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Proximity is not access: A capabilities approach to understanding non-motorized transport vulnerability in African cities

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A paradigm shift regarding the fundamental premise of transport planning is underway. The objectives of shifting to accessibility-based planning includes changing the focus of transport planning practices from speed to access, from the system to the user, and from efficiency to equity. However, despite equity as a stated aim, many approaches to access planning fail to question an inequitable, often subconscious, belief at the core of transport planning: that proximity is access. But, for many groups of people in our society, proximity to public transport does not mean affordability, proximity to services does not mean disability-friendly, proximity to destinations does not mean personal safety; proximity is not the same as access. To explore this disjuncture between proximity and access for those vulnerable people groups, and what it means for transport planning, this study utilizes a less conventional conceptualization of access, one in terms of the capabilities approach. This framework, along with a series of semi-structured interviews, is used to better understand the nature and consequences of access deprivation on vulnerable young non-motorized transport users in three African cities, and its implications for transport planning practice. The research finds that, despite the theoretical access that the participants have, to amenities, services, employment opportunities and transport infrastructure, through proximity, their actual set of viable access options is constrained much further by factors outside of the remit of transport planning. The positivist nature of transport planning, and the reliance on quantitative data collection methods, hides the true cost burden of access deprivation for the most vulnerable transport users. The unseen cost burden being the trips that are not taken, the trips that cannot be taken despite the proximity of the destination, and the effect of those unrealized trips on a vulnerable person's freedom to access the opportunities that will improve their livelihood. Desire, intention, need, vulnerability, and capability are all vitally important characteristics of access that are largely invisible in current quantitative datasets, especially for those whose access is most fragile,

vulnerable non-motorized transport users. A “just transition” from mobility-based to access-based transport planning needs to incorporate a combination of mixed-method transport practices.

KEYWORDS

capabilities, NMT, accessibility, access, vulnerable, proximity, barriers

Introduction

Traditional, mobility-based, transport planning theory centers movement between two points in space as the primary objective for transport systems and the profession as a whole (Gutman and Tomer, 2016). However, movement through space usually provides little utility to the users of a transport system, and transport demand derives from the desire for a good, activity, or experience that is not available within proximity of the user; it is a “derived demand” (Balcombe et al., 2004). It is the access to the activity or opportunity that is actually desired; movement is just a facilitator of that access.

Despite the long history of accessibility and access-oriented planning in transport planning scholarship, similar progress in incorporating accessibility in transport planning practice has been slow and arduous (Handy, 2020). Nevertheless, there has been renewed interest in accessibility as a transport planning premise in recent years, both from scholars and practitioners (Gutman et al., 2017). In this paper, “access” is defined as the ability for a person to engage with a good, service, person, or place; and “accessibility” is defined as the degree to which goods, services, people, or places can be accessed. Handy (2020), in their recent article aptly titled “*Is accessibility an idea whose time has finally come?*”, argues that this next step in the evolution of transport planning is being driven by a combination of forces, including the failure of the mobility-based paradigm to achieve its outcomes, the increasing financial constraints on transport authorities, and the contribution of car-dependency to climate change. COVID-19 then upended the mobility paradigm altogether by constraining movement during lockdowns, rendering public transport a health risk, and shifting access provision heavily toward Non-Motorized Transport (NMT), land use, and digital services (UN-Habitat, 2020; WHO, 2020). Accessibility’s time may have finally come, but will this be a just transition? Or will the mobility paradigm carry across some of its inequity to accessibility? And what does that mean for the African context? A context with both inequitable and inadequate access.

The risk of an unjust transition to access-based transport planning presents itself when examining a belief at the core of transport planning, that *proximity is access*. Proximity, in this paper, refers specifically to the physical closeness of something in the built environment, by geographic or route distance,

and is not a normative judgment as to the characteristics of that built environment (e.g., walkability). This belief, or subconscious assumption, can be seen in the gravity-based transport models we use, the SDG 11.2 indicator we measure (proportion of population within a certain distance of public transport) (Klopp and Petretta, 2017; Brussel et al., 2019), and the 15-min city concept we champion (access all needs within a 15-min radius) (Pajares et al., 2021), all of which rely on proximity, physical closeness, as a proxy for access. However, for many vulnerable groups in our society, for those who experience disadvantages due to inherently discriminatory practices in design and policy, for those whose access is inequitably limited by socio-demographic or socio-economic characteristics, proximity is *not* access. Proximity to public transport does not mean affordability, proximity to services does not mean disability-friendly, proximity to destinations does not mean road safety (Kaufmann, 2002; Cass et al., 2005; Lucas, 2012; Klopp and Petretta, 2017). The shift to access-based planning offers unique opportunities to change the focus of transport planning practices from speed to access, from the system to the user, and from network efficiency to outcome equality (Verlinghieri and Schwanen, 2020). However, this opportunity will be lost if access-based planning rests on similar inequitable assumptions or beliefs to those that have supported many mobility planning principles, like *proximity is access*.

Nowhere is the disjuncture between proximity and access felt more viscerally, or with more dire consequences, than by vulnerable people that depend on NMT on the African continent (Alando, 2017). Despite NMT users making up the majority in most African cities, the needs of vulnerable NMT users have been inadequately represented through current transport planning paradigms and have not received commensurate investment to meet those needs (Mitullah et al., 2017). This study aims to explore the intersection between mobility, proximity, and access in order to better understand the experiences of vulnerable NMT users in African cities, and to open the debate on this element of a “just transition” in transport planning practice on the African continent. The study does this by reconceptualizing access and travel behavior through Sen’s (1979) capabilities approach as a means of interrogating underlying transport planning assumptions and illuminating travel experiences that are somewhat invisible to conventional transport data collection techniques. The research question,

therefore, can be distilled down to: *Is the capabilities approach a viable way for African cities to explore the proximity/access disjuncture for their vulnerable NMT groups, and what would that mean for their transport planning policy and practice?* The study investigates this lens on access and justice through the lived experiences of vulnerable NMT users in Lusaka, Zambia; Cape Town, South Africa; and Kigali, Rwanda. In turn, this paper reflects on the importance of the capabilities approach in being able to make the true cost of access deprivation visible to transport planners in African cities and offers recommendations for achieving a just transition to access-based planning for African NMT users, and other vulnerable user groups.

Access, proximity, and capability

Uneven access, and the related conceptions of justice in transport, have enjoyed a surge of interest among transport scholars in the 2000s, as the access paradigm rose to contest traditional, mobility-based, transport planning theory (Verlinghieri and Schwanen, 2020). There has also been a significant rise in interest around uneven mobilities, from the scale of the individual, such as the work on “motility” (Kaufmann, 2002) or the capacity to be mobile, to the scale of nation-states, and the mobility of international tourism or migration Sheller (2018). While the spatial scales of mobility and access are intrinsically linked, the focus of this study is the relationship between proximity and access for vulnerable NMT users in African cities, and the implications for the transition to access-based planning.

Much of the work on uneven access, or achieving “transport justice,” has focused on the equitable distribution of access in the aggregate, in particular, the Walzerian framing of justice by Martens (2012) and the Rawlsian framing of justice by Geurs and van Wee (2004). The conceptualization of justice by Martens (2012) as a framework for transport investment based on the notion of an equitable distribution of access is a notable milestone in this approach. This approach focuses on the strategic allocation of transport investments and programmes to target transport justice by maximizing the average access that everyone enjoys while ensuring a “sufficient minimum” level of access for the most disadvantaged groups of users (Golub and Martens, 2014). Conversely, the Rawlsian approach, such as the Rawlsian difference principle, aims to maximize the access of the most disadvantaged user groups, those with the least access (Pereira et al., 2017). Both approaches have been used effectively for access modeling purposes, and the analysis of existing transport service provision, but they have also, historically, relied on quantitative methods of data collection and analysis, as well as the conventional transport modeling principles that underpin the assumptions related to proximity being interchangeable with access. Similarly, their focus on access equity or (re)distribution, in the aggregate, limits their

engagement with the contextual factors and systemic processes that constrain the access of disadvantaged people: the conditions that disadvantage them (Verlinghieri and Schwanen, 2020). Hence, the focus on justice in the transition to access-based planning risks.

However, the “new mobilities” paradigm (Urry, 2000) and the capabilities approach have delved much deeper into the role of access in our lives and how transport planning as a practice would need to change at a fundamental level, in order to address access-related inequity. The new mobilities paradigm forefronted the extent to which access, in all its forms, can determine the extent to which one has full membership to a society, the degree of citizenship that a person has available, and begins to conceptualize mobility through the lens of human rights (Cass et al., 2005). Alando (2017) produced a seminal work for using this approach to analyze African NMT in his dissertation on cycling in Kisumu, Kenya. The study found that cyclists are actively excluded from the street space, and from partaking in livelihood improvement activities, through the hostile traffic and environmental conditions, which are reinforced by neoliberal transport planning priorities and policies. The study highlights that present transport planning tools are inadequate at revealing, measuring, or analyzing access deprivation among NMT users, and identifies the problematic assumption that building roads is sufficient to meet the mobility or access needs in the city. Alando (2017) advocates for new transport data collection techniques that include the currently “invisible” travel demand for walking and cycling, and the wider adoption of the tenets of inclusion in transport project evaluation. These recommendations illustrate the systemic access inequity and deprivation within which the assumption that “proximity equals access” can create such detrimental consequences. Alando (2017) also offers a wider critique of modernist planning, and its contrasting objectives to those of access, but stops short of questioning the assumptions that this paradigm is built on.

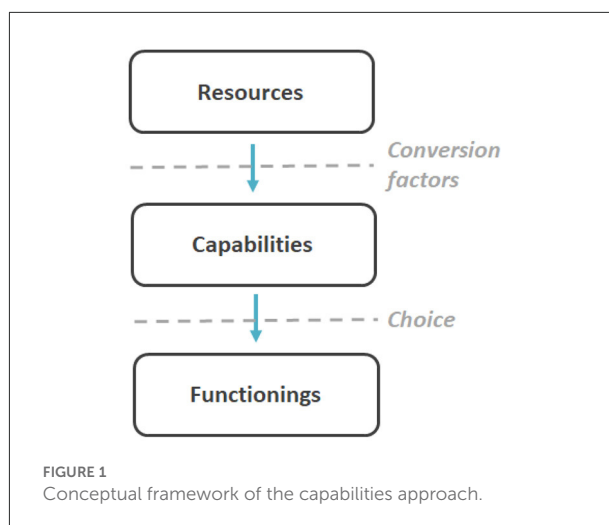
Of the reviewed approaches to transport justice and access inequity, the Capabilities Approach (CA) was chosen to explore the notion that proximity is not access for vulnerable transport user groups as it actively questions the spatial assumptions of access by reforming them around the aspatial concept of capabilities. CA was first developed by Amartya Sen and emphasizes the importance of expanding what people are capable of choosing to be and do (Sen, 1979). This is opposed to the more common, egalitarian approach in mobility where the emphasis is on the equality of transport supply. Verlinghieri and Schwanen (2020, P.2) highlight this distinction; that “having access to a bus, a bike, or a healthcare centers is not particularly helpful if you don’t know how to read a timetable, don’t cycle because you feel it is too unsafe, or can’t negotiate the stairs or ramp at the entrance of the clinic.” The capabilities approach questions whether a “resource,”

in the abstract, is necessarily enabling for a person in a particular situation.

There have been previous studies in which CA has been applied in transport to understand broad social equity issues (Mella Lira, 2019), but mostly, it has been utilized as a conceptual framing for access equity or access evaluation in the aggregate (see Beyazit, 2011; Hananel and Berechman, 2016; Martens, 2017). Nordbakke (2013) and Ryan et al. (2016) have used focus groups in Norway and Sweden, respectively, to assess the mobility and access capabilities of elderly populations through understanding individual and contextual characteristics that act as facilitators or barriers to mobility. Nordbakke (2013) focused on opportunities for mobility as subject to both the resources an individual holds, and the opportunities and constraints that lead to the contextual conditions for action. In Cao et al.'s (2019) study of a low-income neighborhood in Beijing, transport-related social inequity was assessed as a measure of the difference between actual and desired mobility looking at various factors that acted as barriers due to socio-economic disparities. However, the focus of the study was on access to motorized means of transport. Applied to non-motorized mobility, according to Blečić et al. (2015), the freedom of pedestrian movement extends beyond whether reaching a place on foot is physically possible. The emphasis in assessing the discrepancy between realized and desired mobility is shifted to the quality of the environment making that activity possible. It is not enough to know that a person can access a destination on foot, but what is important are the qualities of the route, e.g., security, cleanliness, and dedicated pathways. In this regard, measurements of walkability have been created to assess freedom of pedestrian movement given environmental qualities (e.g., Reid, 2008; Blečić et al., 2015). The focus of measuring of NMT capability continues to be in terms of the obstacles to pedestrian movement (Blečić et al., 2015), including in African contexts (Sietchiping et al., 2012; Oyeyemi et al., 2013; Anciaes et al., 2017), instead of questioning the transport planning assumptions that have produced that environment. Furthermore, CA itself has yet to be utilized to investigate NMT in African cities for any purpose (Anand, 2018).

Conceptualizing the travel behavior, access, and capabilities of vulnerable NMT users

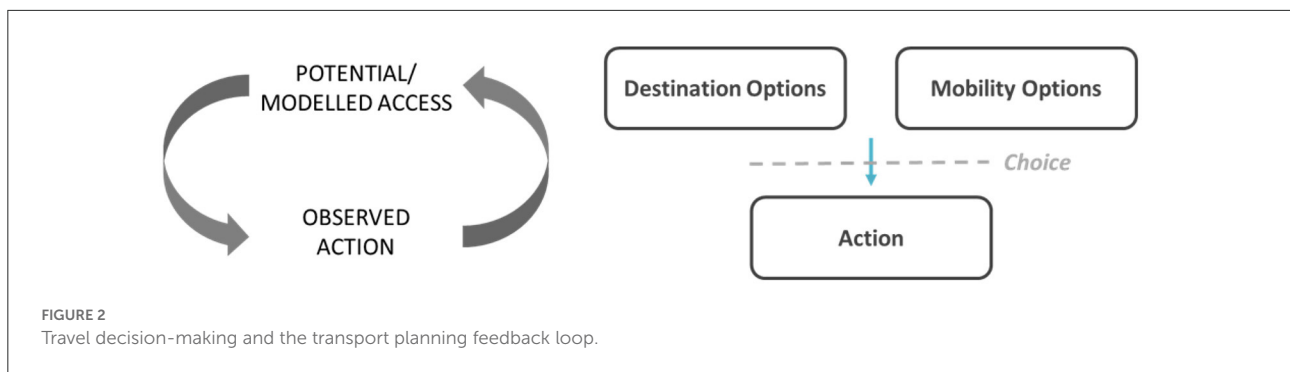
If the objective is to understand how to create more accessible cities for everyone, including NMT users, then it is important to first understand users' diverse needs. Accessibility is often measured and evaluated from the perspective of what activities and opportunities someone engages in Levinson and King (2020); however, various environmental, social, and physical factors may impede access differently depending on the person. Rather than focusing on what NMT users



do and achieve, it is important to consider from what set of opportunities an individual is choosing from, and what opportunities they want to achieve, as these differ significantly between users. This idea of focusing on a person's set of viable opportunities, rather than the goods and services that are theoretically available to them, or what choices they end up making, is a key principle behind Amartya Sen's capability approach (Sen, 1992; Hananel and Berechman, 2016).

According to Sen, obstacles should be removed so that people have more freedom to live the kind of life that they have reason to value (Robeyns, 2005). The term "capabilities" refers to the collective set of options a person is free to choose from, given available resources. "Functionings" is a subset of these capabilities—the capabilities that are realized, the ones that people have chosen to enact (Sen, 1992). "Resources" are the goods and services that are theoretically available, from which people can derive their capabilities. However, whether an individual can convert these resources into capabilities is dependent on conversion factors (Sen, 1999). An individual's conversion factors can be personal, social, economic, and environmental in nature. Even a sidewalk, benches to rest on, or an inclined grade are conversion factors that determine whether an elderly individual is able to make use of walking as a mobility means to achieve desired outcomes.

Figure 1 illustrates that there is then a second filter between capabilities and actions (functionings), choice, and it is just as important as conversion factors. People with identical capability sets can choose to pursue very different types and levels of actions, as they make different choices, following their different ideas of the life they desire to achieve. This notion that the action of partaking in a behavior or activity is not the same as actively choosing to partake in that behavior or activity is key to understanding the capabilities approach, as well as the disjuncture between proximity and access. Sen (1999) stresses that it is important not to limit what life options people



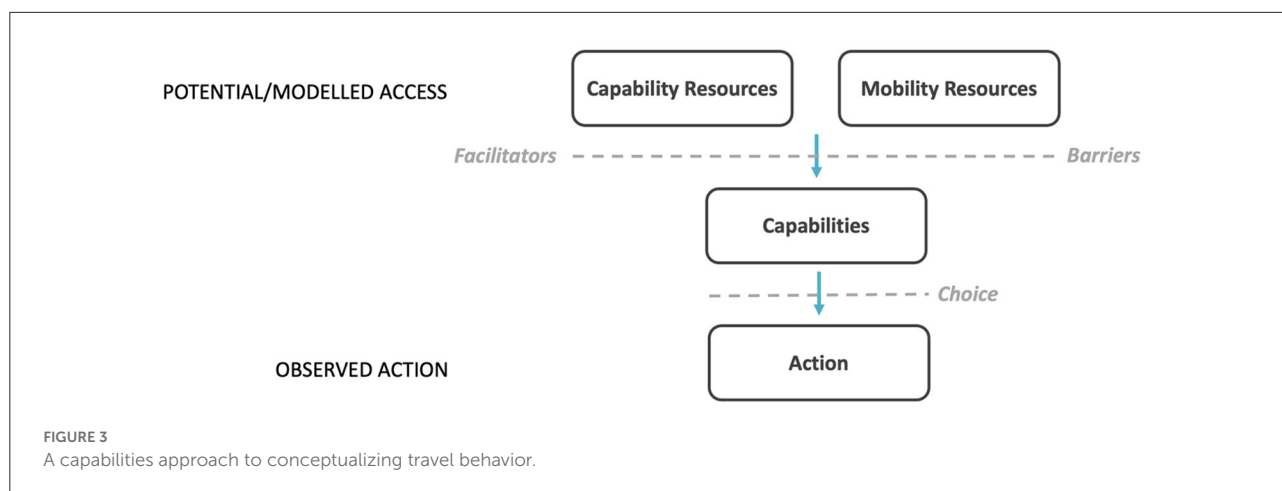
choose to pursue. Resources should be provided by taking into consideration the wide variation in individuals' conversion factors in order to enable an equal set of capabilities. While Sen (2004) argues that a predetermined list of universal capabilities that is relevant to all situations is not feasible, Nussbaum (2003) advocates for a list of ten categories of capabilities individuals should have access to and argues that without such a list, any capability could be argued to be valuable. To avoid presupposing individuals' choices and the opportunities they may have reason to value, many studies focus on actions (functionings) as a proxy for capabilities (Kleine, 2013). This flawed practice of equating the observation of action with capabilities or desires is the genesis of the problems that come from equating proximity and access in transport planning practice, that vulnerable users experience. To utilize the capabilities approach to explore this issue, a similar conceptual framework is needed for the travel decisions that users make, in terms of capabilities.

Figure 2 illustrates a simplified framework of travel decision-making, wherein there are destination options that have resources that individuals desire, as well as the mobility options that individuals can consider to reach them, before making a choice, and translating decision into action. While this simplified framework omits the nuances of human decision-making, it reflects the conceptualization of decision-making that exists in the transport models that inform transport planning. The first step in the traditional travel demand model analyses people's desires to engage in activities elsewhere, as well as lists the various destination options across a city and estimates the number of people that may be attracted to each of them: trip generation. The second step estimates which people are likely to choose which destinations: trip distribution. The third step estimates which people are likely to choose which mobility option: modal split. The final step estimates which route the person will take to get to the chosen destination using the chosen mode. The model is calibrated by measuring actions in the real world, travel data, and iterating back-and-forth until the result is a good approximation of travel choice. A key assumption in this framing of travel behavior is that each person is capable of choosing any destination, mobility, or

route option. The capabilities approach questions the validity of that assumption.

Figure 3 applies the capabilities conceptual framework to represent how barriers and facilitators (conversion factors), in reality, reduce the travel options available to an individual. Firstly, when people travel to a destination, it is conventionally because they desire to access a resource. Hence, it is not the physical destination itself that matters, but the resource they need, which will allow them to be capable of something they desire (Verlinghieri and Schwanen, 2020). For example, a person's place of employment is an important destination for them to access because it provides them the capability to be employed, to earn a salary, to work with colleagues, etc. The place of employment can be thought of as a resource that people access to fulfill a desired capability, hence we have denoted destinations as capability resources. Beyond employment, capability resources represent the various activities a person may want to partake in, or places a person may want to visit, such as going to health clinics, socializing at a party, or attending a class. Similarly, mobility resources represent all of the mobility-based options available for a person to physically access a capability resource, such as a bus, a bicycle or even a sidewalk.

Unlike the theoretical accessibility that transport models assume is available to everyone, the set of capabilities available are unique to an individual or group and reflects the true collection of options available to choose from. That is, the conventional data sets do not help a planner differentiate between a user that does not desire to utilize a resource, and therefore choosing not to access it, and a user not being able to access a resource that they may want to use. For example, a person that desires an education but is prevented from getting one, and a person that is uninterested in schooling, can look identical in terms of access using data collection methods that rely on observed action. Understanding the effect of these conversion factors as barriers to capabilities is very difficult in transport planning because the "capability" step in the process is missing. In traditional transport data collection methods, two cases may look very similar as the measured actions are of similar



type and magnitude. Hence, there remains a troubling amount of uncertainty between the theoretical, or modeled, access that a user has, and the data on trips that is used to infer access needs. The capabilities approach helps break down access into an understanding of the link between resources and the capabilities these resources afford, and shifts the focus from revealed actions to the unobserved differences in capabilities between different individuals and groups. This study attempts to test the value of this capability framing of access in three African cities as a framework for qualitative data collection, specifically, and as a guide for transport planning practice more broadly.

Research design

Study context

In South African, Rwandan, and Zambian cities, the needs of vulnerable NMT groups have not been prioritized in planning policies and practices, and are not systematically invested in. Multiple agencies within the United Nations, and external partners, are collaborating to support these three countries, among others, in redesigning their systems of investing, approving, and building of transport infrastructure to ensure that they are inclusive of the needs of vulnerable NMT users. This study aimed to provide a pragmatic theoretical framework that government stakeholders and planning practitioners could utilize to better understand the mobility and access needs amongst vulnerable NMT groups in different African cities, and a vocabulary to aid in the inclusive design of access system interventions.

Data collection

To explore the access of vulnerable NMT users, a qualitative research study was designed, embedded within the conceptual

framework of the capabilities approach in three African cities: Cape Town, South Africa; Lusaka, Zambia; and Kigali, Rwanda. Individual face-to-face interviews were conducted using semi-structured questions with participants representing young NMT users, between 18 and 23 years old, who do not have access to motorized forms of transport. Snowball sampling was used to select respondents, and interviewing continued until saturation was achieved, i.e., additional interviews lent no new insight to the research objectives. Across Kigali, Lusaka, and Cape Town, 96 respondents were interviewed, with a minimum of 30 respondents per city, and a female/male split of 45% female and 55% male respondents. The majority of respondents predominantly relied on walking as their main form of transport, though one-fifth of the respondents in Kigali relied on bicycles. The interviews in Lusaka, Zambia, and Kigali, Rwanda were conducted between October and November 2020, and between March and April 2021 in Cape Town. The timing of the interviews was determined by local COVID-19 rules and protocols. For Lusaka, youth participants were selected from the low-income settlements of George, Kanyama, and Matero. The identification of the participants was assisted by People's Process on Housing and Poverty in Zambia (PPHPZ)—the Slum Dwellers International Alliance in Zambia. In Kigali, the interview participants were youth university students and high school graduates, who came from different locations across the metropolitan area. In Cape Town, participants were sampled from Philippi, a low-income settlement, with the help of the Philippi Village Community Center.

The interview questionnaire was structured to first ease the participant into the interview topic through asking questions about their regular travel behavior. Then the questionnaire transitioned to several questions focusing on various barriers and facilitators that can mediate that regular travel behavior. These included hypothetical questions around access in a scenario where heavy rains prevent the use of the respondent's normal route of travel, as well as experiential questions around

instances when the respondent was not able to partake in an activity because of mobility-imposed limitations. From here, the interview questions segued to a focus on the capability resources for which an individual values access highly, but has been unable to access due to spatial and aspatial barriers. Questions were phrased as simply as possible, to be easily translated and communicated to non-English speakers, and respondents of varying educational backgrounds. Respondents were pre-screened to ensure they met the population sample requirements and given a brief overview of the study purpose. Responses were recorded aurally. Key words were organized by response for each interview question to get a comprehensive set of responses rather than a ranked set or other sort of prioritized list of responses, since we only interviewed until saturation for the purposes of testing the application of CA as a guiding framework, and not to gain a statistically representative sample of respondents. Recorded interviews were translated, transcribed, and analyzed using thematic analysis. Key words were organized by key CA components (e.g., conversion factor: barrier/facilitator) to understand commonalities in individuals' abilities to access capability resources through NMT, and how conversion factors differed amongst them, as well as between the three cities. This comprehensive set of responses to the interview questionnaire helped reveal a broader set of patterns and themes related to capabilities, conversion factors, and NMT travel means for low-income youth across the city, and between cities. A similar method was used by Vecchio (2020), in their study of microstories as a tool for bringing the capabilities approach into urban mobility planning in Bogotá, Colombia.

The value in using the capability approach is that it goes beyond investigating actions, to understanding how capabilities (e.g., trips taken and trips that could have been taken) vary between different people based on their own unique circumstances. By this nature, the full capability set includes both realities and hypothetical alternative futures. Preliminary tests of the question set among youth respondents highlighted that these hypothetical questions needed to be framed with as little complexity as possible. Hence, to address this issue, without losing the value of the capabilities approach, questions needed to bring an element of reality (e.g., a rainstorm) around which the respondent would be able to think hypothetically about a future that was not able to materialize.

The complex experiences of vulnerable non-motorized transport users in three African cities

Though the study commenced with an emphasis on conversion factors and their intersection with personal vulnerability, the capabilities approach revealed that the unrealized, but desired, capabilities are critical to understanding the effect of these barriers to access. While the experiences

of vulnerable NMT users were unique to each of the three cities, some patterns emerged that are representative of the conversation African cities need to be having around our transport planning assumptions. Through the interviews, the complexity and opaqueness of the relationship between physical proximity and access began to reveal itself. Under normal circumstances, proximity to a routine capability resource, such as place of work, by foot or bicycle may very well be the same as the access to engage in that resource. However, when those routine conditions are disrupted, proximity is partially or entirely thwarted by conversion factors that negate access, bringing into question both the robustness of that access and the robustness of the assumption that they can be equated. In the sections below, there is a discussion of the four most significant factors, often interlinked, that affected the proximity-based access of our vulnerable respondents in the different cities, which were: physical accessibility (land use and NMT infrastructure); affordability (of public transport); personal safety (crime and road safety); and social norms (the stigma of NMT). Each of these barriers or facilitators of access also have unique relationships with physical space and the concept of proximity for different vulnerable users or user groups. These four factors are not representative, nor generalizable, they are merely illustrative of the type of data and the type of conversations that can be garnered through the use of capabilities as a framework for transport data collection, and as a framing for access and the disjunctures therein.

Cape Town, South Africa

South African cities went through a period of intense urbanization after the advent of democracy in 1994 and the abolition of apartheid restrictions on the freedom of movement. This period saw a strong trend toward suburbanization amongst higher income, white population groups around existing economic nodes and vast low-income, non-white settlements developing on the cheaper land at the urban periphery. This trend, coupled with the apartheid legacy of forced relocation, has exacerbated the spatial dislocation of the majority of residents from the available opportunities and services in the historic economic nodes (Visser, 2001). Access to resources is largely dependent on mobility. People who cannot afford public transportation or who live in areas where public transportation is unavailable or limited are constrained to walking long distances to reach their destinations. In Cape Town, the NMT environment is generally considered to be of a low quality of service, with much worse quality in lower income neighborhoods. This is generally due to inadequate infrastructure planning, a lack of an integrated design strategy, and challenges with public space operation (City of Cape Town, 2018).

Lusaka, Zambia

While the city's population is growing at a rate of 4.8%, Lusaka has a poorly developed transport system and the predominant means of getting around in the city is on foot (Taylor et al., 2021). The informal settlements are scattered in all regions (inner city to periphery) while new formal settlements are rapidly growing at the urban fringe. While the socio-economic relationship between the formal and informal settlements is very strong (labor, market, commerce), the transport link between these two forms of urban settlements in Lusaka is poor, making NMT the predominant form of mobility (Taylor et al., 2021). Despite the central role of NMT in Lusaka, many streets lack proper footpaths and the requisite services to make walking safe and secure.

Kigali, Rwanda

The City of Kigali has seen rapid growth for the last two and half decades, and is among the fastest growing cities in Africa, with a population of ~1.5 million and an annual urbanization growth rate of 4% (Republic of Rwanda, 2015; City of Kigali, 2020). A significant impact of demographic pressure on the city is the development of low-density neighborhoods on the city's outskirts, leading to urban sprawl, ignoring topographic constraints, and creating new scattered settlements in places where subsistence agriculture is practiced. This has resulted in the spatial dislocation of the majority of new residents in the city from accessing the available opportunities and services. Low urban densities and increasing commuting distance tend to go together with a high level of reliance on private motor cars and a lower usage of non-motorized transport and public transport, but that is not an option for the majority, low-income residents (City of Kigali, 2020).

Physical accessibility

A prominent theme that arose across Kigali and Lusaka, but less so in Cape Town, was that the physical properties of the built environment acted as significant barriers to capability resources, systematically challenging the conflation of proximity and access. In Kigali, major urban developments are primarily found in the valleys, and the surrounding slopes are steep, with most roads traversing along contours to ascend the hills. The hilly terrain of the city has historically been a challenge to develop and distribute capability resources equitably, as well as to implement a comprehensive and continuous NMT network to link these resources (City of Kigali, 2020). Respondents described the difficulty of traversing these ridges and valleys to access basic capability resources, such as medical services, especially for those

who were sick or had physical impairments. The topography was regularly noted as a barrier for vulnerable NMT users to access the capability resources required to improve their livelihoods and has aggravated the access inequality.

In addition to the maneuverability challenges that physical conversion factors present, physical factors can also present emotional and social barriers, limiting the viability of NMT as a mobility resource to access capability resources. In Lusaka, despite the dominance of walking as the main mode of transport, the city lacks basic NMT infrastructure and services, such as paved walkways, cycle paths, bus shelters, and street benches, especially in informal settlements and informal trading areas (Chomba et al., 2017). The vulnerable users described how this lack of provision for NMT has made walking highly risky, and unattractive for the majority of their communities. The respondents narrated emotional encounters with vehicles, the dangerous accident scenes, and the dirty or dusty walking environments that people who are forced to walk as a primary means of getting around have to deal with every day.

“When walking, I easily get tired, and it is stressful. When I get home, I have to help out at home. That makes it hard for me to even study and do my homework. I get tired and can't even study due to the long distances I cover on foot every day.”

Personal Interview, Youth respondent, Kigali, Rwanda

Moreover, the hypothetical question posed around access to capability resources under adverse weather conditions revealed that the capabilities individuals are able to realize are highly vulnerable, and can be substantially limited by minute changes in conversion factors. Particularly in the informal settlements in Lusaka, a lack of drainage, or poor-quality drainage, was described as a major problem. The young respondents chose to settle in the informal areas near the city center, such as Kanyama, because of the proximity *via* NMT to work and business opportunities, but across the African continent these well-located informal settlements have tended to be in flood-prone areas that are particularly vulnerable to climate change, as they are the few places not desired by formal developers (Vermeiren et al., 2012). In most cases, the lack of adequate NMT infrastructure under adverse weather conditions made routine routes unnavigable. Alternative routes present access options, but because of the heightened role that personal safety and security play as conversion factors in enabling the routine routes, and eliminating the alternative routes, non-routine access options remain largely constrained. As a result, respondents reported missing out on opportunities for jobs, education, business, and social recreation as a result of disruption to routine access routes or resources, illustrating that their proximity to the city center has not provided adequate or resilient access options for many of these informal settlement dwellers. It demonstrates a systemic risk around the assumption

that proximity is access for areas without climate and weather hazard resilient NMT infrastructure, which is the case for most African cities. Climate change hazards and inadequate adaptation could exacerbate the disjuncture between proximity and access for vulnerable people groups in the coming years.

Affordability

Where physical factors presented themselves as barriers to alternative NMT routes in accessing capability resources, affordability constrained public transport options from becoming viable alternative mobility resources in all three cities. In Kigali, the rapid urban expansion away from the city centers, in search of affordable land, has created higher commuting costs for the residents and a higher cost for the city to supply new infrastructure. Respondents claimed that these additional costs are transferred to the consumers, who are, mainly, the low-income communities. Consequently, the disparity between cost-of-provision and ability-to-pay leads to a very limited supply of capability resources on the outskirts of the city, close to the vulnerable residents. Even where the capability resources are provided in proximity to vulnerable residential communities, the respondents that do have access to them referenced affordability issues stemming from the high demand in outlying areas, which further entrenches their access segregation and inequality. In Lusaka, the interviews indicated that those who walk or cycle to their daily activities do so primarily because of a lack of affordable alternatives. Affordability is such a significant barrier in the city that some respondents would even prefer not to travel rather than have to use their bicycle, as the associated maintenance or physical exertion requirements could be cost-prohibitive, despite its speed and access advantages over walking.

In Cape Town, respondents similarly pointed to affordability as a barrier to accessing motorized means of transport, and instead opting for NMT on monetary grounds. However, this came at a time cost, where respondents would need to walk long distances to access capability resources with the trade-off being a lack of time for other activities, like schoolwork. The apartheid legacy in Cape Town of forced relocation of working-class families from older, better located neighborhoods has exacerbated the spatial dislocation of the majority of residents from the available opportunities and services in the historic economic nodes (Visser, 2001). In 2016, the City of Cape Town proposed Transit-Oriented Development (TOD) as a viable approach to address accessibility concerns, with TOD being a mutually beneficial combination of capability and mobility resources. However, despite the concept of TOD being dependent on the principles of NMT prioritization and access to those resources, associated NMT infrastructure has not received commensurate attention and funding within the TOD paradigm (City of Cape Town, 2018). The proliferation of the assumption

that proximity is equal to access has resulted in a paradox for the TOD policy. The respondents noted that the lack of facilitating conversion factors, such as dedicated NMT infrastructure, to enable access to potential TOD nodes has reduced their appeal as a destination to access capability resources, leading to little development of services or opportunities, and an insignificant effect on transport or access affordability.

Personal safety

Personal safety and security arose as a real, and a perceived, barrier to NMT use, interlinked with physical factors that determine whether the walking environment takes on an enabling or limiting effect, and the safety concerns are exacerbated by affordability challenges that leaves individuals with no other option apart from NMT. Personal safety while walking or cycling was a shared concern between both male and female respondents across the three cities. While in Kigali, personal safety was primarily related to road safety concerns, and thereby intertwined with physical conversion factors. In Cape Town and Lusaka, the fear of crime and violence was prevalent, and the participants shared that their choice of walking or cycling route was largely dependent on the likely occurrence of a crime, even if this meant taking the longest route. In Cape Town, the fear of violence, and its effects on access, were multifaceted. The territoriality of the gang culture in the city was highlighted as a significant access risk. It mattered far less to the participants where the location of a capability or mobility resource was physically, and far more for where it was territorially. The young male respondents especially, noted that crossing the road next to their dwelling could result in grievous injury or death depending on whether that was a border for a neighboring gang. An unexpected barrier to access that the respondents noted was the regular protests, strikes, and civil unrest in their neighborhoods. Because of the potential for violence and the extended time period that protests or civil unrest can persist for, many respondents preferred to stay at home, eventually refusing to engage in any activity for a lengthy period of time.

In Lusaka, drug-related crime and violence was interwoven into almost every account of travel decision making for the respondents. Walking was described by as “unsafe,” “risky,” and “dangerous,” especially if walking is not done in a group. They highlighted that the risk of being attacked when walking at night is so high that they rarely leave their houses or informal dwellings after dark. The threat of the “junkies” (drug users) was exacerbated by inadequate street lighting and a lack of public safety infrastructure, or services, such as visible policing. Hence, walking in the early mornings and evenings was deemed to be too risky, with most vulnerable users avoiding travel during those hours entirely. This has become a significant threat to many of the female respondents’ informal retail businesses as they are expected to receive their retail stock early in the

morning at the depot. The female respondents noted that despite living nearby, access to the depot is unviable in the early morning, meaning that their male counterparts get access to the best stock to sell each day. The female users also reported that the threat of sexual assault was the most prominent factor in their travel behavior choices.

“My brother was robbed on the way to work. He was walking to the taxi rank when a construction worker on a bicycle stopped him and asked him for his phone.”

Personal Interview, Youth respondent, Cape Town, South Africa

Social norms

Social norms presented soft barriers to access. In Lusaka and Kigali, exposure to dust and heat resulted in unfavorable conditions for the respondents, who would arrive at their destinations “sweaty” and “dirty.” This made it difficult to attend more formal events, like weddings, where there were expectations around cleanliness. This fed into the image that walking is a “poor man’s” mode of transport, which contributed to the social stigma around it in the two cities and further diminished users’ access to opportunities for livelihood improvement. For example, our respondents described how security guards in public offices often disrespect NMT users, barring their access to services during specific periods of the day. The respondents revealed that even the security guards at the university entrance do not treat people who come on foot the same way as people who come with private cars.

Many trips, to a range of different activities, never happened due to the limitations of the current NMT environment. Respondents missed out on seeing friends and family, accessing necessary services at local authorities, attending book launch events, attending peer group meetings, participating in sport activities, visiting family relatives, and going to hospital, among other life-fulfilling experiences, just due to the social stigma of arriving in an unclean state after walking on unpaved roads or up a steep hill. Participants further indicated that attending ceremonies by use of NMT, one feels ashamed because of sweating and people would think they are coming from a sporting activity. For female respondents, verbal or sexual harassment, and multiple forms of bullying, meant that they would rather take a longer route to avoid main roads and major transport interchanges.

Sweat, dirt, and gender norms are not problems inherently tied to the lack of capability or mobility resources, but rather social constructs and stigmas that prevent individuals from realizing their full capabilities. Female respondents in all three cities stated that the negative social norms or stigma affects their status in the community and reduces their interest in the

use of NMT. In addition, the women were of the strongly held belief that cycling can lead to the loss of their virginity, hence, some households tended to discourage young women from cycling. This negative perception was widely held by the female respondents in Lusaka who categorically stated that cycling is not an option, they would rather walk. These soft barriers to access are often invisible to most conventional transport data collection and analysis methods, as well as to the traditional assumptions around proximity and access in the transport plans.

Reflecting on the capabilities approach, access, and vulnerability

This study has explored how qualitative data collection methods, guided by a capabilities framework, can provide insights into how the various less-visible conversion factors affect vulnerable NMT users’ access to resources, the limitation of their capabilities, and the resultant impact on their personal development. The interviews show that these challenges limit respondents’ capabilities in complex and intersectional ways. All respondents argued that they had to limit their travel activities for various non-spatial reasons, and this limits their potential to grow and live a full life. The major reflection by respondents is that before starting off for a trip, no matter how short, or deciding on a particular route, one needs to deeply analyze the feasibility of the trip in terms of the personal safety, weather hazards, environmental hazards, energy levels, and social stigma. The lack of resilience for the limited access experienced by vulnerable NMT users in the three cities negatively contributes to their access deprivation and limits their socio-economic progress. Consequently, this results in decreased social cohesion among the urban community, as NMT users fail to meet their day-to-day basic needs because of the vulnerability imposed on them by the current access system and the assumptions that underpin it.

The analysis of desired and realized trips to access essential capability resources and opportunities provided an important lens to understand the disjuncture between assumed human potential and the level of realization that is realistically available. For the realized trips, the case studies have shown that access to urban livelihood systems is based on the means to reach the location of these spatially dispersed opportunities, and that access to physical locations is mediated far more by non-spatial factors than our assumptions acknowledge. Hence, the cases illustrate the value of utilizing a capability framework to understand the role of mobility and access in contributing to inequalities and persistent urban poverty. The data from the three cities shows that the majority of the respondents had to regularly abort trips due to various factors that were beyond their control, lowering the potential of individuals to access, build, and grow their survival systems and networks. Thus, these case studies highlight that the continued assumption

that “proximity is the same as access” inherent in many of our transport planning practices, and the lack of investment in NMT as a viable means of linking urban populations to their networks of opportunity, violates core rights of vulnerable urban populations. The unrealized trips can be interpreted as unrealized human potential and thus, a driver of urban inequality in places where the urban poor typically live and work. This transport injustice, where the ability to realize capabilities is based more on the non-transport circumstances that create vulnerability for certain user groups than on the spatial proximity to resources or mobility options available to them, drives deep inequality in African cities and could be described as a “systemic violence” within their transport sectors. From the perspective of the respondents, these cities work for those who have the capability of unrestricted movement, while for the systemically immobile such as them, the cities are a social mosaic of inequality and disempowerment.

Through the process of this research, our focus has shifted in response to the experiences being shared by the participants. Early in the research, we were hoping to use the capabilities framing to identify inclusive access proposals for the implementation of NMT interventions, but the challenges are too complex to come to such conclusions from our limited research activities. Instead, we have focused on the use of the capabilities approach to question the assumptions in our current transport planning practices, to allow vulnerable NMT users a tool to share their stories, to help planners understand and assess the cost that access deprivation takes on the lives of the vulnerable, as well as to advocate for targeted intervention to expand their capabilities. The emotional, physical, and financial costs of the trips not taken, the trips that could not be taken, is far higher than we as transport planners want to admit. The stories that our generous participants have shared of missing the funerals of loved ones, of missing employment opportunities, of missing exams, or of missing their friends and family, just because they are vulnerable, and NMT-dependent, is both heart-breaking and hopeful. Hopeful because the capabilities approach sheds light on the immense opportunity to create value for vulnerable users by getting NMT, and the associated circumstances, right, through transdisciplinary collaboration. Even though these trips cannot be taken under current conditions, most vulnerable people still vocalize a desire to walk and cycle to destinations that reflect very high aspirations. For every walking or cycling trip we see in the three cities, there are many more that vulnerable users want to take. This untapped realization of access, and ultimately, economic, and social value, should be an enticing prospect for decision makers and local leaders to invest in when they have the tools or the framework to evaluate it. The major lessons from this study that are being taken forward with the planning practitioners in the three cities are: (1) focus on access, not movement; (2) re-evaluate the assumptions around proximity and access; (3) use qualitative data collection tools to better understand the

difference between action and intention; (4) collaborate beyond the remit of transport planning to address access inequity and deprivation; and (5) strive to increase capabilities and realize the trips not taken.

Conclusions and policy recommendations

Despite the theoretical access that these vulnerable groups have, to amenities, services, employment opportunities and transport infrastructure, through proximity—the theoretical access that is assumed in transport planning practice—their actual set of viable access options is severely constrained by factors outside of the remit of transport planning. The positivist nature of transport planning, and the reliance on quantitative data collection methods, hides the true cost burden of access inequity or deprivation, the trips not taken, the trips that cannot be taken, and the effect of those unrealized trips on a vulnerable person’s freedom to access the opportunities and activities that will improve their livelihood. This research has revealed that vulnerable NMT users, by their nature, are captive to the barriers that they face; their vulnerability is not an intrinsic trait but stems from the ill-design of the mobility system and the environment in which it operates. This is where the capabilities approach can be valuable in unearthing the weaknesses and strengths of a mobility system that can often remain hidden to conventional transport planning practices. Addressing these barriers and embracing these facilitators becomes key in retaining NMT users even as they move from being vulnerable and captive to being empowered and equitably served. This study has explored the intersection between mobility, proximity, and access in order to better understand the experiences of vulnerable NMT users in African cities, and to open the debate on one element of a “just transition” in transport planning practice on the African continent.

A framing for the access system that is grounded in the capabilities approach, that seeks to understand what capabilities individuals actually have available to them, and that moves away from practices that equate observed action with choice, is a framing that is more likely to achieve a “just transition” for vulnerable NMT users, especially in African cities. The capabilities approach can be used to disentangle action from choice in order to understand the limitations placed on an individual’s access options. In approaching mobility in this way, transport data collection moves from solely the quantification of action, which is common in many African cities, to an understanding of barriers and facilitators of access, and can uncover areas where improvement is needed most to facilitate access equity. The capabilities approach has proven itself to be a useful tool to identify and frame necessary reforms in the urban transport sector in these three cities, and potentially more across the continent. The simplified framework developed in

this study demonstrated that urban transport can determine the realization of human rights, as well as the right to the city itself. Thus, the framework can be used to present arguments about human rights and how they can be realized through a just transition from mobility-based to access-based transport planning. Urban inequality and urban poverty are grounded within an unequal access landscape, hence, addressing these entrenched inequalities in transport will require a framework that links human potential with the opportunities for growth and development. Thus, the capabilities approach appears as a valuable platform to explore how mobility really connects the city's centers of education, recreation, and commerce to people's desires and actions to access these resources for growth. The capabilities approach to access, and other rights-based approaches, can be presented as a viable bridge from deprivation to opportunity for vulnerable transport users, the way that transport systems were once envisioned in the past.

To mitigate the marginalization that vulnerable groups experience due to transport-related social inequities, transport planners need to avoid assumptions and practices that conflate access with proximity. Just as affordability, onboard safety, physical accessibility, and other factors have been taken into consideration to break down barriers to motorized public transport access, similar considerations need to be made around the various tangible and intangible barriers to NMT users' ability to access capability resources under various individual and external circumstances. The shift to access-based planning has many opportunities for creating a more equitable and just transport planning practice, but it can also perpetuate inequities and access deprivation if the spatial assumptions from mobility-based planning are not questioned using techniques and framings like the capabilities approach.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Dyllon Randall, University of Cape Town. The

patients/participants provided their written informed consent to participate in this study.

Author contributions

SC: conceptualization, writing-original draft, and editing. BR: conceptualization, methodology, and editing. GS, AN, and LM: conceptualization, data collection, and data analysis. MZ: review and editing. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Alando, W. (2017). *A Framework for Inclusive Transport Planning in Medium-Sized Sub-Saharan African Cities: The Case of Cycling in Kisumu, Kenya*. Available online at: <https://eldorado.tu-dortmund.de/handle/2003/35849> (accessed November 11, 2021)

Anand, P. B. (2018). *Cities and the capability approach*. *New Front. Capab. Approach* Cambridge: Cambridge University Press. 519–546. doi: 10.1017/9781108559881.022

- Anciaes, P. R., Nascimento, J., and Silva, S. (2017). The distribution of walkability in an African city: Praia, Cabo Verde. *Cities* 67, 9–20. doi: 10.1016/j.cities.2017.04.008
- Balcombe, R., Mackett, R., Paulley, N., Preston, J., Shires, J., Titheridge, H., et al. (2004). The demand for public transport: a practical guide. *Transp. Policy* 13, 295–306.
- Beyazit, E. (2011). Evaluating social justice in transport: lessons to be learned from the capability approach. *Transp. Rev.* 31, 117–134. doi: 10.1080/01441647.2010.504900
- Blečić, I., Cecchini, A., Congiu, T., Fancello, G., and Trunfio, G. A. (2015). Evaluating walkability: a capability-wise planning and design support system. *Int. J. Geogr. Inf. Sci.* 29, 1350–1374. doi: 10.1080/13658816.2015.1026824
- Brusel, M., Zuidgeest, M., Pfeffer, K., and Van Maarseveen, M. (2019). Access or accessibility? A critique of the urban transport SDG indicator. *ISPRS Int. J. Geo Information* 8, 1–23. doi: 10.3390/ijgi8020067
- Cao, M., Zhang, Y., Zhang, Y., Li, S., and Hickman, R. (2019). “Using different approaches to evaluate individual social equity in transport,” in *A Companion to Transport, Space and Equity*, eds R. Hickman, B. M. Lira, M. Givoni, and K. Geurs (Boston, Massachusetts: Edward Elgar Publishing), 209–228.
- Cass, N., Shove, E., and Urry, J. (2005). Social exclusion, mobility and access. *Sociol. Rev.* 53, 539–555. doi: 10.1111/j.1467-954X.2005.00565.x
- Chomba, C., Kunda, D., Chimbola, O., and Kaliki, B. (2017). Incidences and fatalities of road traffic accidents in Zambia for the period 2008–2013: a prelude to sustainable road transport sector development for socio-economic development. *J. Sustain. Dev. Afr.* 19, 137–162.
- City of Cape Town (2018). *Comprehensive Integrated Transport Plan 2018–2023*. Cape Town. Available online at: <http://resource.capetown.gov.za/documentcentre/Documents/Citystrategies,plansandframeworks/ComprehensiveIntegratedTransport-Plan.pdf> (accessed November 11, 2021)
- City of Kigali (2020). *Transport Plan - Kigali Master Plan 2050*. Kigali.
- Geurs, K. T., and van Wee, B. (2004). Accessibility evaluation of land-use and transport strategies: review and research directions. *J. Transp. Geogr.* 12, 127–140. doi: 10.1016/j.jtrangeo.2003.10.005
- Golub, A., and Martens, K. (2014). Using principles of justice to assess the modal equity of regional transportation plans. *J. Transp. Geogr.* 41, 10–20. doi: 10.1016/j.jtrangeo.2014.07.014
- Gutman, J., and Tomer, A. (2016). Developing a common narrative on urban accessibility: an urban planning perspective. *Brookings Mov. Access* 1–43.
- Gutman, J., Tomer, A., Kane, J., Patel, N., and Shivaram, R. (2017). *Delivering Urban Access: A Framework to Guide Researchers, Policymakers, and Practitioners Working in Urban Transport*. Washington, D.C. Available online at: <https://www.brookings.edu/wp-content/uploads/2018/01/delivering-inclusive-access.pdf>
- Hananel, R., and Berechman, J. (2016). Justice and transportation decision-making: the capabilities approach. *Transp. Policy* 49, 78–85. doi: 10.1016/j.tranpol.2016.04.005
- Handy, S. (2020). Is accessibility an idea whose time has finally come? *Transp. Res. Part D* 83, 102319. doi: 10.1016/j.trd.2020.102319
- Kaufmann, V. (2002). *Re-Thinking Mobility*. Avebury.
- Kleine, D. (2013). *Technologies of Choice? ICTs, Development, and the Capabilities Approach*. Cambridge, MA: MIT Press.
- Klopp, J. M., and Petretta, D. L. (2017). The urban sustainable development goal: indicators, complexity and the politics of measuring cities. *Cities* 63, 92–97. doi: 10.1016/j.cities.2016.12.019
- Levinson, D. M., and King, D. (2020). *Transport Access Manual*. 229. Available online at: <https://ses.library.usyd.edu.au/handle/2123/23733> (accessed November 11, 2021)
- Lucas, K. (2012). Transport and social exclusion: where are we now? *Transp. Policy* 20, 105–113. doi: 10.1016/j.tranpol.2012.01.013
- Martens, K. (2012). Justice in transport as justice in accessibility: applying Walzer’s “Spheres of Justice” to the transport sector. *Transportation* 39, 1035–1053. doi: 10.1007/s11116-012-9388-7
- Martens, K. (2017). *Transport Justice: Designing Fair Transportation Systems*. New York, NY; London: Routledge.
- Mella Lira, B. (2019). “Using a capability approach-based survey for reducing equity gaps in transport appraisal: application in Santiago de Chile,” in *Measuring Transport Equity*, eds K. Lucas, K. Martens, F. Di Ciommo, and A. Dupont-Kieffer (Amsterdam: Elsevier), 247–264.
- Mitullah, W. V., Vanderschuren, M., and Khayesi, M. (2017). *Non-motorized Transport Integration Into Urban Transport Planning in Africa*. New York, NY, USA: Taylor & Francis.
- Nordbakke, S. (2013). Capabilities for mobility among urban older women: barriers, strategies and options. *J. Transp. Geogr.* 26, 166–174. doi: 10.1016/j.jtrangeo.2012.10.003
- Nussbaum, M. (2003). Capabilities as fundamental entitlements: Sen and social justice. *Feminist Econ.* 9, 33–59. doi: 10.1080/1354570022000077926
- Oyeyemi, A. L., Oyeyemi, A. Y., Jidda, Z. A., and Babagana, F. (2013). Prevalence of physical activity among adults in a metropolitan Nigerian city: a cross-sectional study. *J. Epidemiol.* 23, 169–177. doi: 10.2188/jea.JE20120116
- Pajares, E., Büttner, B., Jehle, U., Nichols, A., and Wulffhorst, G. (2021). Accessibility by proximity: addressing the lack of interactive accessibility instruments for active mobility. *J. Transport Geogr.* 93, 103080. doi: 10.1016/j.jtrangeo.2021.103080
- Pereira, R. H. M., Schwanen, T., and Banister, D. (2017). Distributive justice and equity in transportation. *Transp. Rev.* 37, 170–191. doi: 10.1080/01441647.2016.1257660
- Reid, S. (2008). Fit for purpose: evaluating walkability. In *Proceedings of the Institution of Civil Engineers-Engineering Sustainability* (Vol. 161, No. 2, pp. 105–112). Thomas Telford Ltd.
- Republic of Rwanda (2015). *National Urbanization Policy*. Ministry of Infrastructure. Available online at: https://www.mininfra.gov.rw/fileadmin/user_upload/Mininfra/Publications/Policies/Urbanization_Human_Settlement_and_Housing_Development/Rwanda_National_Urbanization_Policy_2015.pdf (accessed November 11, 2021)
- Robeyns, I. (2005). The capability approach: a theoretical survey. *J. Human Dev.* 6, 93–117. doi: 10.1080/146498805200034266
- Ryan, J., Svensson, H., Rosenkvist, J., Schmidt, S. M., and Wretstrand, A. (2016). Cycling and cycling cessation in later life: findings from the city of Malmö. *J. Transp. Heal.* 3, 38–47. doi: 10.1016/j.jth.2016.01.002
- Sen, A. (1979). Utilitarianism and welfarism. *J. Philos.* 76, 463–489. doi: 10.2307/2025934
- Sen, A. (1992). *Inequality Reexamined*. Oxford, UK: Oxford University Press.
- Sen, A. (1999). *Development as Freedom*. New York, NY: Knopf Press.
- Sen, A. (2004). Capabilities, lists, and public reason: continuing the conversation. *Fem. Econ.* 10, 77–80. doi: 10.1080/1354570042000315163
- Sheller, M. (2018). *Mobility Justice: The Politics of Movement in an Age of Extremes*. London, UK: Verso Books.
- Sietchingip, R., Permezel, M. J., and Ngoms, C. (2012). Transport and mobility in sub-Saharan African cities: an overview of practices, lessons and options for improvements. *Cities* 29, 183–189. doi: 10.1016/j.cities.2011.11.005
- Taylor, A., Siame, G., and Mwalukanga, B. (2021). “Integrating climate risks into strategic urban planning in Lusaka, Zambia,” in *Climate Risk in Africa*, eds D. Conway and K. Vincent (Cham: Palgrave Macmillan).
- UN-Habitat (2020). *COVID-19 in African Cities*. Nairobi, Kenya: UN Habitat Reports on Human Settlements Program.
- Urry, J. (2000). Mobile sociology. *Br. J. Sociol.* 51, 185–203. doi: 10.1080/000713100358499
- Vecchio, G. (2020). Microstories of everyday mobilities and opportunities in Bogotá: a tool for bringing capabilities into urban mobility planning. *J. Transp. Geogr.* 83, 102652. doi: 10.1016/j.jtrangeo.2020.102652
- Verlinghieri, E., and Schwanen, T. (2020). Transport and mobility justice: evolving discussions. *J. Transp. Geogr.* 87. doi: 10.1016/j.jtrangeo.2020.102798
- Vermeiren, K., Van Rompaey, A., Loopmans, M., Serwajja, E., and Mukwaya, P. (2012). Urban growth of Kampala, Uganda: pattern analysis and scenario development. *Landsc. Urban Plan.* 106, 199–206. doi: 10.1016/j.landurbplan.2012.03.006
- Visser, G. (2001). Social justice, integrated development planning and post-urban reconstruction. *Urban Stud.* 38, 1673–1699. doi: 10.1080/00420980120084813
- WHO (2020). *Supporting Healthy Urban Transport and Mobility in the Context of COVID-19*. Available online at: <https://www.who.int/publications/item/9789240012554> (accessed November 11, 2021)