

Article

Disability, Mobility and Transport in Low- and Middle-Income Countries: A Thematic Review

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Received: 3 October 2019; Accepted: 2 January 2020; Published: 13 January 2020



Abstract: This paper discusses issues affecting the transport and mobility needs of people with disabilities in middle- and low-income countries and how disability intersects with a range of other factors to impact on transport needs, use and engagement. The paper is intended to stimulate discussion and identify areas for further research, and identifies a number of key issues that are salient to discussions around equitable and inclusive transport provision, including patterns of transport use, behaviour and experiences, solutions and policy directions, measuring access and inclusion, policies and intersectionality. The paper also identifies gaps in knowledge and provision, barriers to addressing these gaps, and some possible solutions to overcoming these barriers. These include shifting the focus from access to inclusion, reconceptualising how ‘special’ transport might be provided, and most importantly listening to the voices and experiences of adults and children with disabilities. Despite lack of transport often being cited as a reason for lack of inclusion of people with disabilities, there is surprisingly little evidence which either quantifies this or translates what this lack of access means to people with disabilities in their daily lives in low- and middle-income countries.

Keywords: people with disabilities; inclusive transport; high volume transport; accessible transport; low- and middle-income countries

1. Introduction

This paper aims to capture the current state of knowledge about the transport needs of people with disabilities in low- and middle- income countries (as defined by the Organisation for Economic Cooperation and Development’s Development Assistance Committee list); and how disability intersects with a range of other factors to impact on transport needs, use and engagement. It complements other papers in this special issue, which focus on the mobility needs of young people and older adults; and highlights how these identities intersect and impact on choices. In line with the overarching aims of the special issue in focusing on sustainable High-Volume Road and Rail Transport in low-income countries, we have included the experiences of people with disabilities undertaking both urban and long-distance journeys.

While there has been some research that links a lack of transport to barriers to other services for adults and children with disabilities, such as education [1] or healthcare [2], there has been much less focus on the actual mode of transport used, or the journey itself. So, despite a lack of transport often being cited as a reason for lack of inclusion of adults and children with disabilities, there is surprisingly little evidence which either quantifies this lack or translates what this lack of access means to people

with disabilities in their daily lives. Without this information, it remains challenging for planners and policymakers to understand where, what and how they should best invest in making transport more inclusive of people with disabilities.

It is worth reiterating at the outset that while there is some literature on patterns of travel behaviour, types of travel and journey experiences in higher income countries, there is surprising little from low-income countries. Previous work has tended to focus on transport exclusion, rather than inclusion, and in turn how transport exclusion can create and perpetuate social exclusion [3]. As the authors note, social exclusion as a term is often poorly defined and measured, with the result that it is operationally and theoretically difficult to assess [3] (p. 2).

The paper starts by placing inclusive transport in the context of existing international agreements and global frameworks relating to disability rights. We then move on to discuss patterns of travel behaviours and journey experiences identified in the literature. These have tended to be from higher-income countries, but it is possible to identify some possible ‘solutions’ to current transport challenges that could be, or are already being, explored in low- and middle-income countries. These include adaptations of physical transport infrastructure, development of holistic/door-to-door journey approaches, specialised transport services, fare subsidies and technological innovations. The knowledge gaps about evidence of ‘what works’ in terms of disability inclusion align with existing gaps more broadly. Most reviews, for example around inclusive education or health, tend to argue for a ‘twin track’ approach [4]—both mainstreaming disability into services, as well as providing specialist targeted services for those that need them. From the limited evidence there is in the transport sector, the indications are that this is also the required approach to inclusive transport. Finally, we also explore the role of national policies and other institutional factors. The paper ends by identifying the gaps in the literature, highlighting the lack of research around transport issues for people with disabilities in low-income countries, and makes a series of recommendations for future research.

Transport Issues Affecting People with Disabilities in Middle- and Low-Income Countries

Transportation issues rate highly as a challenge for people with disabilities globally [5–7]. However, measuring access to transport, or indeed understanding who is the most severely affected, remains challenging [8]. However, the United Nations (UN) Convention on the Rights of Persons with Disabilities (CRPD) [9], has had an impact on both national and international policy and focus around transport. While the CRPD does not have a specific Article on transport, it does acknowledge the centrality of transport for people with disabilities to access a range of services including homes, schools, healthcare facilities, workplace and leisure [CRPD Article 9]. The CRPD enshrines the right of people with disabilities to access transportation on an equal basis with others. However, barriers to the enjoyment of these rights can be broadly divided into three main areas: institutional (legislation, political will, policy, etc.); environmental (infrastructure, vehicles, information); and attitudinal (transport staff, other passengers, lack of accessible information, etc). In reality, these often overlap.

Globally, there have been increasing efforts to address inclusion and ensure ‘no one is left behind’, culminating in the Sustainable Development Goals (SDGs) [10], with the aim of equity for all by 2030. While all 17 goals are relevant for people with disabilities, SDG 11 ‘Making cities and human settlements inclusive, safe, resilient and sustainable’ has a specific target (11.2) that ‘By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons’; as well as an indicator (11.2.1): ‘Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities’. However, SDG targets and indicators are adapted to the country context, and it is left to individual countries to set country-specific goals, indicators and targets to monitor their progress. Moreover, in the most recent SDG progress report, there is no mention of progress towards this target. The recent UN Flagship Report on Disability and Development [11] also reviewed progress toward SDG 11 as it relates to people with disabilities, though again, there is very little data or

information on specific progress with regards to accessible transport at global level. This omission may be due to a lack of agreed definitions on what accessible transport is, and/or a lack of standardised targets and indicators. It could also mean that few countries have set targets, monitored their progress, or indeed actually focused in making any improvements.

In the Asia Pacific region, the Incheon Strategy (2012) is the benchmark for progress on ‘making the rights real’ for people with disabilities in the region [12]. Goal 3 of the strategy is to: ‘Enhance access to the physical environment, public transportation, knowledge, information and communication’, although it is interesting to note that while the overall target is: (3.B) Enhance the accessibility and usability of public transportation, the overall core indicator is (3.2) Proportion of accessible international airports. While this is a laudable target, it could be argued that it does not address the most likely day-to-day transport barriers faced by the majority of people living in the region.

Similarly, in 2013, a global online survey carried out by the Global Alliance on Accessible Technologies and Environments (GAATES) Transport Committee with its members (completed by 257 people from 39 countries) aimed to better understand what mobility issues people with disabilities faced around the world [13] (p. 1). According to the data presented, the two biggest challenges were inaccessible public transport vehicles and attitudes of drivers/staff. In terms of possible solutions, respondents were fairly evenly divided on four main areas: technical guidance on inclusive design solutions aimed at civil engineers, planners, etc.; guidance/information aimed at transport providers/senior management in transport companies; guidance/information aimed at people with disabilities to empower them; and guidance/information aimed at politicians about the UN Convention, etc. [13] (p. 7).

What these initiatives highlight is that even with a range of measures in place to facilitate inclusion, there may still be a gap between availability and use—demonstrating how these barriers often intersect. A second, related challenge is to measure the size of this gap. Estimating how many adults and children with disabilities have access to, and more importantly use transport systems, as well as their safety, affordability and reliability is challenging. Some countries collect transport data as part of a national census or other largescale surveys. However, even if they highlight a lack of access and availability, it is still challenging to attribute this as a sole cause to a lack of access to healthcare, education or employment, though it is certainly a contributing factor [c.f. 14]. However, regardless of the cause, it is unequivocal that barriers to accessing inclusive transport are found across most countries, in a range of contexts and for a spectrum of impairments, and result in a loss of education, employment and overall wellbeing (see for example, on reduced access to education [1,14]; for employment [15,16]; wellbeing more broadly [17]).

The knowledge gaps about evidence of ‘what works’ in terms of disability inclusion align with existing gaps more broadly. Most reviews, for example around inclusive education or health, tend to argue for a ‘twin track’ approach—both mainstreaming disability into services, as well as providing specialist targeted services for those that need them [4]. From the limited evidence there is in the transport sector, the indications are that this is also the required approach to inclusive transport. There are some innovative and potentially paradigm-shifting ways to deliver this, including ‘Mobility as a Service’ (MaaS), which use locally available and adapted structures with technology to provide the necessary ‘total journey’. More work needs to be done to test these for a range of adults and children with disabilities in a range of contexts.

2. Materials and Methods

Whilst this was not intended to be a systematic review, a search of the literature was done to identify the key themes. There is a large volume of literature on the broad theme of ‘accessible transport’, and an initial search was done on the Web of Science database in January 2019, in line with the other articles in this series. The search operator was developed, based on similar operators used in other thematic areas of this study [18], to ensure consistency and include as wide a range of

types of impairment as possible in selected geographical regions, and return results based on various transport-identifying expressions.

Results that were written in English from the year 2008 to present were chosen for review. This year was chosen as it represented both an approximate 10-year timespan but also marks papers that were written following the coming into force of the CRPD in 2008. Inclusion criteria were reports that focused on people with disabilities' experience and issues with using various forms of transport. Papers that were not primarily focused on transport were excluded; so, for example, the large volume of literature that exists around active transportation or that of road safety. These are of course relevant to wider discussions about policy, given the prevalence of road traffic-related injuries and disabilities [4] (p. 60), but were not the main focus of this review. Road safety—and the relation between road traffic accidents and disabilities in low- and middle-income countries—is one of the other themes of the overall review. It is worth noting that data on the number of people who survive crashes but live with disabilities are almost non-existent [19].

The search of the Web of Science databased returned 295 results. These results were screened by title and abstract, and a total of 23 results were selected for inclusion. A number of articles were excluded on the basis that they conceptualised 'mobility' as it relates to impairment, rather than transport mobility, so were screened and excluded on this basis. During the full-text review a further 12 articles were excluded due to inappropriate content or unavailability. Following the review of the returned results of the literature review, a further manual review was undertaken using Google Scholar using the same inclusion criteria. This review returned an additional 38 articles from both 'grey' and scientific literature. This literature was included to capture national guidelines on transport and disability inclusion, and reports from civil society and other actors which were not included in the database review. This is important as it provides a context as well as potentially identifies policies and practices not yet featured in the published literature. A total of 49 articles were included in this review. We manually coded and grouped together the main themes that emerged from this body of literature, as well as from existing literature and knowledge in the field using theme content analysis.

Limitations

This review included results from one database search—Web of Science—in line with other articles from this series. This limited the number of results included in the review, and some may have been omitted. This literature review is not intended to be systematic but rather thematic and comprehensive; the results included here give a helpful set of themes that emerge from the literature.

The search terms and inclusion criteria excluded returns from high-income countries, although some were used in the manual search to allow for comparisons to be made and to highlight important points in the absence of comparable low-income country returns. Transport issues in higher-income countries were not a focus of the review and these may have overwhelmed the search returns and skewed the emergent results. A further limitation to the operator was that if an article was about a specific country (for example, Kenya but it did not mention Africa), it may not have been picked up.

3. Results

In this section, we present the set of themes emerging from the literature and aim to highlight the persistent gaps, and some of the measures being developed to close them, in other low- and middle-income countries. These may also enable low-income countries to target this issue, and reach the global goals, more effectively

3.1. Patterns of Travel Behaviour and Experiences

Given the paucity of data on transport disadvantage, identifying 'what works' to overcome the disadvantage can be even more challenging, given the array of factors involved. Moreover, there is very little research on the types of journeys adults and children with disabilities make, the modes of transport they use, and their overall experiences of the journey, in particular from a participatory perspective.

To deliver an inclusive transport system requires a joined-up approach that focuses not only on the what, but also on the how. The type of transport provided, and how it is provided, varies according to country and priorities. Many countries—particularly the higher-income ones—link the issue of accessible transport to broader legislation and commitments, including the CRPD (e.g., [20]). Higher-income countries can obviously provide more comprehensive transport options, though as recent analysis of the in the UK demonstrates, even with these in place, people with disabilities still face a number of challenges in using public transport. [21].

3.2. Transport Infrastructure

Many of the efforts to reduce car use and improve high volume (often public) transport have been in urban areas, in particular, cities. However, these initiatives have not always been accessible or inclusive for adults or children with disabilities, as for some, cars and/or taxis offer freedom, independence and mobility, which public transport may not. Research in a number of higher-income countries has shown that people with disabilities tend to favour cars—their own or others (such as taxi services) [22]—rather than, for example, waiting for a ramp to enable them to get on or off trains [23], or where there is limited provision of services (more so the case in rural areas). Cars can confer a level of independence, autonomy and safety that users do not always feel on public transport. Fear—of how to use the services as well as other passengers' attitudes—is often a key factor, and many users report feeling unsafe on any form of public transport; and parents of children with disabilities cited fear for their child's safety as one of the key barriers in their journeys to school [1,14].

3.3. Long Distance Journeys

People living in rural areas who need to make long-distance journeys are generally less well-served by public transport almost everywhere. This is partly due to limited demand, which in turn leads to reduced services [24]. A complex set of factors need to be taken into account when planning long-distance travel services. In countries with limited or no formal public transport system, cars or taxis provide one of the few means of getting around, particularly in rural or semi-urban areas and especially in emergencies. Use of hired vehicles raises the issue of additional costs for people with disabilities—the 'hidden costs' of disabilities [25,26]. However, there is limited data which quantifies the amount of these additional costs, or costs of lost opportunities, for example, for adults and children with disabilities who cannot afford transport to make (often long-distance) journeys for educational or income-generation purposes, or access other services and activities.

3.4. Affordability and Subsidies for Individual Journeys

Included in debates around the 'inclusiveness' of sustainable accessible transport are issues of cost and affordability. In part due to inequalities and exclusionary practices, in many countries around the world, people with disabilities experience poverty. One form of poverty is transport poverty, which can be related to cost, affordability as well as accessibility [27,28]. However, transport poverty is hard to measure, and there are no universally agreed definitions. Moreover, some question whether it even exists as a stand-alone phenomenon or whether it is simply an extension of being poor. Put differently, the question remains as to whether transport poverty a 'real' problem for individuals, or is it a systemic problem that has a systemic solution, and if so, what are these solutions? Given this, is it a problem that has a transport solution, or rather is it a broader issue of social welfare? [28] (p. 353).

In many (usually higher-income) countries, a range of measures have been put in place within transport policies, including concessionary fares, subsidised public transport services and free special transport services (STS) for eligible groups such as older people, children, and/or people with disabilities. As such, they are only viable where there are (public) transport systems in place.

South Africa provides a heavily subsidised public transport system for older adults and people with disabilities [22,25]. However, in his study reviewing provision of services, Venter found that it

was access, rather than affordability, that was the largest barrier to use, and the solution was therefore to increase access more broadly, rather than to provide targeted subsidies:

“The overall implication is that the limited funds that are available for improving public transport in cities should go towards improving accessibility for all, rather than towards lowering fares for all disabled persons as a group. This is not to say that subsidisation is not needed: the evidence shows that both disabled and non-disabled commuters benefit substantially from having access to subsidised bus and rail services. But the benefit stems from the subsidies being available to all low-income workers.” [25] (p. 138)

Such universal coverage may also help overcome the predictable eligibility challenges, as assessment of disability is already a complex and much debated issue, particularly in low-income countries which have limited mechanisms for assessment [29]. In addition, most of the debates in the literature tend to focus on the delivery structures and mechanisms, rather than eligibility criteria, so there is limited evidence on what are the most effective mechanism for assessment or identification of eligibility.

3.5. *Measuring Access to Services*

In addition to limited evidence about assessment and eligibility criteria, there are also significant gaps in the literature about what specific impact transport restrictions have on people with disabilities' lives (e.g., opportunities lost), or the additional costs that may be associated with this lack of access (e.g., hiring taxis to get to work, or not getting to work at all) [25,26]. This gap exists across high- [20] and low-income countries and is largely due to a lack of agreed measures to estimate access and inclusion. Of the limited literature available that does address this, intersecting issues of age, gender, poverty, ethnicity, disability, etc., come to the fore (e.g., [2,30–32]). These make it difficult to attribute transport—or lack of—as a singular cause for exclusion. In recent research undertaken by authors in Liberia [33], when asking matched household heads about barriers to accessing healthcare services, distance to health facilities was weighted similarly between disabled (11.0%) and non-disabled households (12.8%). Unfortunately, the study did not ask what the most commonly used mechanism of transport was, nor whether this resulted in additional costs, for example if persons with disabilities had to use more expensive means of transport (e.g., taxi cars instead of taxi motorbikes), or spend more on transport overall. Therefore, while the issue of transport—or lack of—is a barrier to access and inclusion in all aspects of life and is highlighted in many papers (e.g., [1,34]), there are few papers that identify mechanisms to quantify this.

One of the few pieces of research available that does attempt to do this is Venter [25] discussing the situation in South Africa. Here the research found that geographic location was a key determinant of the affordability of transport, with transport in urban areas being unaffordable for poor people generally, but not specifically people with disabilities or older people, whereas in rural areas limited travel options constrain everybody as much as affordability, thus the solutions again point to improving the affordability, availability and quality for all users, not just specific groups, as all users would then benefit [25] (p. 129).

3.6. *Transport Services Available*

One area of transport provision that aims to address a lack of mobility are special transport services (STS). These are designed to address services gap and are usually (though not exclusively) for people with mobility difficulties, such as older adults or people with disabilities. There have been some well-reported models in South Africa, Brazil and Russia [4] (pp. 178–184), all high middle-income countries and we found none from low-income countries. STS (also known by a variety of other names, including ‘paratransit, or ‘dial-a-ride’ in other countries) vary not only in name, but also in delivery and funding structures, as well as types of vehicles used. Some supplement existing services, or link to feeder routes (such as mass rapid transport (MRT) services in Cape Town and Brazil), while others

offer specific door-to-door services in adapted accessible vehicles (such as Dial-a-Ride in South Africa, which offers users a heavily subsidised service).

There are a number of debates about the provision of STS, particularly around equity, as they tend to offer a segregated service (see for example [16] p. 4), as well as cost. In some countries, provision of STS (e.g., to schools, hospitals, etc.) is a mandatory requirement by law, though provision can be costly, and demand likely to increase with an ageing population. They are often publicly funded, or at least subsidised. Some high-income countries are exploring different models of payment for these services (see for example [35]). Though their findings are from a wealthy country with high levels of service provision (Sweden), they do have some implications for decentralised budgets elsewhere—not the least of which is the need to coordinate service provision (e.g., school buses) and that overall improved public transport services can have a positive impact on access and inclusion more generally. According to one study from eThekweni Municipality (South Africa), the Dial-a-Ride service provided faces an array of challenges, including high costs, difficulty in managing high demand, scheduling of services and lack of flexibility in adapting route planning. In fact, demand was such that it had to be restricted to people going to study or work. Complaints about the tendering process were also made [30] (p. 35).

An excellent practical guidance for setting up STS in low-income countries but drawing on experience from high-income countries, suggests using a variety of state and non-state funding mechanisms [36]. The guide suggests utilising existing locally available transport mechanisms, including motorised auto-rickshaws, cycle-rickshaws, and similar vehicles operated exclusively or partly for mobility-impaired people. The one thing they all have in common is that they are “demand-responsive”, which can be interpreted in one of several ways—pre-booked, scheduled or instant access. This approach strengthens the idea that public transport provision needs to move away from traditional delivery approaches, as well as addresses the challenge that the provision of STS does not address equity, inclusion or attitudinal and other barriers to transport access, nor does it confer independence or autonomy on users, as there is still a reliance on others to provide a service. On the other hand, if there is no way to get to a station or bus stop—no matter how accessible the route is, then it could be argued that the provision of special transport enables people with transport restrictions to make necessary journeys. To be genuinely effective, special transport needs to be included as part of a wider package of measures to address barriers to access and inclusion, such as increased and accessible information and financial aids, such as concessionary travel passes [37] (p. 54).

However, if users require a high degree of assistance, there are still limitations in most current transport provisions around driver capacity, attitudes and willingness to provide such services. Another criticism of STS is the extent to which such systems include alternative (as well as sustainable and healthy) modes of transport such as cycling or walking.

3.7. Holistic Approaches

People with disabilities in South Africa seem to enjoy more accessible transport opportunities than those in neighbouring countries, including subsidies to address any additional costs they incur. However, even there, when progressive legislation is in place to enhance the rights of people with disabilities, they still face a range of challenges. These include boarding the ostensibly accessible mass rapid transport (MRT) services in Cape Town—anecdotally, not all the MRT buses are fully accessible, so users who need them have to wait for the next accessible vehicles to come along, causing delays to their journey. By far, the most popular method of public transport for most people in South Africa are taxi minibuses. These pose a number of challenges for people with disabilities, ranging from inaccessible vehicles to other passengers and the drivers themselves. Research with people with disabilities and taxi drivers in the Durban area highlights that the actual operational structures of taxis or other private minibus services function, often unintentionally, to actively disincentivise drivers to pick up passengers with disabilities [30]. Given that taxi drivers often lease their cars from owners, time is money and drivers are less keen to stop and spend time trying to get a wheelchair into, or on top of, a vehicle, or wait for somebody with mobility difficulties to board. In their research,

Lister and Dhunpath found little understanding of either side's perspective, which they suggest could be ameliorated by incentives, such as cash and/or training to encourage taxi drivers to pick up passengers with disabilities, along with disability awareness training, and subsidised fares for people with disabilities [30].

3.8. Mobility as a Service

Taking the idea of shared, often private, services a step further is the idea of 'mobility as a service'. In some respects, such an approach may well be undertaken informally in a range of settings. While the idea of a barrier-free, door-to-door journey is not new, new ways to conceptualise what a 'total' journey, or 'continuity of travel chain' or even 'integrated mobility' might look like are in development. These factor in age, health, mobility status as well as a range of other intersectional aspects and move away from the more traditional 'special transport' models discussed above to more integrated approaches that acknowledge that what works in one location or for one group may not be effective or utilised in another.

One of the most innovative and exciting area that links up discussions about autonomy, choice, continuity of journey, as well as bringing in new technology is that of 'Mobility as a Service' (MaaS). Not specifically designed for people with disabilities, MaaS is a way:

"... to see transport or mobility not as a physical asset to purchase (e.g., a car) but as a single service available on demand and incorporating all transport services from cars to buses to rail and on-demand services." [38] (p. 583)

Originating in Sweden, it offers users the opportunity for door-to-door integrated services, paying for a package of services 'as they go' via one (often online) payment system. Though most of the research around MaaS has been in higher-income countries, the concept has relevance to low-income countries, making it worth raising in this paper, and some very preliminary research about transposing it to such contexts has begun [39].

MaaS has the potential to cover a range of transport options, from self-drive cars (still under research), through to taxis (similar to Uber, which already operates via an app-based service), bicycles and even walking. However, despite the ideology, such tailored services can be expensive, and inefficient to deliver, so researchers have begun to conceptualise how journeys can be 'bundled', so users can and buy specifically tailored transport packages, in much the same way as they can buy satellite or cable TV packages to suit their specific viewing requirements [38].

The research focused on developing and delivering a broad range of options for both type of journey (work, socialising, etc.) and mode of transport (buses, taxis, etc.), which could be standardised to some extent to reduce costs. These 'service packages' could also be customised, perhaps including add-ons such as household travel-planning, availability of car space in localities, travel training, ICT training, providing a driver for own car and learning to drive [38] (p. 590). These were offered as alternatives to car ownership, increasing car-sharing to reduce individual ownership, and therefore increase sustainability, but at the same time maintaining independence and freedom of movement. As the researchers note, whilst MaaS was not specifically set up for use by people with disabilities, the system could offer opportunities for flexibility and autonomy. Viewing transport as part of a service package has the potential to move discussions away from seeing transport provision for older adults and people with disabilities as a welfare issue, as, they argue, it currently is. Although they caution about the need to take the social benefits of mobility into account when thinking about MaaS too [38].

While MaaS offers an exciting potential for people with disabilities, it was not (necessarily) designed specifically for people with disabilities, but rather it is a transport system that *can* be used by people with disabilities. In this, it is similar to existing 'community' or 'flexible' transport' systems, usually privately-funded or run cooperatively. Community transport can be funded and provided through a variety of mechanisms, including shared transport (such as cars or taxis), and may be a viable option in low-income countries, as they may lessen costs for passengers, as well as reduce the

number of vehicles on the road. However, there are debates about the extent to which they are likely to be viable as a long-term solution to reduced mobility in rural or semi-urban areas, in particular for people with disabilities, as they do not solve broader issues around mobility, including social aspects, such as independency and autonomy.

3.9. Technology

Technology has enabled significant improvements across a range of domains, including transport-specific services such as Uber and MaaS, as discussed above, as well as facilitate mapping of journeys to better understand patterns and usage and adapt services accordingly. There is already a significant body of literature exploring the benefits (as well as some of the more negative aspects) that technology can bring to the lives of people with disabilities, in particular how it can support and maintain independence [40]. This is reflected in the array of transport-focused literature on technological advances in the transport sector, some of which may have been specifically designed and intended for use by people with disabilities, though not all. However, all have had a major impact on the ability to travel. These fall largely into two categories: technology which provides information; and technology which provides a service. Some, but not all, of these are mainly used in higher-income countries, but all have the potential for transfer and adaptation.

Information-providing technologies include apps which give live updates about planes, trains, buses and other (usually public) transport, as well as live trackers, digital maps, etc. These often use location-tracking devices, such as GPS. Use of these tracking devices has extended to support independent travel for people with disabilities [15,41,42]. Whilst all these examples have been tested in higher-income countries with existing infrastructure and services, what the results demonstrate is that whilst accessible infrastructure is a necessary condition, it is not enough. Many of the challenges faced are related to, but not inherent within, the transport system, such as uncertainty about scheduling or routes. This indicates that not just the transport mode, station or service need to be inclusive, but the whole journey, requiring a joined-up approach to inclusive transport.

Technologies which support service provision include online ticketing systems, as well as automated and integrated payment systems. However, whilst convenient, for some users with disabilities it has been argued that these integrated payment systems can also present challenges. In their work in Durban, Lister and Dhunpath talk about these in relation to the Muvo Card, a single smartcard that can be used across all three of Durban's transport systems. Users in Durban report difficulties with locating the machines, drivers being in a hurry, no signalling facilities for blind or visually impaired users and numerous other problems with the machinery [30] (p. 40).

Similarly, in their findings from the Philippines, Cendana et al. [43] argue that such a single-use smart card could be a mechanism for more equitable urban transport, though their main concern was about implementation and eligibility. To overcome this, they argued for a provider that would enable the implementation of the use of the smart card across multiple transport platforms (hence multiple providers) to enable discounts to be systematic to eligible travellers.

However, in the end, while technology is an enabler, a facilitator for accessible and inclusive transport for people with disabilities, it is not in itself enough. Much more research is needed on the systems within which it is embedded—including the costs (demand and supply) and user needs (especially the voices of adults and children with disabilities who will use the services—see [1]). Moreover, focusing solely on access tends to lead researchers to create solutions to overcome physical and environmental barriers, rather than attitudinal or social barriers [44].

3.10. Intersectionalities, Inequalities and the Lifespan

Disability, like gender and age, is a factor that cuts across mobility, access to transport services from operational and employment perspectives [45]. However, much of the existing research around accessible transport has tended to compare transport use between disabled and non-disabled populations, rather than between different groups of people with disabilities. As a result, there

is limited evidence of what works for specific groups, but as noted above, it is clear there is not a one-size-fits-all solution to these challenges. Perhaps as a consequence, increasingly in both high- and low-income countries, researchers and advocates have drawn attention to the need for a broader focus on inclusion, making it accessible and inclusive to all, not just people with disabilities, but also those with temporary mobility difficulties, older adults, people using pushchairs or prams, small children, cyclists and many other groups as well. However, while these design-led solutions tend to address the access issues, there are fewer indicators of measures of success around inclusion, or the socio-political changes required more broadly (see [46] for discussion around the application of these principles in South Africa). Moreover, such universal approaches may unintentionally benefit most those who need it the least if underlying issues such as poverty or fear are not addressed.

These issues have been discussed more widely in the fields of gender and to some extent ageing (see for example [47,48]). Ahmad (2015) highlights how in Pakistan, in order to make public transport accessible for women, including women with disabilities, planners and politicians need to consider religious and social issues as much as financial and logistical ones, as it is these that have the most impact on women. He draws on work which focuses on the gendered aspects of public transport access and provision (e.g., [31,47]) to show how dialogue between disability scholars, feminist critiques, and transport planners is needed to address continuing gaps [49].

Overall, less is known about the complex interactions of disability with a range of other factors including age, sex, location, class, caste, etc. One aspect highlighted in the literature is the unavoidable fact that as people age, their ability to drive safely is compromised, so there is also a safety aspect to reducing the number of older drivers on the road—for example, through mandatory vision screening [50]. This raises challenges when much of the research highlights how cars confer a sense of independence and autonomy, but which can be taken away at the very point when it is most needed, often leaving older adults with disabilities without alternatives.

There is a significant body of research that highlights the changing patterns of transport use across the lifespan, as well as according to location (e.g., [31,51]). However, the majority tends to focus on older adults in higher-income countries, with much less focus on children or young adults (for some exceptions, see [52,53]). Other researchers have highlighted the social aspects of public transport for older adults [54]. Older people have also become a focus for advances in travel technology (see for example, [55,56]). However, there is much less evidence on these complex intersections in low- and middle-income countries. One study, from Mexico, highlights the range of factors that mediate access to transport, with subjective ‘transport deficiency’ being strongly associated with being female, illiterate, having a mobility disability and using assistive walking devices [31]. The researchers also noted the most commonly used mode of transport for older adults in Mexico City is private car, followed by walking, with a range of factors given for this, including fear, geographical location and limited accessibility of transport options for older adults in Mexico City [31]. Similarly, data in South Africa also suggests that travel options are limited by factors other than affordability [25].

Venter suggests that it is spatiality, rather than affordability or even accessibility, that determines use, a finding also found in other higher-income countries [21]. Venter further suggests that initiatives such as road and footpath upgrading in rural areas would improve access and use [25] (p. 138). Moreover, he suggests that current subsidies in South Africa actively disincentivise older adults from using public transport. Sammer et al. [37] go even further in highlighting the intersecting, and accumulating nature of transport inequalities, referring to ‘mobility impairment’ more broadly:

“In the past, mobility problems of physically disabled or sensory-disabled people were the focus of attention, whereas, more recently, problems of the elderly have been recognized as well. However, if such problems concern other groups, such as immigrants and people with learning disabilities, they have been more or less neglected” [37] (p.46)

These findings highlight not only how disability can lead to exclusion, which comes about from a complex intersecting of factors, but also the inequalities this exclusion can create. It is clear from the

literature that disability can lead to inequalities more broadly within the transport sector, particularly with regards to access and inclusion, but also health inequalities more specifically. As noted above, this paper has not included the vast literature around road traffic accidents, the impact of which can be most severely felt by people in low-income countries, where there is often less regulated transport systems, poor infrastructure and limited availability and access to emergency services.

It is also clear that beyond these negative aspects, adults and children with disabilities may miss out on the mental and physical benefits of travel (see for example Vancampfort et al. [57] for a discussion about the associations between active travel and physical multi-morbidity). As Mindell [58] notes, disability and illness, along with age, is associated with 'non-travel'; and recent research has shown that urban residents in the USA with health conditions that limit travel, particularly driving, are more likely to limit their travel than their rural counterparts (Henning-Smith et al., 2018, cited in [58]). This is problematic from a number of angles, not least of which is social isolation and loneliness, all of which impact on mental and physical health. Transport policies that are good for health and reduce inequalities are low carbon, sustainable approaches, promoting active travel and public transport use, and reducing private car use [58]. Moreover, Mindell notes that in the majority of countries, motor vehicles are owned and used more by the rich while the adverse health effects, such as injuries, air and noise pollution, and community severance are experienced primarily by those with fewer resources [58] (p. 1). This implies that not only are people with disabilities less likely to travel, but they are at higher risk of the consequences of the overall health effects of non-travel.

There is also a cautionary note to this, in that much of the discussions around inclusion in the transport sector have not focused on sustainable alternative modes of transport, such as cycling or walking. It is worth noting that there is almost no literature that focuses on redressing these inequalities, from legislative or other perspectives, for people with disabilities, and there remains a gap in the literature addressing the inequities of the health benefits of active travel and transport for adults and children with disabilities.

4. Solutions and Policy Directions

From the evidence above, there remains a gap between global goals toward accessible, sustainable and inclusive transport provision and addressing the specific transport needs of children and adults with disabilities. Nevertheless, there have been attempts to address this gap, starting with policy. What lessons can be learnt from these, and are they transferrable to other contexts?

This growing shift is evident in much of the literature in the transport sector and reflects moves away from a more straightforward focus on accessible transport 'solutions' (e.g., infrastructure, connectivity, adapting environments and policies) to that of 'inclusive transport'—a broader understanding of the wider impact of transport exclusion (see for example [1,14]). Nevertheless, many guidelines still focus on physical access. In the UK, both public companies such as Transport for London, as well as private companies such as Uber promote themselves as accessible and inclusive. Inclusive transport is not only for people with disabilities but reflects a desire for a truly encompassing and integrated system. However, this is the central challenge—creating a system that works for everyone, whilst ensuring that the specific needs of individuals are catered for. Nevertheless, whilst some of these mechanisms have been aimed primarily at people with disabilities, including legislation and access standards, negative attitudinal and other barriers persist [21].

Having political backing may at least enable these issues to be raised in the first place. Many countries have developed context-specific access standards, including the Government of India, which supports a largescale national campaign on accessible public transport and buildings [59], though recent newspaper reports question how successful these have been [60]. However, whilst these access standards and audits can be contextually relevant, another barrier is the absence of agreed (and universally comparable) definitions over what constitutes 'accessible travel' or its opposite, 'transport impaired' travel. How are these measured if, as argued above, there has been a more general shift away

from ‘access’ to ‘inclusion’? In the wider development context, there are few tools or indeed markers, of what inclusion, participation or empowerment actually are, let alone how they are measured.

To address this gap, a team of researchers from Australia have developed and tested a set of tools which combined access audits and road safety audits with inputs from people with disabilities in Cambodia to create a ‘Journey Access Tool’ (JAT). The JAT is used to measure personal and interpersonal experiences on a regular journey taken by a person with a disability, for example when they utilise health, employment or education services, or wider community access. The authors caution that while the tools were overall a success in the trial, the interventions and interpersonal dynamics (e.g., the personal assistants, interpreters and relations of the people with disabilities) were more difficult to address, as there was a tendency for care givers and assistants to speak on behalf of the person with a disability or interpret their views, risking skewing the data. Key messages may also be overlaid or misinterpreted through the interventions of (often well-meaning) others [61]. Though the tool is only at the trial stage, these findings illustrate the crux of the debates about accessible transport provision: the extent to which it is the transport system itself, or wider systemic issues, that create the biggest barriers for people with disabilities. The examples provided here demonstrate that while overall there is an awareness of the need to shift from focusing solely on access—which can be measured and audited by sets of standards and other tools—to broader discussions on inclusion, what actually constitutes meaningful inclusion, as well as what disabled and other ‘transport impaired’ people want themselves, is still largely missing from the discourse.

Whilst it is clear from the literature that a conducive policy environment is necessary for accessible and inclusive transport, it is also clear that policies alone are not enough. As the examples from South Africa and other countries illustrate, without engaging with local political and other contexts, the best intentions can go awry. Integrating and upgrading locally available transport systems requires more than just accessible vehicles and paved roads. It also requires political will, budgets, monitoring of the process, and recourse if legislation or policy is not upheld. There also needs to be regular engagement with, and training of, public and private transport workers, unions and, crucially, people with disabilities with a range of transport and access needs themselves. Even then, the picture can be mixed. For example, another paper from South Africa highlights the positive changes that, they argue, have come about through constitutional and legislative changes in the country [62]. The paper explores taxi drivers’ experiences of, attitudes towards, and beliefs about passengers with communication difficulties in Gauteng Province. In addition to again demonstrating user preference for taxis because of the level of independence that they conferred on people with disabilities, the paper also found that the drivers included in the study viewed people with communication disabilities:

“... as equals, with no negative stigma to a communication disorder... Participants regarded individuals with communication disorders as ‘good’, normal people. This finding, arguably, indicates a positive and embracing culture rather than a negative and discriminatory one, facilitating participation and inclusion.” [62] (p. 6)

However, while the researchers credit the positive and enabling policy environment in South Africa for these findings, they acknowledge it is a small study, and the results are not necessarily generalisable to other contexts. They also note that many of the people with communication difficulties did not travel alone, which reduces their autonomy, as well as the strength of the research findings. Another recent piece, again in South Africa, draws attention to the very positive policy context in the country, in particular South Africa’s Bus Rapid Transport (BRT) services, and linked upgrading and integration of existing services to promoted accessibility. However, this has provided challenges to realise, due to the limited implementation of the BRT system and the majority of passengers that rely upon a combination of conventional buses, trains and minibus taxis. The authors note that:

“While we need to continue to improve the access offered in the formal system, the slow rollout means that the number of disabled people benefiting from these changes (i.e., ‘horizontal

equity’) are likely to remain proportionately very small for the foreseeable future.” [22] (p. 184)

Behrens and Görgens argue that there are two key reasons for this failure: over-expectation about the role of the state in delivering transport services on the one hand, while on the other, an underplaying of the role—and power—of the private sector (in this case, taxi-minibuses) in South Africa. They argue this has led to a lack of an understanding of the complexity of delivering the promised accessible and integrated transport system in a context where the formal (state) and informal sectors intersect, compete with and occasionally complement each other [22] (p. 185). They conclude that a key focus for the promotion of universal access in South Africa should be the minibus-taxi operations and provide a range of options to encourage this in line with existing policy. These include universally accessible infrastructure and wayfinding information provided at minibus-taxi ranks and at public transport interchanges; state-supported incremental fleet renewal of existing taxis to more accessible vehicles; a (partial) shift to user subsidies, for example, cashless fare collection technologies for designated passengers (eligible for concessions/subsidies) and financial incentives to the minibus-taxi operators to carry passengers who would otherwise not be served [22] (p. 194). It could be argued that the authors could have also included something around disability awareness raising and training—though perhaps, just the use of accessible buses, wayfinding information, etc. would raise awareness of drivers and other users anyway.

Finally, it is worth noting that there is a striking absence of literature from low- and middle-income countries on the extent to which the voices of any people with disabilities are included in arenas where transport policies are decided, monitored, evaluated or governed.

5. Discussion

Whilst throughout this paper we have been keen to demonstrate that there is no ‘one size fits all’ solution to the provision of inclusive transport, it is interesting to note that despite the diverse range of literature included here, the income levels of the countries and types of impairments written about, there are a number of common threads that emerge across the literature. These can offer some guidance about creating sustainable, accessible and inclusive high-volume transport systems in low-income countries that avoid some of the pitfalls outlined above. Addressing legislative, environmental and attitudinal barriers by improving access, delivering specific targeted services and policies and practices, as highlighted in the World Report on Disability [4] remain key. However, whilst transport is widely acknowledged to be a barrier to equity and inclusion, the size of the exclusion gap remains difficult to measure, and what works to close it remains difficult to know, particularly in low-income countries. This may be because of an overall lack of understanding about transport needs, in particular from the perspective of those who need it most and are most affected by these gaps. The voices of adults and children with disabilities themselves are rarely heard in the literature. We found very little evidence of discussions around costs or user satisfaction, particularly around new technologies. It is also apparent that transport is not seen as a right—yet without it, rights will not be attained. Understanding and appreciating the “full social benefit of mobility services” [38] (p. 590) is yet to be realised in many countries. There is then an urgent need for more research in this area.

It is also clear that more work needs to be done to support adults and children with disabilities to use transport services, but this should and could be done by integrating it more fully with other interventions, including education and livelihoods, shifting away from seeing it as a ‘transport’ issue per se. Overall, the research highlighted the possibility that improving general public transport (including door-to-door access) would enable more people with disabilities to use these services.

A supportive policy environment is necessary, as is a Universal Design framework, but it seems it is not actually the mode of transport that makes the biggest difference to use, rather convenience and autonomy. Even in countries with relatively good, regular public transport systems, and subsidised services (including paratransit services), many people with disabilities prefer to use cars (or taxis, and motorbike taxis—though there is very little on the use of motorbike taxis and people with

disabilities). If high volume transport networks are extended, it is worth considering how adults and children with disabilities can and will be included for the whole journey. To do this, there first needs to be a shift by providers about transport access as a right, based on freedom of choice, rather than as a welfare provision (whilst still acknowledging that some people may benefit from additional assistance). Viewing transport provision for people with disabilities as a welfare issue is tied to how current funding mechanisms and delivery structures target and work for people with disabilities (in particular, concessions and STS). Universal concessions remove some of this stigma but can be politically motivated; moreover, the evidence about their usefulness was mixed, with several reviews arguing the money would be better spent on general subsidies [25]. Nor was there much evidence in the literature on the commercial benefits of including adults and children with disabilities into mainstream (existing) transport structures, rather the focus has been on the costs of providing special transport services. Again, this is a lost opportunity.

In the examples from higher-income countries such as South Africa and elsewhere, one common theme that emerged was the need to ‘twin track’ [63] accessible and inclusive transport—both upgrading and ensuring new buses and mini-buses, etc. are accessible, but also actively incentivise bus and taxi drivers to pick up passengers with disabilities. This could be via a range of methods, including providing additional cash incentives (e.g., subsidising fares), but also providing training and education for drivers and vehicle owners. There should also be public awareness campaigns to promote transport as a safe space for all users, and recourse mechanisms for those who do experience discrimination whilst using public (or where possible private) transport. Such information could be collected through complaints mechanisms, even text-message numbers to report instantly, as well as from passenger surveys. All this information will lead to a rethinking of how to target resources more equitably—and effectively—based on evidence from the users themselves, and in turn help focus delivery of these resources.

However, none of this can be done without listening to the voices of children and adults with disabilities themselves. To date, there is very little research from low-income countries that genuinely includes these perspectives—what the absence of transport means to people with disabilities, why they do not use it, what would enable their access and increase their inclusion. Not only are their voices absent, but there is an almost total absence of any literature from low-income countries on the extent to which people with disabilities are included in governance and decision-making around transportation. Moreover, people with disabilities are not a homogenous group and their identities intersect across age, sex, social class, ethnicity, etc. Listening to these multiple voices and perspectives help us understand the transport and mobility needs (and rights) of other marginalised and excluded groups, including women, older adults and young people. This would seem to be key to moving the inclusive transport agenda forward.

Overall, the focus on inclusion still needs work to shift from a focus on solely access—which can be measured and audited by sets of standards and other tools—to broader discussions on inclusion. However, solutions need to be mindful of ensuring that the onus is put on adapting the environment, not the person, to ensure they are in line with the human rights principles of the CRPD. One issue that has yet to be resolved is how to measure and monitor transport access and inclusion for adults and children with disabilities across a variety of settings, with a range of impairments, incorporating issues of safety and security, independence and autonomy. Crucial to this discussion is what ‘inclusive transport’ actually means for people with disabilities, and not what other (often well-meaning) people think it means. It is clear from the literature that despite the lack of transport provision to rural areas both within low-income countries and globally, merely providing accessible transport to these areas will not be enough to increase inclusion. Evidence from urban areas shows that provision has not in itself universally increased public transport access in these areas in higher-income countries, and people continue to rely on cars for autonomy and convenience.

There is also a lack of evidence on what inclusion looks like—as noted above, though countries are tasked with developing their own indicators for the SDGs, it is unclear that these are being meaningfully

translated regionally or nationally, nor are there any agreed universal targets or indicators for inclusive transport. In order to deliver global commitments, as well as local ones, transport solutions need to move away from putting the onus on adapting the person and focus on adapting the environment and behaviour change. While there are some interesting examples of accessible transport solutions, including from low- and middle-income countries, there are almost no examples from low-income countries of systemic adaptations or accommodations, such as universal travel concessions for eligible passengers, or indeed any examples of prosecutions of companies or people who break the law regarding discrimination in access to transport in low- or middle-income countries. It is clear that significant knowledge gaps remain.

6. Conclusions

In order to move this agenda forward, a number of recommendations emerge from this review. The first is the need for much more research on what inclusive transport is—or should be—from the perspective of users in low- and middle-income countries, as noted, there is an overall paucity of research from low-income contexts to review. Secondly, there is a particular need for the voices of adults and children with a range of disabilities to be heard in order to better understand their transport needs. Thirdly, while the review has highlighted some positive examples of favourable policies and joined-up services facilitating access, as the example of STS demonstrates, this has not necessarily led to inclusion. In order to enable a shift to inclusion, planners not only need to consider access from a holistic perspective (Universal Design, whole journey approach, subsidies and adapted/specialised services), but also as a right (for example the right to health, education, etc.). In order to do this, planners should consider a ‘twin track’ approach to inclusive transport—making improvements to services, training staff, etc., whilst at the same time ensuring that the specific needs of adults and children with disabilities are met. The review has also highlighted how travel and access needs change over time and vary according to a range of factors, including age and location—one size will not fit all. This does not mean accessible approaches cannot be implemented, but planners will need to listen carefully to a range of voices to understand who may be left out, and what alternatives can be developed for them.

In order to facilitate this shift, incentives for existing structures should be developed, taking passengers, transport providers, drivers, unions and other key players into consideration. It is vital that people with a range of impairments are included in planning discussions, on access panels, and in audits of existing services and structures. Linked to this, governments need to develop a locally and contextually appropriate sets of standards, targets and indicators, in collaboration with local disability organisations (e.g., disabled people’s organisations) to measure availability, accessibility, affordability, acceptability and quality, as well as safety and security, independence, and autonomy. Complaint mechanisms for users must be developed and adhered to, with appropriate recourse mechanisms, and disciplinary measures for those that do not adhere to them.

Finally, the review has only been able to touch on the range of technologies available to facilitate access and inclusion—much more research on existing and new enabling technologies appropriate for low- and middle-income country use is needed.

Author Contributions: Article conceptualisation, M.K. and J.T., methodology, M.K. and E.C.; validation, M.K. and E.C.; formal analysis, M.K. and E.C.; investigation, M.K. and E.C.; resources, J.T.; data curation, M.K.; writing—original draft preparation, M.K.; writing—review and editing, M.K., E.C., and J.T.; visualization, M.K. and J.T.; supervision, M.K. and J.T.; project administration, M.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by UK AID through the UK Department for International Development under the High Volume Transport Applied Research Programme, managed by IMC Worldwide.

Acknowledgments: The authors would like to thank Gina Porter for her comments on an earlier draft of this paper.

Conflicts of Interest: The authors declare no conflict of interest.

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