • Route de Delmas / Delmas 31 • Route de Delmas / New Boulevard • Route National 1 / Route de Delmas • Route National 1 / Boulevard la Saline • Route National 1 / Boulevard des Industries • Route National 1 / Rue Butte Boyer (Croix des Missions) • Route National 1 / Route de Santo (Carrefour Shadda) • Route de Santo / Marassa) • Boulevard Louverture / Boulevard 15 Octobre • Boulevard Louverture / Avenue Gerard Theodat • Boulevard Louverture / Avenue Mais Gate • Delmas 33 / Avenue Mais Gate • Boulevard Harry Truman / Boulevard Jean Dessalines	Improve operation / capacity of intersections. Additional benefits from intervention likely to include: • Increased vehicle speeds • Reduced overall journey times • Improvements to local air quality (reduction in localized emissions) • Improved road safety and provision for non-motorized transport such as with improved pedestrian crossings.	Medium to long term	$500,000 (per location)

Operational improvement	Objective	Timescale	Cost
Traffic / movement strategy for downtown Port-au-Prince: • Regulation / control of street traders • Intersection improvements • Removal and continual program of solid waste removal • Creation of one-way streets • Deployment of traffic officers to manage / control traffic at local intersections	Improve road safety, movement, and accessibility for non-motorized transport Reduce city center congestion to reach improved journey-speed Improve environmental conditions	Medium to long term	$5,000,000
Drainage channel improvements Locations: • Martissant / Savane Salee • Petion Ville / Carrefour Clercine	Improve highway capacity for increased vehicle speed and reduced journey time Improve environmental and social conditions	Short to medium term	$500,000 (per location)
New Tap Tap interchanges • Petionville (former cemetery) • Croix des Bouquets (rehabilitation of highway, improved highway drainage) • Gare Léogane, Gare de Jacmel and Gare du Sud	Improve passenger interchange Improve Tap-Tap operations, and reduce highway congestion	Short to medium term	$500,000 (per location)
Solid Waste Management Strategy (collection and disposal)	Improve highway capacity and increase vehicle speed for reduced journey time. Improve environmental and social conditions	Short to medium term	Unknown

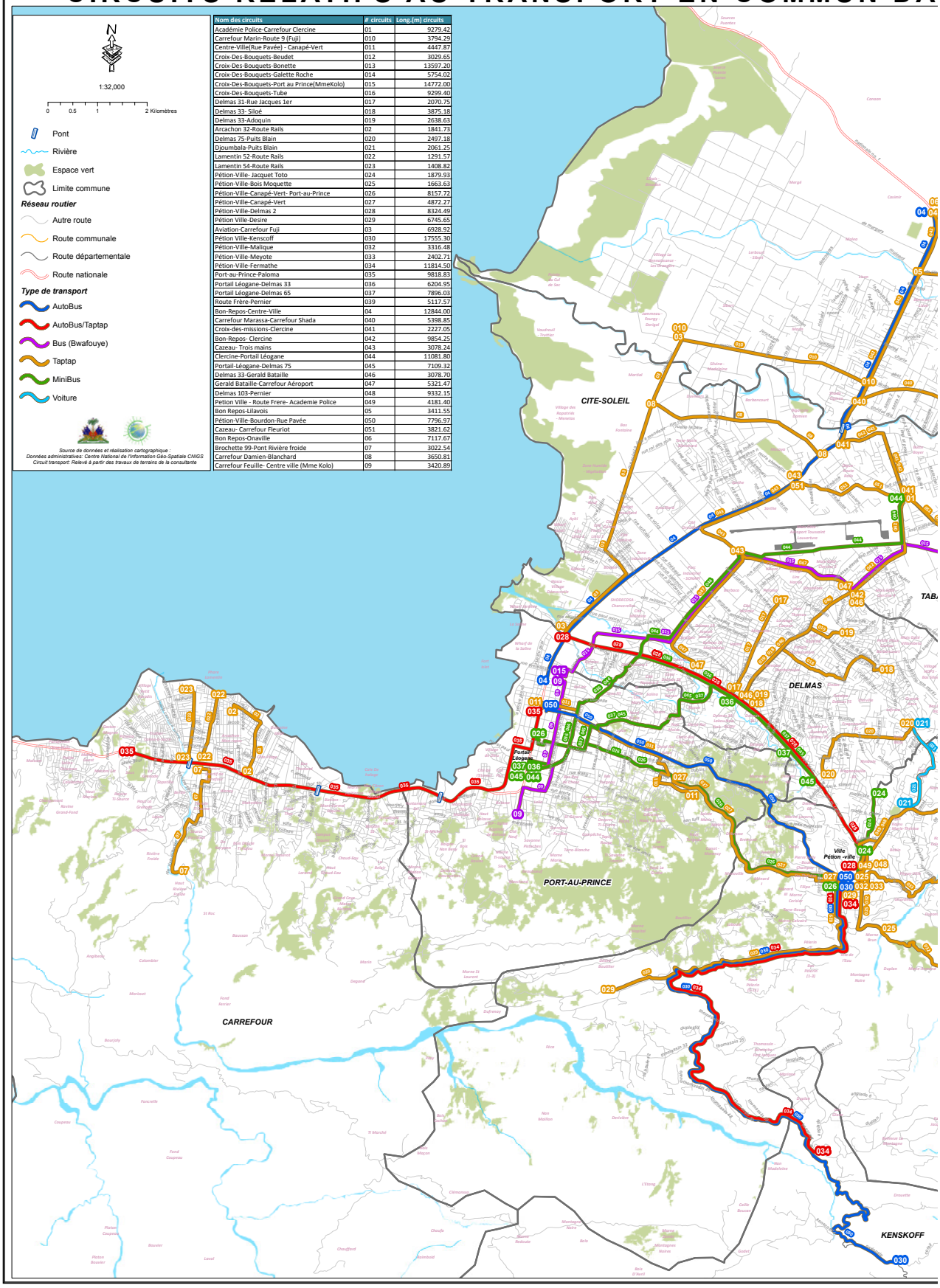
Table 10. Site-specific operational improvements for Cap-Haïtien for further consideration

Aim	Objective	Timescale	Cost
Highway improvement on approach road to new road bridge	Improve accessibility to city center, reduce congestion on existing road bridge	Short term	$500,000
Traffic Management Strategy for the core area of the city center • Banning of HGV's within the core area of the city center, especially on roads immediately surrounding the main market area • Introduction of one-way streets, and prohibited traffic movements (to improve movement and accessibility) • Introduction of pedestrian only streets, focusing on key links around the main market area • Improvement of intersections	• Improve road safety, movement and accessibility for non-motorized transport. • Reduce city center congestion, improved journey-speed • Improve environmental conditions	Medium term	$3,000,000
Potential for one-way traffic movement into the city center from RN6. Inbound traffic to access the city center over the new road bridge, and outbound traffic one-way movement via existing road bridge	Improve accessibility to city center, reduce congestion on existing road bridge	Short term	$2,000,000
• Intersection redesign - traffic signals at RN6 / Rue A • Intersection redesign at RN6 / Rue L – conversion of uncontrolled intersection into a three-armed roundabout • Intersection redesign at RN1 / Hotel Imperial – conversion of uncontrolled intersection into a four armed roundabout	Reduce congestion and improve vehicle journey speed Improve road safety	Short term Short term Short term	$500,000 (per location)
New Tap –Tap turnaround and interchange located at intersection of RN1 and what forms a southerly bypass route around Cap Haïtien	Improve passenger interchange. Improve Tap-Tap operations (remove existing forced U-turn at constrained point), and so reduce congestion	Short term	$500,000
Full construction of southern bypass route on existing informal highway corridor	Reduce city center congestion through a strategic removal of through-traffic	Long term	$5,000,000

Aim	Objective	Timescale	Cost
Provision of passenger ferry from Petite Anse to Cap Haïtien port area	Improve accessibility to city center for one of Cap Haïtien's main residential areas	Long term	Unknown
Highway pavement improvement on RN1 at Vaudreuil	Improve vehicle journey speed. Improve Tap Tap operations (contribution towards reduced maintenance on vehicle due to improved road surfacing)	Short term	$500,000
Either identification of a suitable site for the relocation of Gare Routière, or, improvement management / operation of existing facility, which would include removal of solid waste, improved vehicle parking (to reduce highway blockage and delay)	Reduce localized congestion in the area. Improve passenger interchange through the provision of a functional design	Medium term	Unknown
Improved Tap-Tap turnaround facility at Madeline (RN3).	Improve passenger interchange. Improve Tap-Tap operations (remove existing forced U-turn at constrained point) and so reduce congestion	Short term	$500,000

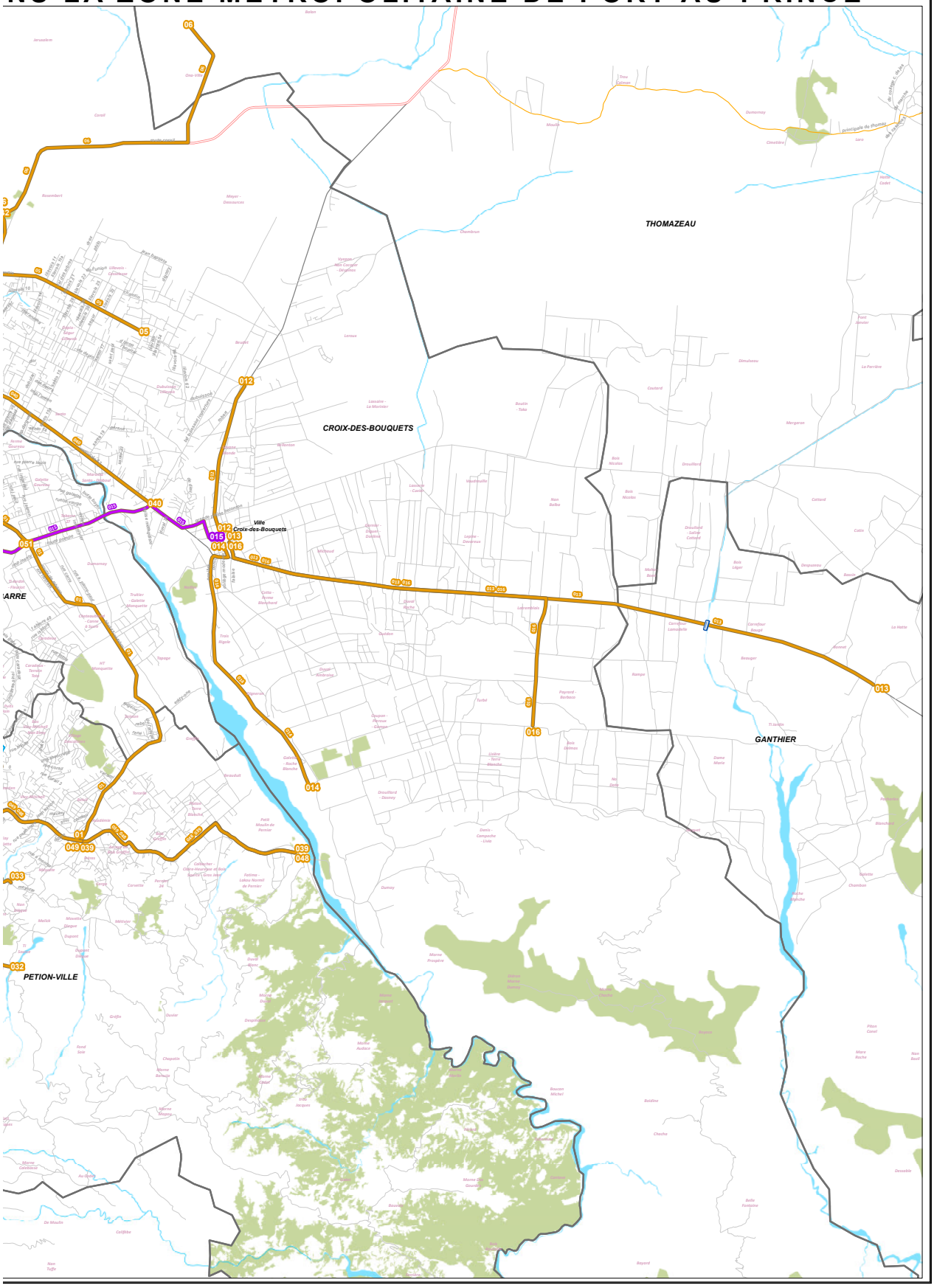
Annex 3: Public transport network in Port-au-Prince

CIRCUITS RELATIFS AU TRANSPORT EN COMMUN DA



Nom des circuits	# circuits	Long.(m) circuits
Académie Police-Carrefour Clercine	01	9279.42
Carrefour Marin-Route 9 (Fuji)	010	3794.29
Centre-Ville(Rue Pavée) - Canapé-Vert	011	4447.87
Croix-Des-Bouquets-Beudet	012	3029.65
Croix-Des-Bouquets-Bonette	013	13597.20
Croix-Des-Bouquets-Galette Roche	014	5754.02
Croix-Des-Bouquets-Port au Prince(MmeKolo)	015	14772.00
Croix-Des-Bouquets-Tube	016	9299.40
Delmas 31-Rue Jacques 1er	017	2070.75
Delmas 33- Siloé	018	3875.18
Delmas 33-Adoquin	019	2638.63
Arcachon 32-Route Rails	02	1841.73
Delmas 75-Puits Blain	020	2497.18
Djoumbala-Puits Blain	021	2061.25
Lamentin 52-Route Rails	022	1291.57
Lamentin 54-Route Rails	023	1408.82
Pétion-Ville- Jacquet Toto	024	1879.93
Pétion-Ville-Bois Moquette	025	1663.63
Pétion-Ville-Canapé-Vert- Port-au-Prince	026	8157.72
Pétion-Ville-Canapé-Vert	027	4872.27
Pétion-Ville-Delmas 2	028	8324.49
Pétion Ville-Desire	029	6745.65
Aviation-Carrefour Fuji	03	6928.92
Pétion Ville-Kenscoff	030	17555.30
Pétion-Ville-Malique	032	3316.48
Pétion-Ville-Meyote	033	2402.71
Pétion-Ville-Fermathe	034	11814.50
Port-au-Prince-Paloma	035	9818.83
Portail Léogane-Delmas 33	036	6204.95
Portail Léogane-Delmas 65	037	7896.03
Route Frère-Pernier	039	5117.57
Bon-Repos-Centre-Ville	04	12844.00
Carrefour Marassa-Carrefour Shada	040	5398.85
Croix-des-missions-Clercine	041	2227.05
Bon-Repos- Clercine	042	9854.25
Cazeau- Trois mains	043	3078.24
Clercine-Portail Léogane	044	11081.80
Portail-Léogane-Delmas 75	045	7109.32
Delmas 33-Gerald Bataille	046	3078.70
Gerald Bataille-Carrefour Aéroport	047	5321.47
Delmas 103-Pernier	048	9332.15
Petion Ville - Route Frere- Academie Police	049	4181.40
Bon Repos-Lilavois	05	3411.55
Pétion-Ville-Bourdon-Rue Pavée	050	7796.97
Cazeau- Carrefour Fleuriot	051	3821.62
Bon Repos-Onaville	06	7117.67
Brochette 99-Pont Rivière froide	07	3022.54
Carrefour Damien-Blanchard	08	3650.81
Carrefour Feuille- Centre ville (Mme Kolo)	09	3420.89

NS LA ZONE METROPOLITAINE DE PORT-AU-PRINCE



Annex 4: Walking assessment methodology

Building on existing walking assessment methodologies, the World Bank developed a comprehensive assessment tool to evaluate the walking environment. While several of the existing tools depend on an elaborate data collection process, the new tool was designed for rapid deployment across large urban areas—particularly in developing city contexts—and therefore relies on a compact set of indicators and readily available survey tools. The tool also summarizes the survey output to create aggregate scores for the four key elements of the walking environment: street design, building design, land use (especially on the ground floor), and street network.

Indicator selection. A walking assessment tool must strike a balance between the level of detail and the ease of deployment on a widespread basis. To determine the most effective pedestrian mobility indicators, the World Bank weighed four factors:

- Importance for pedestrian mobility: The tool should rely on a compact set of indicators that have the largest impact on walkability.
- Difficulty of obtaining data: In order to scale the survey at the city level, the tool must rely on data that are easily captured
- Data reliability: The tool should capture accurate data.
- Data subjectivity: Results should be consistent across multiple surveyors.

Each factor is assigned a weight, based on the team's judgement. The results are then normalized to a 0 to 100 scale to determine the most and least useful data points. On this basis, a set of indicators was developed, comprised of those that could be collected efficiently and objectively but also would have the largest impact on walkability. These indicators are shown in Table 11.

Table 11. Pedestrian environment indicators

Area	Indicator
Street design	• **Sidewalk presence:** Presence of sidewalks with at least 2 m of clear space. • **Sidewalk condition:** Condition of the sidewalk surface. • **Ramps for grade changes:** Presence of kerb ramps with a slope of 1:12—needed to make the sidewalk accessible. • **Parking blocking sidewalk:** Frequency of cars parked on sidewalks. • **Vending blocking sidewalk:** Frequency of vendors blocking sidewalks. • **Street width:** Total public right-of-way. The street width is used to evaluate the need for median refuge islands. • **Shade:** Assessment of the amount of shade from trees and/or building arcades. • **Midblock crossings:** Count of the number mid-block crossings with traffic control (i.e., either signalisation or traffic calming). • **Midblock pedestrian refuges:** Count of the number of mid-block refuges where people can wait before crossing the second half of the street. • **Lighting:** Presence of night time lighting. • **Intersection crossings:** Count of the number legs of each intersection with traffic control (i.e., either signalisation or traffic calming). • **Intersection pedestrian refuges:** Count of the number of legs of each intersection where people can wait before crossing the second half of the street. • **Intersection kerb ramps for grade changes:** Presence of kerb ramps with a slope of 1:12 or pedestrian crossings raised to the level of adjacent footpaths—needed to make the intersection accessible.
Building design	• **Visually active frontages:** Transparent frontages comprising windows and doors. • **Permeability:** Building entrances directly along the street per m of block frontage.
Land use	• **Mixed-use development:** A mixture of land uses including residential, active, parking/industrial.
Network design	• **Block length:** The length of a block face.

Survey tool. The tool relies on two data collection methods: an on-site walking survey and a desk-based GIS analysis. In the walking survey, data is collected through observation of the existing environment. This is done through "Device Magic", a smartphone app that records the data as well as GPS location and the time of collection. Most data points described above are collected in this manner, except for street right-of-way and block length, which can be ascertained from satellite imagery sources, such as Google Earth, and mapping tools such as Open Street Maps. The elements were formulated to make the survey as objective as possible, facilitating consistent documentation of pedestrian environment features across multiple surveyors. The variables are simple to observe and record—enabling cities to enlist survey teams with minimal formal training.

The data from the app are automatically stored in a cloud-based spreadsheet format for fast and easy analysis.

The app has been designed to collect data quickly by aggregating response options to ranges. For example, the extent of active frontage along the block is described in 10 percent intervals. Some items have more aggregate ranges. For example, sidewalk coverage is collected in four bins: 0-10, 10-40, 40-70 and 70-100 percent coverage. Some of the more qualitative elements, such as lighting and sidewalk condition, are described using a series of multiple-choice options (good, moderate, poor, N/A), allowing fast data collection. Other items require counting and inputting numbers. These include the number of midblock crossings, the number of building entrances, and the number of locations a sidewalk is obstructed.

The data in the app are collected in two stages—a mid-block survey and an intersection survey—in order to avoid confusion between data that relates to an entire block and data relevant only to intersections. The mid-block survey collects data between intersections, including items such as the presence of sidewalks and the number of building entrances. The intersection survey collects data relevant to intersections, including the presence of crosswalks, intersection traffic control, and curb ramps.

As mentioned, to supplement the walking survey, many data pieces are collected remotely via various mapping tools. Total street right-of-way and carriageway width for example are collected by measuring aerial images from Google Earth or an equivalent mapping tool. Block lengths are determined using Open Street Map data, which contains street centerline files for the streets in each area surveyed. The street centerlines are imported into a Geographic Information System (GIS) program where they are broken into blocks. Using GIS, the user can measure the length of each block. From these data, the investigator can calculate factors such as the number of building entrances per meter of block face.

Analysis and scoring. To facilitate rapid interpretation of the final results, the tool develops final “scores” for the four categories that determine a walkable environment: street design, building design, land use, and street network. As shown in Table 12, each category involves assessment of several elements, each weighted for their effect on walkability within that category and normalized based on a maximum score of five. Various elements in a category are combined to form aggregate measures. An example of this is for obstructions, where vendors, parking, and other items which block the sidewalk, with a cumulative effect. In addition, the degree of mixed-use element was calculated on an area-wide basis using three factors: the percentage of residential uses, the percent of other active uses, and the percent of negative uses. These scores were combined to form the overall mixed-use score. From this analysis, each item contributes to an overall score for each category that influences walkability. These can then be plotted on a map on a block-by-block basis for each study area.

Table 12. Weighting for scoring elements.

Category	Element	Weight (%)
Land use	% residential uses	33*
	% active uses	33*
	% parking/industrial uses	33*
Street network	Block length	100
Building design	Active street & frontage	50
	Physically permeable frontage	50
Street design	Obstructions (including vendors, parking, and built obstructions)	20
	Sidewalk presence	35
	Sidewalk condition	15
	Lighting	10
	Shade	10
	Midblock crossings per 100 m	5
	Midblock pedestrian refuges	5

Note: *For land use, the scores for residential uses and active uses are averaged together. The percentage negative uses score is a deduction that is subtracted from the average score.

Implementation strategy. The methodology has been designed with future use in mind. The data collection can be performed on any smartphone with GPS capabilities and does not require an internet connection. The price of smartphones has dropped dramatically in recent years, making this an affordable means of data collection. The technology for using smartphones has also improved, reducing the risk of theft, as phone can be turned off remotely. The assessment tool can be deployed across any survey platform, using the JavaScript Object Notation (JSON) survey coding language. The tool can be deployed on a city-wide scale, allowing cities to provide a snapshot of pedestrian access across an urban area.

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