State of the Knowledge Study on Age, Disability and High Volume Transport in Developing Countries

FINAL REPORT

Prof Gina Porter
Dept of Anthropology
Durham University
UK
in Partnership with
Dr Maria Kett, Institute of Epidemiology and Health Care
University College, London
and
Mark Gorman and Sion Jones
Help Age International, London

September 2019

HIGH VOLUME TRANSPORT
APPLIED RESEARCH

UKaid
from the British people

Reference No.	HVT/008.001
Lead Organisation/ Consultant	Prof. Gina Porter, Durham University
Partner Organisation(s)/ Consultant(s)	Dr Maria Kett, UCL and Mark Gorman and Sion Jones, HelpAge International
Title	State of the Knowledge Study on Age, Disability and High Volume Transport in Developing Countries
Type of document	Project Report
Theme	Gender, inclusion, vulnerable groups
Sub-theme	Youth, Older People, Disability
Author(s)	Prof. Gina Porter, Dr Maria Kett, Mark Gorman, Sion Jones
Lead contact	Prof. Gina Porter
Geographical Location(s)	Global
Keywords	Children, Mobility, Transport, Africa, Asia, Youth voice, Road safety, Ageing, Disability, Gender, Poverty, Urban, People with disabilities, Inclusive transport, High volume transport, Accessible transport, Youth, Older people, Developing countries, State of knowledge.

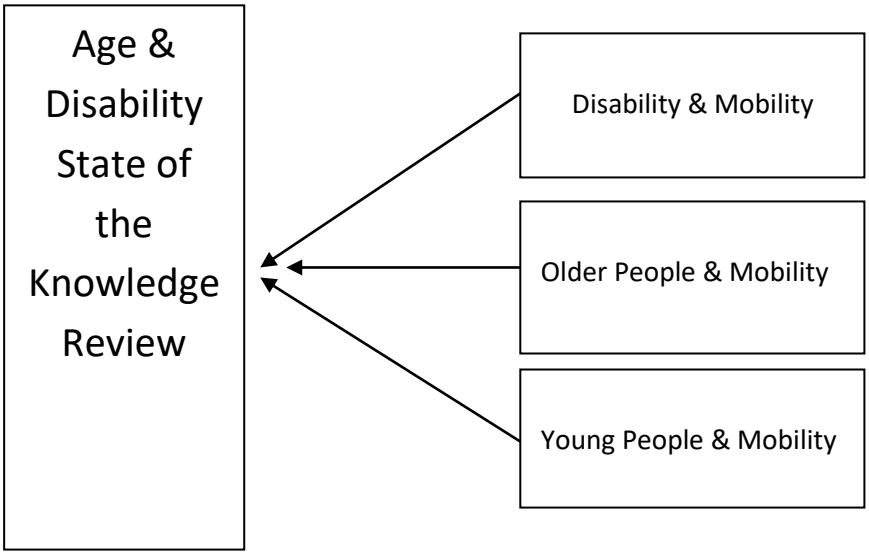
DISCLAIMER: This research was funded by UKAID through the UK Department for International Development under the High Volume Transport Applied Research Programme, managed by IMC Worldwide.

Table of Contents

Executive Summary

The Department for International Development (DFID), the United Kingdom's international aid agency, had begun a five-year research programme on high volume transport (HVT). The first phase of that programme has been to assess the existing state of knowledge of HVT, which will inform a second phase of research in the programme. This final report details the work conducted so far on the Gender, Inclusion and Vulnerable Groups theme of the HVT programme. The main objective of this research theme is to understand how high volume road and rail transport situations in urban areas and along long distance transport corridors can negatively affect or exclude women, girls and other vulnerable groups.

In order to develop an understanding of the knowledge in this widely defined area, a series of contractors have delivered a series of focused pieces of work related to specific areas and gaps in knowledge in the area of inclusion and transport. The work described in this final report covers five specific areas of work:



- Disability and Transport
- Older People and Transport
- Young People and Transport

All five studies have found some common themes. All studies have found very limited levels of specific research addressing the issues concerned on developing countries. They have as a result drawn parallels from the much greater amount of literature related to the context of the Global North and drawn parallels, where appropriate, for global phenomena or patterns.

All three studies have highlighted the need to understand any particular issue of inclusion in a holistic and inter-sectoral manner. They highlight the difficulty of just focusing on ageing without an understanding of the impact that gender plays on the experience of growing older in developing contexts, for example. As a result, they make the case for research in these areas to be undertaken in an integrated manner in order to understand and incorporate these cross-sectional concerns.

All studies also highlight the need to improve methodological approaches to measuring degrees of inclusion and equity. Furthermore, there is an overall agreement across the studies on the need for more in-depth detailed social and behavioural science research on needs and patterns of different vulnerable groups that features methods that include such vulnerable groups in the development of the research understanding.

The initial draft recommendations from the State of Knowledge reviews in this theme highlight four main themes:

- **Data issues**
- **Technology**
- **Inclusive HVT Planning**
- **Intersectionality**

Data

- In-depth social research to identify the issues facing young and older people and people with disabilities across transport systems in developing countries

Technology

- What scope is there for enabling technologies for people with disabilities and older people, appropriate for low and middle-income country use?
- How can we design smart mobility and smart-city solutions with a particular focus on creating inclusive settlements?
- What is the impact of mobility as a service and uber-type transport service delivery for inclusion and equity issues in urban areas?

Inclusive HVT Planning:

- Linked to this, persons with a range of impairments must be included in planning discussions, on access panels, and in audits;

- Governments need to develop a locally and contextually appropriate set of standards, targets and indicators, in collaboration with local disability organisations (e.g. DPOs), which also measure access, inclusion, acceptability, as well as safety and security, independence, and autonomy;

Intersectionality

- In-depth research is needed to understand the interactions between gender, age and disability and road danger; the role of road safety in causing disability; the role of disability in extenuating poverty. The interactions between older age and disability need to be understood in the context of mobility so that no one area of inclusion/exclusion is isolated.
- How to fuse spatial development and relocation policies to improve women's opportunities – wrt education, health and employment?
- How to frame a multi-sectoral approach - ensure mobility for women, people of different ages and mobility levels (both urban and rural) to ensure their access to employment/markets, education, health centers?
- The impact of road safety on disabilities
- Planners need to consider a 'twin-track' approach to inclusive transport - travel and access needs change over time and vary according to a range of factors – one size will not fit all. This does not mean access approaches tailored to individual groups 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;
- Planners much consider access from a holistic perspective – the whole journey approach, not just transit routes etc;

1. Introduction and Overview

Women and girls have a particularly high transport burden, given that they are responsible for the majority of travel associated with domestic provisioning activities (e.g. food, water and fuel), have less access to private vehicles and have higher safety and security concerns. Safe, reliable and affordable transport services are key to improving women's mobility. However, there has been little research on distributional impacts of transport infrastructure. Informed policy on gender-sensitive high-volume transport could lead to more inclusive infrastructure benefits and better outcomes for women, girls and other vulnerable groups. On public transport, women and children can be vulnerable to physical and verbal harassment. Operator policies and poor siting of bus stops and termini can increase real and perceived dangers for women and children and for other groups, such as the aged or disabled; it can thus prevent access to transport services.

Women may not benefit from or could be adversely affected by high volume transport. Urban transport systems tend to suit men, who have routine travel patterns between home and work during peak hours. Travel patterns for women involve more frequent short journeys during off-peak hours and longer travel times. Women tend to have less access to private transport compared to men, disadvantaging women workers disproportionately. New roads and rail links can make women more vulnerable to health and safety risks, including HIV/AIDS and human trafficking. Women and girls also risk verbal abuse, sexual harassment and violence on public transport systems. In some cultures, sexual harassment, which can lead to girls being ostracised or even to suicide, is prevalent on streets, taxis, bus and rail systems. There is also need for more evidence-based strategies for improving the participation of women in the provision of high volume transport infrastructure, operation and services.

Objectives

The main objective of this research theme is to understand how high volume road and rail transport situations in urban areas and along long distance transport corridors can negatively affect or exclude women, girls and other vulnerable groups. The contractors in this theme are delivering these objectives through a series of focused pieces of work related to specific areas and gaps in knowledge in the area of inclusion and transport. The contractors will also engage in communication and collaboration with other contractors across the other 3 HVT Themes in order to minimise overlap in effort and also to support the mainstreaming and integration of Inclusion into all areas of HVT.

Purpose

Research in this theme needs to identify gaps and point to solutions that will make road and rail passenger transport safe, accessible and inclusive.

Scope of Work

Research questions for the Part 1 state-of- knowledge paper and scoping for feasibility of follow-on research are guided by the overall Terms of Reference given by the HVT business case. The research questions that the Scope of Work in Theme 4 seeks to answer include:

- What are the constraints and needs of the poor, women and girls and other disadvantaged or vulnerable groups when accessing public transport in low income countries in Africa and South Asia and how do these differ for formal and informal transport?
- Women and children often have different transport use patterns than men. Often these are shorter distances, more frequent journeys and at non-peak times. How does this impact on transport access needs for women and children?
- How can new technology and potential solutions from HIC help and be adapted to improve the transport opportunities, safety and security for women and girls and other disadvantaged groups accessing high volume transport?

The final outputs of Part 1 for this Theme will be a series of high-quality robust evidence products as state-of-knowledge papers meeting the research objectives on gender and vulnerable groups and road safety. These will include:

- Three Draft State of Knowledge (SoK) papers on disability and transport, older people and transport, and on young people and transport, each with associated bibliographies suitable for publishing in a peer-reviewed journal .

All papers will identify any significant and relevant evidence gaps affecting high volume transport in the context of the transport themes considered in the project (urban transport and long distance passenger transport). Examination of case studies (developing/developed) will form an important element of the evidence base for work under this theme and will look to draw out lessons and experience that can provide workable and affordable solutions for low income countries in Africa and South Asia. Part 1 will also provide recommendations for research questions for Part 2.

2. Methodology

This section describes the processes followed across core areas of this Theme in order to gather appropriate literature to review and identify research gaps and future research areas.

2.1. Disability & Transport

Whilst this was not in any sense a systematic review, a search was done of the literature to garner the key themes. There is a large volume of literature on the broad theme of 'accessible transport', and an initial search was conducted using the Web of Science database in January 2019. The search operator was developed, based on similar operators used in other thematic areas of this study, to include as wide a range of types of impairment as possible in selected geographical regions,[1] and return results based on various transport-identifying expressions.

> *((disab* OR impair* OR blind OR deaf OR (intellectual AND (disab* OR impair*))) AND travel AND (Africa OR Asia OR Latin America)) OR ((disab* OR impair* OR blind OR deaf OR (intellectual AND (disab* OR impair*))) AND mobility AND (Africa OR Asia OR Latin America)) OR ((disab* OR impair* OR blind OR deaf OR (intellectual AND (disab* OR impair*))) AND transport AND (Africa OR Asia OR Latin America))*

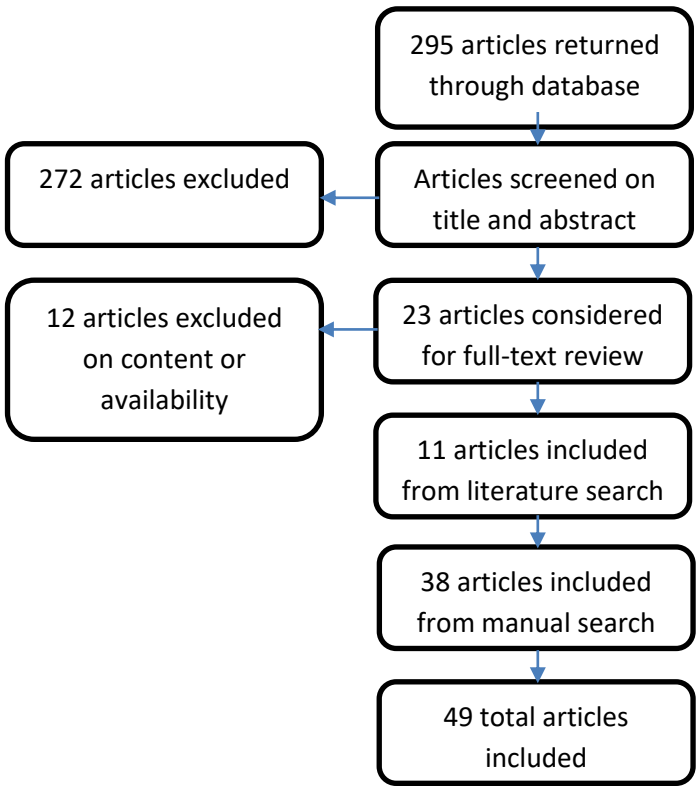
Results that were written in English from the year 2008 to present were chosen for review. This year was chosen as it represented both an approximate 10-year timespan but also marks papers written following the coming into force of the CRPD. Inclusion criteria were reports that focused on persons with 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 on road safety; or that around active transportation. These are of course relevant to wider discussions about policy but were not the main focus of this review. 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 per se, 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. This process is set out in Figure 1.

[1] A limitation of this approach is that if an article was about a specific country (e.g.) Kenya and did not mention Africa, then it might not have been picked up.

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.

A total of 49 articles were included in this review. We have grouped together the main themes that emerged from this body of literature, as well as from existing literature and knowledge in the field and these are described in Section 3.2.

Figure 1 Literature review process



2.2. Young People & Transport

This paper reviews available published and grey literature on young people's transport and mobility experiences and potential in order to identify major research gaps. It draws on the authors' personal knowledge of literature in this field, searches in transport/mobility journals and Google Scholar, plus Web-of-Science searches undertaken for the period 2000-2019 using the following search terms: Young people/Children/Youth AND Transport/Mobility AND Africa/Asia/Latin America. Overall references in Web-of-Science are far fewer for Asia than for Africa and even fewer still for Latin America: for instance a search on Young people AND mobility AND Africa produces 63 references, but only 19 for Young people AND mobility AND Asia (and just 8 for Latin America); Children AND mobility produces 176 references for Africa, 62 for Asia and 28 for Latin America. Literature specifically focused on young people with disabilities is reviewed separately in the companion paper by Maria Kett. There was insufficient space to review the substantial evidence regarding the broader importance of transport services for the health of children and young people beyond the traffic accident issues noted in the paper, for instance regarding vaccination, maternal health, access to TB, malaria and eye treatment, to ARVs and sexual and reproductive health; also in

terms of the effect transport and road infrastructure has on health professionals' decisions re work place selection.

Overall, the review draws on literature from a diversity of disciplines, extending from transport studies and health sciences through to the social sciences (notably geography and anthropology) where interest in mobilities research has expanded significantly over the last decade. Where possible, the spotlight throughout is on young people from poorer households, since poverty and mobility intersect and interact in complex ways and this needs far closer attention. Youth transport issues are set in their global context but with particular reference to LMICs, especially countries in Africa and Asia. Africa is the focus of particular attention in this paper because it is demographically the world's youngest continent: by 2050 the estimated number of young people entering the labour force in Africa will exceed that of the rest of the world combined.

3. Research Findings

This section sets out in detail, the research findings gathered from a review of the pertinent literature across of the 5 core and secondary areas of:

- Disability & Mobility
- Older People and Mobility
- Young People and Mobility and

3.1. Disability & Mobility

3.1.1. Patterns of travel behaviour and experiences

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:

> "Although social exclusion involves many issues in which transport dimension is peripheral (e.g., poverty, and politics), better transport overcomes many problems associated with social exclusion enabling people to reach essential opportunities. A number of studies have demonstrated that a lack of access to transport results poor access to goods and services and consequently leads to social exclusion. As a result, the focus of transport policy is to take into account the needs of those who are transport disadvantaged to reduce transport-related social exclusion. [16] (p.1)

However, they go on to note:

> "…social exclusion is often a misunderstood, poorly defined and poorly measured construct. As a result, an operational and theoretically sound measure of transport disadvantage in assessing social exclusion is almost absent." [16] (p.2)

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 do make, the modes of transport they use, and their overall experiences of the journey, in particular from a participatory perspective. We have included what include what little we could find in the review.

To deliver an inclusive transport system requires a joined-up mechanism 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. [17]). 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 using public transport. The UK has made significant advances in accessible transport in terms of policies, strategies and implementation, and in line with national and international commitments [18]. However, despite these efforts, many of the challenges faced by disabled people in the UK may be all too familiar for people with disabilities in other countries too:

> "Many day-to-day problems for disabled people stem from confusion over the rules, poor or insufficient communication, inadequate training, and/or a lack of enforcement." [18]

Whilst this acknowledges that the problems are systemic, rather than with the people with disabilities themselves – for example, inadequate staff training, and crucially, lack of enforcement of existing legislation and policy – it also highlights the persistent gaps that persons with disabilities still face to inclusive transport globally.

3.1.2. Urban Transport

Of course, reducing environmental barriers has been hugely beneficial in increasing access to transport for people with disabilities, along with technological advances and policy provision. Researchers comparing access to urban transport systems in the US, UK and Hong Kong note:

> "It was revealed that perceived safety and level of service of individuals with impaired mobility is remarkably enhanced after the introduction of accessible design of transport stations/bus stops. The walking environment was also found to affect the level of satisfaction and perceived safety and security, especially for individual with impaired mobility and the elderly. In addition, public transport journey time of individuals with disabilities could be reduced, and travel and activity participation could be enhanced. It was suggested that accessible design should be implemented from the perspective of an integrated network approach, and priority should be given to passenger concentration points in the multi-modal transport system. Given advances in information technology, it is essential to enhance the availability of geospatial information of accessible facilities for pre-trip planning and real time navigation, to improve travel time reliability." [19]

What their review highlights is the need for a comprehensive approach to accessible transport that incorporates design, technology, policy, and environmental factors to really address issues of access for people with disabilities. However, taken together, these approached may still not fully address social factors – a point we will return to below.

In attempts to avoid 'peak car'[i] and achieve global goals to reduce carbon emissions, those working in the field of high volume transport are creating scenarios that aim to leapfrog car-use (particularly private car use), to focus on sustainability – better for both environmental and human health. There is often an emphasis on cycling [20]. However, particularly in higher-income countries, this can be at a cost of other factors - for example, an increased focus on cycling may be to the detriment of persons with certain mobility restrictions who use cycle lanes [21]. Therefore, whilst these approaches address key issues such as health and sustainability, there may be a trade-off with greater inclusivity.

Many of the efforts to reduce car use and improve high volume (often public) transport have been in urban areas, in particular, cities. Again, these efforts also raise questions about access and inclusion (particularly in higher income countries), as for many people with disabilities, cars and/or taxis offer freedom, independence and mobility, which public transport may not. Research in a number of countries has shown that persons with disabilities do 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 bus services, such as in rural areas. Cars can confer a level of independence, autonomy and safety that users do not always feel on public transport. Other factors include availability of transport services, and fear – both of how to use the services as well as other passengers' attitudes. Many users do not feel safe 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 for in their journeys to school [11-12].

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 is progressive legislation 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 – though anecdotally, not all the MRT buses are fully accessible, so users who need them have to wait for 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 [24]. 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 [24].

3.1.3. Long Distance Journeys

According to the literature, people living in rural areas who need to make long-distance journeys are generally less well serviced by public transport; in part due to cost, but also reduced demand, which in turn leads to reduced service, and so even less use. Mattson et al outline a choice-based model they developed to estimate demand for rural intercity bus services in North Dakota, USA, where a lack of transport is one of the biggest barriers [25]. Exploring how a range of intersecting factors such as age, sex, disability, number in travel party, reason for journey etc. impact demand, they assess preference for four different modes of high-volume travel (bus, air, rail and car). They noted that in this context, people with disabilities were least likely to choose car or plane and more likely to choose bus or coach. The model they developed was to measure demand in rural areas, so may not be transferrable to other areas or countries. However, it does go some way to illustrate the complexity of factors that 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 [26-27]. However, there is limited data which quantifies the amount of these additional costs, or costs of lost opportunities, For example, for adults and children who cannot afford transport to make (often long-distance) journeys for educational or income-generation purposed, or access other services and activities. We will discuss some mechanisms in place to ameliorate these additional costs below.

3.1.4. Other Choices

Recent evidence from the UK and other higher-income countries offers some insights about transport use, and how the choices people make changes over the lifespan, as well as varies according to impairment type, location and age [18]. This makes a 'one size fits all' solution difficult, but the favourable policy environment and widespread availability of transport concessions (mainly concessionary travel passes) in the UK has no doubt impacted positively on the choices people with disabilities make about what mode of transport to use, given the

range available. For example, while buses are popular in the UK, they are not utilised by a significant minority (including those in very rural areas, or people with disabilities). A similar observation was made in the USA for both adults [25] and children and young people [28], making it difficult to draw any concrete conclusions as to which, if any, specific transport sector governments should invest in. As noted above, cars continue to be valued for the independence they confer; for example, a review of data for the UK highlighted how older people, especially women in Scotland, preferred cars as public transport was not felt to meet their needs [29]. The researchers therefore concluded that funding for incentives such as free bus passes would in fact be better spent elsewhere (including improving the driving safety of older drivers) as it was not achieving the aim of reducing private car use. However, they also acknowledged that in the UK, this was more of a political issue which is now entrenched as an expectation and would require strong political impetus to discontinue [29].

3.1.5. 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?

3.1.6. *Shift from access to inclusion*

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 [11-12]). It is also debatable as to the extent of this shift, for example, many guidelines still focus on physical access. In the UK, both public companies such as Transport for London[ii], as well as private companies such as Uber[iii] promote themselves as accessible, though perhaps to a lesser extent, inclusive. Inclusive transport is not only for people with disabilities, but reflects a desire for a truly encompassing and integrated system. This is perhaps the central challenge – creating a system that works for everyone, whilst ensuring that the specific needs of everyone are catered for.

Several of the mechanisms in place to try and achieve equity and inclusion have been aimed primarily at people with disabilities, starting with legislation and access standards. However, even in countries with such legislation in place, including the UK, negative attitudinal and other barriers persist [18]. 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, who support a largescale national campaign on

accessible public transport and buildings,[iv] though recent newspaper reports question how successful these have been.[v] 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 carers 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 [30]. 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, remains missing from the discourse.

3.1.7. Innovative approaches

While the idea of a barrier free, door-to-door journeys is not new, new ways to conceptualise what a 'total' journey, or 'continuity of travel chain' or even 'integrated mobility' might look like, bringing in age, health or mobility status and other intersectional aspects are being developed that move away from the 'special transport' models discussed above to more integrated approaches. As noted above, recent research in higher-income countries demonstrates, for example, that bus use is determined by location, age, impairment type and other factors, so what works in one location or for one group may not be effective or utilised in another. For those people with disabilities for whom the most

convenient form of transport is a car, this can lead to an over-reliance on personal car ownership, which is good for neither personal or planetary health. For people living in lower-income countries, and/or where there is a lack of availability or money, walking is the most likely transport option, or hiring a vehicle (car or motorbike). There is very little literature which discusses the impact of walking or cycling – or lack of – on people with disabilities, but increasingly discussions are turning toward thinking about a more holistic approach to travel, which includes more sustainable methods that enable people to gain or maintain independence and mobility.

Universal Design has had a major role to play in improving continuity of the travel chain both for persons with disabilities (see for example [31] on the design of bus terminals). However, this requires users to get to stations or terminus, which for some users is problematic. Approaches to the total journey (door-to-door) fall largely into two categories: general transport services that can be booked from door-to-door; or specifically targeted services. These will be discussed in turn.

3.1.8. Mobility as a Service

One of the most innovative and exciting area that links up discussions about autonomy, choice, continuity of journey as well as brings in new technology is that of 'Mobility as a Service' (MaaS). Not specifically designed for persons 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." [32] (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 payment method system (similar to the Oyster Card in London).

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. Such an approach – which could be applied in lower-income settings, using a range of transport options – has the potential to offer people with disabilities increased opportunities for self-determined, autonomous and inclusive whole

journeys. Although talking about Australia, and therefore a higher-income context, researchers highlighted the potential advantages of this approach:

> "It was noted that these [packages] could be viewed as similar to existing transport and welfare service offerings where the client made a decision as to how to spend a total amount on the services they require. One potential advantage would be to spread costs and make the more expensive individual journeys less visible through bundling with the less expensive social outings. There was cautious optimism about the use of other modes as part of service delivery (e.g. liftsharing, car clubs, Uber etc) although it was noted that clients require a certain level of care" [32] (p.589)

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 [32] (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 in Australia (and elsewhere). However, they caution, it needs to be seen as part of an overall paradigm shift:

> "The MaaS approach offers the possibility to take mobility to another level where transport or mobility is not simply regarded as entitlement (under threat by Government cuts) but an essential part of engaging in society. However…[it] will only ever be of limited success until the full social benefit of mobility services is recognised." [32] (p.590)

Their last point, about the *social* benefits of mobility is reflected in a great deal of the research around technology as an enabler, which encourages mobility, and in turn increases socialisation and engagement.

3.1.9. Transport services available

While MaaS offers an exciting potential for people with disabilities, it was not (necessarily) designed specifically *for* persons with disabilities, 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, and not specifically for people with disabilities. 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 lower-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.

One area of transport provision that does aim to address this lack of mobility are special transport services (STS). These are designed to address this service gap and are usually (though not exclusively) for people with mobility difficulties, such as older adults or people with disabilities They are also usually (though not exclusively) publicly funded, or at least subsidised. Not exclusively the preserve of higher income countries, there have been some well-reported models in South Africa, Brazil and Russia (see for example [6] p.178 - 184). However, 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 [33] p.4); and cost. In some countries, provision of STS (e.g. to schools, hospitals etc.) is a mandated requirement by law, though provision can be costly, and demand likely to increase with an ageing population. In Sweden, STS is one of the components of the public transport service, and where responsibility for delivery of this service shifted from municipalities to regions in 2010. People using the service pay a comparable fare to regular public transport routes, with the number of permitted journeys varying by county. Researchers in Sweden undertook a review of the impact this change in policy, budget and implementation responsibility has had on service delivery. They concluded that there was mixed evidence for cost reduction with the transfer, with results depending on a range of factors such as rurality of location, purpose of journeys (e.g. to school), and level of existing public transport provision – higher levels of public transport service contributed to fewer people using STS in Sweden, which, they conclude, may contribute to reducing the total costs of STS [34]. Though these findings are from a wealthy country with high levels of service provision, they do have some implications for decentralised budgets elsewhere – not least 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.

STS (also known by a variety of other names, including 'paratransit, or 'dial-a-ride') not only vary in name, but, as outlined above, 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). According to one study from eThekwini Municipality (South Africa), the Dial-a-Ride service 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 where also made [24] (p.35). One of the accessibility consultants recruited for the whole programme told the research team that he thought the money used for Dial-a-Ride would have been better spent on a subsidy system, as it would have reached more people for the same cost, and even went as far as to say that the subsidy could have been incorporated into the national disability grant, and so would have been funded by national government until such time as all transport is universally accessible. However, another of their informants thought it should be the drivers, not the business owners, who should benefit from any subsidies, and proposed that taxi drivers got issues with free vouchers that could be used for education or skills training – which in turn would create incentives for drivers to pick up passengers with disabilities [24]. Both these people reiterate the possibility that improving general public transport (including door to door access) would enable more persons with disabilities to use these services.

An excellent practical guidance for setting up STS, including state and non-state funding mechanisms, is provided by Tom Rickert [35]. The guide includes existing locally available transport mechanisms, including motorized 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 several ways - pre-booked, scheduled or instant access. In many respects, including a range of locally available transport options which can be flexibly organised sounds very much like the MaaS approach outlined above, and as such, strengthens the idea that public transport provision needs to move away from traditional delivery approaches.

It also addresses the challenge that the provision of special transport 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 [36] (p.54). However, as pointed out about MaaS, if users require a high degree of assistance, there are still limitations in transport current provision around driver capacity, attitudes and willingness to provide such

services. Another criticism of STS – which may also be mitigated by a move to the MaaS model – revolves around the extent to which such systems include alternative (as well as sustainable and healthy) modes of transport such as cycling or walking. To date, there is limited evidence, particularly in low- and middle-income countries, of innovations in this field, but there are a number of technology-based tools offering opportunities for accessible and inclusive travel, which confers users with autonomy and independence, which we will now turn to.

3.1.10. Technology

In addition to specific technologies that enable access and inclusion discussed below, advances in technology have enabled improvements across all of the other domains discussed here, for example, to support the provision of services such as Uber and MaaS, 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,[vi] in particular how it can support and maintain independence. 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. In Belgium, such a device has been piloted with some success for one specific group of travels, people with intellectual disabilities. The researchers noted that the main travel barriers for this group were unfamiliarity with services, fear, and lack of confidence – none of which were addressed by structural adaptations that largely focus on access, such as adapted buses or dropped kerbs [37]. The researchers found that for this group, it was the social aspects that prevented them using public transport, so they designed a tool to help overcome these barriers. The travel training tool (‘*viamigo’*) works with both (real) personal coaches as well as a tool (in this case a watch or app) which works via a web interface to train users to learn regular routes, identify points of familiarity (and danger), eventually coaching users to manage them independently. Multiple routes and modes of transport can be incorporated into the device, which can also monitor the route being taken (‘geo-fencing’) and send real-time information to the coach. Initial trials in Belgium have been promising [37]. Davies et al. [13] gave a similar example of a successful trial using a similar GPS-based device to enable persons with intellectual disabilities to travel independently on buses in the USA.

Researchers in Germany – another high-income country with overall good transport links and access – asked about the major transport issues for people with disabilities in the Rhine-Ruhr region [38]. The biggest challenges identified were lack of information about the services and dealing with uncertainty. Their project ('project mobile') aimed to holistically address these issues though three key mechanisms: customised advice; adaptable interactions with the system; and provision of services from door to door. In order to deliver such a service that would be inclusive of all users, including those with intellectual impairments, researchers used a range of systems including GPS, Bluetooth, wearable devices, and augmented reality to test routes and develop scores for level of difficulty, resources needed etc. The overall aim was to improve disabled users total travel experience in an existing 'well-meshed' public transport network [38]. While the project was ostensibly presented as a 'success', with the potential to be scaled up across a range of settings, the research presented no discussion of cost, or user satisfaction, so it is difficult to attribute success from these perspectives, a common issue for much of the technology-focused research.

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 uncertainly 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 such as the Oyster Card system used in London, whereby a single card can be charged with credit and used across the entire public transport network. 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, similar to Oyster. However, 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 [24] (p.40).

Similarly, in their findings from the Philippines, Cendana et al [39] argue that such single use smart card use could be a mechanism for a more people-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.

These varied examples give a flavour of the role that technology can and is an improving access and inclusion in many high- and middle-income countries. Many of the lessons learned could be shared with lower-income countries, in part to enable them to leap-frog some of the outdated, exclusionary and environmentally unsustainable transport mechanisms already trialled, such as diesel buses. 'MaaS' and other user-led mechanisms have the potential to radically shift ideas about what inclusive and accessible mass or high-volume transport might look like in the future. But 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 [12]).

Moreover, focusing solely on access tends to lead researchers to create solutions to overcome physical and environmental barriers, rather than attitudinal or social barriers. As a team of researchers from Norway argues in their critique of current approaches to accessible travel, approached such as Universal Design do not address many of the social barriers to travel [40]. To overcome this, they advocate for a greater focus on enabling strategies such as travel buddies or 'travel 'training' for people with disabilities, in addition to STS and other more individualised solutions uses. However, such interventions raise the issue of cost and affordability on the demand side, and investment on the supply side.

3.1.11. 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 [41-42].[vii] However, transport poverty is hard to measure, and there are no universally agreed definitions; moreover, some question if it even exists as a stand-alone phenomenon or if 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? [42] (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 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. The provision of concessionary transport has been hailed as an overall success, though some argue it is as much a political success as an access one [29,43]. One third of all bus trips taken in England are taken with concessionary travel passes (CTPs) [43] (p.114). In his review, Mackett also highlights the wider benefits that CTPs can confer, including increased access to services and facilities, increased exercise (e.g. walking to bus and train stops) and increased social interaction, all of which have benefits to health and well-being [43] (p. 117). The provision of CTPs in the UK is based on eligibility criteria, including age and/or disability status, which even in the UK presents a number of administrative challenges.

South Africa also provides a heavily subsidised public transport system for older adults and persons with disabilities [26, 44]. 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, rather than subsidies:

> "On the question of whether disabled and elderly people face particularly severe affordability-related problems, the data did not clearly indicate this to be the case… It is the inaccessibility rather than the unaffordability of transport that disabled people tend to regard as a more serious constraint to their mobility. 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. [26] (p.138)

Such universal coverage may also help overcome the likely eligibility challenges – assessment criteria for persons with disabilities for CTPs, or indeed other state provided social protection mechanisms – is already a complex and much debated issue particularly in lower-income countries which have limited mechanisms for assessment [45]. However, most of the debates in the literature about 'special transport' 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.

3.1.12. *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's 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, for example) for persons with disabilities [26-27]. This gap exists across high- [17] 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. [24, 46-48] – see also section 6 below). These make it is difficult to attribute transport – or lack of – as a singular cause for exclusion, or even poverty, as outlined above. In recent research undertaken by the author in Liberia [49], 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 aspect of life and is highlighted in many papers (e.g. [12, 50]), 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 [26] discussing the situation in South Africa:

> "…the data confirm that vulnerable groups see transport affordability as a significant problem, especially rural and low-income populations. However it appears that the actual impacts of unaffordability, in terms of constraining necessary travel, vary significantly according to a person's geographic environment. In urban areas transport unaffordability limits some travel for the poor generally, but not for disabled and elderly travellers specifically: for them, trip-making is constrained more by accessibility limitations than by cost concerns. In rural areas, trip-making is constrained for everybody, by limited opportunities at least as much as by affordability problems. It follows that, in both cases, improving the affordability of transport (for instance by subsidising fares) may benefit some users, but that other more binding constraints on mobility, such as limited transport availability and quality, need equal attention." [26] (p.129)

Another paper outlines a methodology developed to measure access to available jobs by public transport for individuals with and without a physical disability in 'socially vulnerable' areas in two Canadian cities: Montreal and Toronto [33]. Whilst perhaps not without some design faults – not least that access to the actual location of the jobs is not the only factor

impeding or enabling people to get a job, though it certainly contributes – the study does quantify how transport can stymie opportunities. The findings highlight the contrasts between the numbers of accessible jobs by public transport for wheelchair users compared to the general population. Wheelchair users in Toronto, which has more accessible facilities, have (potential) access to 75% of jobs that are accessible to users that are not in a wheelchair, whilst their counterparts in Montreal have access to only 46% of the jobs accessible to other users [33] (p.1). Not only does this study provide an opportunity to highlight intersecting disparities within the transport system, and by extension, where federal agencies should invest as a priority, but it also highlights unintended consequences of the same federalised system in Canada as though there is overarching legislation it is interpreted and implemented differently in each state [33] (p.4). One outcome of this is that the likelihood of an accessible 'whole journey' across Canada is slim, unless alternative (and more costly) services are offered as supplements. This in turn lessens the opportunities for accessing leisure and services.

3.1.13. *Policies and political environments*

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 show, 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. But again, as the example of the taxi drivers from South Africa discussed above shows, these are still not enough. There 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 highlight the positive changes that, they argue, have come about through constitutional and legislative changes in the country [51]. 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 individuals with communication disorders 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." [51] (p. 6)

However, while the researchers credit the positive and enabling policy environment in South Africa for these finding, they do it note is a small study, and the results not necessarily transferrable 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 on 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 challenging to realise, with the result that:

> "The reach of the BRT system remains limited to just a few corridors where it has been rolled out, and so the majority of passengers continue to rely on a mix of minibus taxis, conventional buses, and trains. 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." [44] (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 and occasionally complement each other [44] (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 [44] (p.194). It could be argued that the authors could have also included something around disability awareness raising and training – though perhaps just by the fact of using accessible buses, wayfinding information, etc. would raise awareness of drivers and other users anyway.

Even higher-income countries are accused of a lack of understanding of the complexities of inclusive transport provision: researchers from Austria argue that despite extensive legislation:

> "Current transport policy, with its various measures, does not reflect the complexity of the problems and barriers affected people have to face. Besides the typical physical and

> constructional problems, people affected mention mainly problems with the behavior of other people, problems with the transfer of information, and the lack of quality of the public transport offered. Developing a strategy for the solution of the problems thus requires far more measures than currently considered. Raising awareness and improving the provision of information, to include information and communication technologies, are required. Overcoming mobility barriers, at least partly, is an important prerequisite for fair opportunities regarding mobility and social inclusion. A comprehensive strategy for fair opportunities and social inclusion requires further integrated activities in fields such as participation, social equity, spatial planning, and financial compensation." [36] (p.54)

The researchers draw attention to the multifaceted approach needed by policymakers to address transport exclusion. This is governed by the broader socio-political environment, which shifts according to impetus, as happened in South Africa. 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. [47, 52]) to show how dialogue between disability scholars, feminist critiques, and transport planners is needed to address continuing gaps [53].

Finally, 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.

3.1.14. 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 [54]. 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 lower-income countries researchers and advocates have drawn attention to the need for a broader focus on inclusion, making it accessible and inclusive to all, bit just persons with disabilities, but also those with temporary mobility difficulties, older adults, people with pushchairs or prams, small children, cyclists and many other groups besides. 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 [55] for discussion around the application of these principles in South Africa; or [56] for the situation in

Warsaw, Poland). 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 [52,57]). 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, though mandatory vision screening [58]. 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. [47,59]). However, the majority tends to focus on older adults, with much less focus on children or young adults (for some exceptions, see [28, 60]). For example, studies in the USA show an increase in public transport use by older adults with disabilities, especially if it is accessible and concessionary passes are available, as it often works out less expensive than car ownership. Other researchers have highlighted the social aspects of public transport for older adults [61]. Older people have also become a focus for advances in travel technology (see for example, [62-63]). 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 [47]. 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 [47]. Similarly, data in South Africa also suggests that travel options were limited by factors other than affordability:

> "Among rural people in general, rising incomes are less strongly associated with rising mobility, which suggests that geographical factors such as long distances and constrained activity opportunities affect everybody's ability or desire to travel. Among disabled rural people, higher incomes are strongly and counterintuitively associated with higher levels of immobility, as compared to lower incomes. This could indicate that, in rural areas, higher-income disabled persons find themselves in even more isolated or inaccessible places – where even walking is restricted – than do poorer disabled persons." [26] (p.127)

Venter suggests that it is spatiality, rather than affordability or even accessibility, that determines use, a finding also found in other higher income countries [18]. Venter suggests that initiatives such as road and footpath upgrading in rural areas would improve access and use [26] (p.138). Moreover, he suggests that current subsidies in South Africa actively *disincentivise* older adults from using public transport. Sammer et al [36] 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" [36] (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 lower 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. [64] for a discussion about the associations between active travel and physical multi-morbidity). As Mindell [21] 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 [21]). This is problematic from a number of angles, not least 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 [21]. 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 [21] (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.

3.2. Older People and Mobility

The broadest context for population ageing is at the global level. Demographic change and population ageing are now global trends, not ones confined to High-Income Countries. The growing numbers and proportions of people living into later life in all societies pose new questions about their transport and mobility requirements and the extent to which transportation policy and practice will be responsive to the mobility needs of older people. The policy response at global level is an indicator of the extent to which demographic ageing has elicited a policy response, and the degree to which an evidence base to inform policy has been developed.

At a global level, policy parameters are now set by the Sustainable Development Goals (SDGs), whose call to leave no one behind requires that the SDGs are met for all of society, at all ages, with a particular focus on the most vulnerable, including older women and men [19]. Even before the advent of the SDGs various UN agencies addressed the impact of transportation issues on ageing populations in the context of wider agenda-setting debates. Prior to the United Nations' second global assembly on ageing in 2002, Kalache and Keller noted the importance of adequate public transport to enable more independent life well into very old age, noting that "one of the major challenges is to ensure access...to all older persons - including the poor and those who live in remote areas" [20]. The UN's international plan of action on ageing which emerged from the 2002 World Assembly included as a priority "Ensuring enabling and supportive environments - Transportation is problematic in rural areas because older persons rely more on public transport as they age and it is often inadequate in rural areas" and called for investment in local infrastructure, such as transportation [21].

The UN's New Urban Agenda (which lays claim to being "a paradigm shift based on the science of cities; it lays out standards and principles for the planning, construction, development, management, and improvement of urban areas") also makes broad commitments to be age-inclusive, from data collection through consultation to policy-making. Specifically in relation to urban transportation, commitments are made to enable access to safe, efficient and sustainable transport systems for all [22].

In its Global Ageing and Health Report (2015) the World Health Organization addresses the interactions of the different dimensions of an older person's context (social relations, the built environment, policy and regulation, and cultural norms). "Mobility is influenced not only by an older person's intrinsic capacity and the environments they inhabit but also by the choices they make. Decisions about mobility are, in turn, shaped by the built environment, the attitudes of the older person and of others, and having both a motivation and the means to be mobile (such as by using assistive devices or transportation)". The

Report goes on, “Specific consideration will need to be given to the needs of older people to ensure that environments are accessible, including homes, public spaces and buildings, workplaces and transportation” [23].

The World Bank has also recognised that “Vulnerable and special-need groups (including women, children, persons with disabilities, and older persons) are underserved by public and private transport systems...because users and providers do not carry the full societal costs of excluding vulnerable groups”. The World Bank argues for “equity and inclusivity [to be] at the heart of Universal Access. This objective...places a minimum value on everyone’s travel needs, providing all, including the vulnerable, women, young, old, and disabled, in both urban and rural areas, with at least some basic level of access through transport services and leaving ‘no one behind’” [24]. Both the Sustainable Development Goals and the New Urban Agenda call for expended, age- and gender- responsive public transportation that responded to the challenges faced by all.

More broadly, the NUA calls for age- and gender- responsive approaches to policy and planning processes, design, budgeting, implementation, evaluation and review, and this indicates the important potential of focussing on universal access, rather than transport-related solutions aimed at older people alone. The World Bank has addressed ways to ensure universal access, but again the research basis is lacking, at least as far as the participation of older people is concerned. The World Bank itself notes that “While there is no widely agreed upon method of measuring universal access, there is a general agreement that sustainable transport should leave no one behind. Data that measure access to transport infrastructure and services for urban areas are not readily available on a global scale. The data that do exist suggest that the accessibility gap is huge, and potentially growing…” [25].

Notwithstanding the concern of the UN and other global bodies to establish these broad declaratory frameworks, evidence-building and analysis have not been prioritised. For example, while the World Bank makes significant reference to the evolving requirement for sustainable and accessible transport arising in part from the changing requirements of older populations, no supporting evidence is cited for statements such as “The ageing of the population is likely to have significant effects on mobility...” The evidence base for a research agenda to support the implementation of global policy is therefore lacking [26]. Moreover, these global policy concerns are very rarely reflected at regional and national levels. National policymakers cite resource constraints and absence of evidence for these policy gaps [27]. Thus, while a number of studies conclude with proposals for policy interventions, these have not been translated into practice [28, 29].

The inattention to the needs of older populations in transport policy may also reflect the relative lack of political participation by economically and socially disadvantaged older people, and their consequent inability to influence decision-making on mobility services and investment. A low level of political participation has been noted as a key measure of the social exclusion of older people in middle- and low-income countries [30]. While the participation of older people in decision-making processes is restricted, the relative weight given to perceived economic value, social participation and reducing inequalities is likely to remain limited. Porter et al point out that "Transforming evidence into policy and practice is particularly challenging in the transport sector which is dominated by male, middle-aged, middle-class engineers whose principal focus is road construction rather than transport services and where there is still a common reluctance to engage with users or with qualitative data" [31].

The lack of evidence that the perspectives of older people, amongst others, are considered when planning public transportation has been noted by, for example, the Institute for Transportation and Development Policy (ITDP), which recognises the democratic deficit created as result of local and national government transportation investment and planning decisions which fail to consult with and include urban residents, particularly those who are often the most marginalised [32]. In terms of investment and impact assessment, even in high income contexts, there is little existing guidance for comprehensive transport equity analysis that includes all groups of people [33].

3.2.1. Ageing, health and mobility

The relationship between ageing and health is complex; it is now well recognised that a global epidemiological transition from diseases which impact mainly on children to non-communicable diseases (NCDs) which are more common in adults has accompanied the demographic transition with population ageing at its core. The combination of disability and ageing potentially provides a significant limitation on the mobility of older people in LAMICs, though again the evidence base is relatively sparse, since very little research has been conducted on moderate to severe disabilities affecting mobility, communication and mental function in later life [34, 35, 36]. For example a comparative study across urban settings in Latin America and the Caribbean, while addressing gender differences in later life health and functional status, similarly did not establish a connection between limited functional capacity and transport utilisation [37]. This notwithstanding that this research utilised data from the SABE study ("Survey on Health, Well-Being, and Aging in Latin America and the Caribbean"), the first major health study of the old people in Latin America and the Caribbean which included transportation among the physical environment determinants which it assessed [38].

What does seem to be clear from the evidence is that the outcomes of disease and injuries are increasingly undermining the ability of the world's population to live in full health. A recent review of data from the WHO "Global Burden of Diseases, Injuries, and Risk Factors Study" noted that (after anaemia) the leading cause of impairments (by number of individuals affected) were hearing loss and vision loss. These sensory organ disorders were also the leading cause of impairments in 22 countries in Asia and Africa and one in central Latin America; while lower back and neck pain was the main cause of disability in most countries [39]. There is some recognition that these disabling conditions can be critical for the wider social participation of older people. There is little published data on the potential health benefits of active travel in low and middle-income countries, although some evidence exists. For example, studies (which again drew on WHO's widely-used SAGE data for 6 MICs, or the related INDEPTH data sets) found a correlation between increasing age and reduced active travel (walking or cycling), translating into a higher risk of being overweight and raised BMI [40, 41]. A smaller-scale study in peri-urban areas of Nepal elicited similar results [42].

Problems over access to health care facilities is the most frequently cited transport-related issue for older people in LAMICs, with physically remote clinics and hospitals necessitating costly and difficult travel a key barrier. A common finding was that poverty and mobility constraints combined to reduced older people's access to healthcare [43]. Data from the WHO's World Health Survey (2002-04) indicated that, in total, more than 60% of older people in LAMICs did not access health care either because of the cost of the visit, or because they did not have transportation, or they could not pay for transportation. Transportation may be a particularly important issue for older people who live in rural areas because services are often concentrated in large cities far from people's homes and communities [44]. A study in rural Kyrgyzstan, for example, found that 1 in 5 older people lived more than 30 minutes travel away from a health facility, with access particularly problematic for those with a limiting longstanding illness or disability [45]. The structure of health care provision is also problematic, noted by a study in South Africa of care and treatment for older people (50+) living with both HIV and other chronic conditions, which found that services were typically provided at different health facilities or by different health providers, necessitating multiple patient journeys [46].

3.2.2. Ageing, transport and gender

As noted above, a key cross-cutting issue affecting the mobility of older people is that of gender, which has now become a well-recognised issue in transport research, and one that intersects with other factors to increase disadvantage. A study in Bogota for example, which summarised recent research on unequal access to transport systems, focussed on the ways that gender and socioeconomic inequalities may be exacerbated by differences in transport

accessibility [47]. Nevertheless, again the intersection of gender with age has attracted far less attention, despite this being a feature that research has shown to be clearly recognised by older people themselves [48]. Moreover, there are no systematic gender and age inclusion procedures for transport, either in terms of training of professionals, participation of users or the design and planning of systems, services and equipment. Again, as international institutions such as the World Bank have pointed out, a lack of evidence limits progress in policymaking, particularly regarding gender issues in transport relating to older people in the developing world [49].

While other international institutions drawn attentions to the intersections of age and gender, again, a clear evidence base substantiating their assertions is lacking. The UN Economic and Social Council (ECOSOC) for example, have pointed out the economic impacts of differential access to transport for women. They noted in 2009 that women in low-income countries were seriously constrained in their access to transport, limiting access to labour markets, increasing production costs and reducing the amount of goods which could be taken to market. The ECOSOC report focussed on issues such as poor access to transport, affecting girls' school attendance, women's use of health and other public services and maternal mortality. While older women were not specifically mentioned, evidence was noted regarding the lack of access to transport services affecting women who spend long hours hauling water and fuel and walking to and from farm plots. Head-loading was cited as a major health hazard to women, as was the potential to suffer higher accident rates through walking on crowded roads with heavy burdens [50]. Other evidence indicates that these are impacts which fall on women who continue to work into later life [51].

A small number of studies do address age and gender as features affecting access to transport and impacting on mobility. Research in urban settings in Pakistan, Iran and Malaysia all found that age and gender, together with other factors such as car ownership, travel time, travel cost, household size and income were significant factors in influencing individual choices in transportation. These studies all included higher-income households, and demonstrated the importance of car ownership in travel frequency, though even here gender played an important role, with older men making significantly more journeys than older women [52, 53, 54]. Other evidence points to the limitations in "choice" that older women in particular may have; a study of a urban setting in Nigeria found that gender, along with increasing age, education and monthly income were significant in determining walking as the mode choice, in a situation where over 70% of older people lacked access to motorised transport [55].

The impact of gender on transport access in Africa is also examined in a recent field study which assessed whether gender mainstreaming in rural transport programmes in Tanzania

has had a transformative effect on women. The study found that despite the attention given to gender issues, women's participation in designing and implementing rural travel and transport programmes was limited by negative views of women's potential to contribute effectively to such programmes. On the other hand, road construction did lead to improvements in transport services and expanded travel options for all women, including those in later life, who had more time both for family and to pursue multiple projects [56].

3.2.3. Mobility, transport and social isolation

Gender thus has clear impacts on mobility and helps to bring into question the role that mobility plays in causing or mitigating loneliness and social isolation. The World Health Organization has recognised the importance of attitudinal factors for older people, commenting that "Mobility is influenced not only by an older person's intrinsic capacity and the environments they inhabit but also by the choices they make. Decisions about mobility are, in turn, shaped by the built environment, the attitudes of the older person and of others" [57]. Characteristics of the built environment can function to restrict older people's mobility and participation in urban life [58,59]. Nevertheless, research evidence for the role that transport access plays in influencing older people's social isolation is sparse for low-income countries.

In recent years a significant number of studies have made a direct causal link between transport accessibility and social exclusion [60]. Again, the great majority of these studies have been undertaken in high-income countries where both income poverty and lack of transport are relative rather than absolute states. There are few studies on the relationship between transport and social disadvantage in LAMICs, where income poverty is absolute and where there access to transportation is very limited [61]. Studies addressing the social exclusion of older people in relation to transport in low-income countries are still more rare [62, 63, 64]. While some studies discuss the part played by physical mobility in older people's social isolation, the role that transport access plays in this is not examined [65].

Social exclusion has a number of features which may be identified with the experience of older people in relation to transport in the developing world, and which have been the subject of studies which address older people's mobility and transport needs only obliquely. These features of social exclusion are broader than income poverty alone, and include a lack of participation in social, economic and political life. They are also multidimensional and cumulative: for example, limited financial resources and security are often reciprocally linked to low education and skills, ill-health, and, as noted above, limited or no access to political influence. Social exclusion is also dynamic, and subject to changes

over time, as well as directly affecting individuals and households as well as neighbourhoods and local communities [66].

3.2.4. Mobility, transport and social support

One important motivation for mobility and travel for older people is to access social support, particularly from family members, and a factor mitigating against the need for mobility in many low-income settings in Asia remains the fact that normative support for filial obligations to ageing parents is widespread. A recent study of older people in Myanmar for example, found that the majority of rural-dwelling older people had an adult child co-residing or living nearby, facilitating intergenerational exchanges of material support and personal services, and reducing the need for travel [67]. In the same vein, a review of studies on long-term care systems in sub-Saharan Africa noted that "the provision of long-term care rests overwhelmingly with family members, in line with customary sub-Saharan African norms of family solidarity and obligation". However, the review concluded that the evidence also revealed that "a substantial group of older people received no family care whatsoever" [68]. Again, studies which address the implications the care received by older people in terms of their mobility and transport requirements are almost non-existent for low-income countries.

This is equally the case for evidence of older people as caregivers, despite the recognition of the important role that they play in many contexts. A study in Kenya, which found that older women AIDS-caregivers reported high disability scores for mobility and low scores in self-care and life activities domains, indicates that this comes at a high cost to older individuals [69]. Similarly, a Ugandan study showed how older women caregivers faced drastic disruptions of living arrangements, including lengthy travel times and absences from their homes to care for PLWAs [70]. Nor should it be assumed that care-giving is ensured simply by the traditional norms of extended family relationships, when families are spatially separated. For example, a recent study of the mobility constraints experienced by married and externally-resident daughters providing end of life care to parents in northern Ghana shows how these younger women had to negotiate conflicting responsibilities to provide parental care [71]. Similar issues are identified for settings in a recent comparative study on Manila and London [72].

For those living in LICs, social isolation is a significant risk factor with increasing age, again mediated by factors such as gender and poverty. A primary issue for older people in these situations is the impact of psychological factors. WHO notes the importance of the attitudes of older individuals and of others in decisions about mobility, and the motivation (and the means) to be mobile [73]. A small number of studies has addressed the links

between confidence and behaviour, to assess the influences on older people's decision-making relating to mobility.

WHO studies highlight a number of issues that influence decision making related to older people's use of transportation. These include availability of services, affordability, reliability and frequency, appropriateness of service destinations and the availability of specialised and priority services. Comfort is also highlighted as a key concern, with respondents to focus groups in studies in Rio de Janeiro and Mexico City citing hard, uncomfortable and bumpy journeys exacerbating existing health concerns and discomfort. Similar concerns were raised by focus groups undertaken in five cities in Argentina, with issues such as struggling to board buses because of the height of the initial step [60]. Multiple elements are necessary to make public transport an attractive alternative for older people, including physical accessibility, the availability of information and ease of way finding [74].

3.2.5. Mobility, psychology and personal security

Psychological factors such as depression may also play a role in limiting mobility. A study to identify the most burdensome functioning domains in depression and their differential impact on the quality of life using SAGE data from countries in Asia, Africa and Latin America found that affect, domestic life and work and interpersonal activities were the domains most affected by depression, with gender also playing an important differentiating role [75]. Fear of crime and concerns over the safety of public transport have been identified as a limiting factor in older people's mobility in a number of different settings, albeit with wide national and regional variations [76]. Urban locations are by no means the only settings where security issues play a part in older people's travel choices. For example, both the lack of paved main roads in rural Myanmar and security issues in some regions have been found to be a significant barrier to older people's access to health services [77]. A study in Papua New Guinea examining the impact of road development on people with disabilities found that while road development improved service access, inaccessible road and transport infrastructure remained insurmountable barriers to easy and safe travel. Roads were planned for the needs of vehicle users, and planning around road infrastructure did not involve consultation with people with disability [78].

A lack of self-confidence in physical capacity, leading for example to fear of falling, as well as nervousness regarding traffic, have also been identified as limiting factors. Fear of falls is a prevalent factor in activity restriction by older people in a variety of settings. Even among a physically active older population in the Colombian Andes fear of falling decreased physical activity with negative effects for self-perceived health, and depressive symptoms [79, 80, 81]. Again, however, and notwithstanding the high and rising level of death and injuries from road traffic accidents in LAMICs [82], and the significant proportion of older

victims in some contexts, research on the impact of traffic accidents on older people remains undeveloped [83]. The evidence that does exist indicates that older people, whether walking or using public transport, have a significant exposure to accidents and injury [84]. Even crossing roads in busy urban environments in LAMICs may (rightly) induce feelings of anxiety and fear, with a consequent impact on quality of life [85].

3.2.6. Mobility and transport in crises and humanitarian emergencies

The particular vulnerabilities of older people in times of systems breakdown is an area which has had some attention in relation to humanitarian response. Clearly mobility plays a decisive role in periods of crises and humanitarian emergency, and is a major potential issue for older people, (as it is for people with disabilities and children). This has elicited some response from humanitarian agencies which have developed guidance on making services accessible to older people with mobility constraints [86]. However, in comparison to the attention paid to people with disabilities, older people have received less attention from the international agencies, and their transport needs have been largely ignored. The United Nations High Commission for Refugees (UNHCR) has produced guidelines on "Working with Older Persons in Forced Displacement", but while the companion guidance on working with people with disabilities in forced displacement has recommendations for accessible transport, that for older persons does not, confining itself to a broad recommendation to "Help older persons to access services by providing transport" [87].

More recently, a consortium of humanitarian agencies and academic institutions working in the fields of disability and ageing have recognised the overlapping and often coterminous vulnerabilities of older people and those with disabilities in emergencies in establishing key standards for achieving the inclusion of both groups in humanitarian action, by, for example, addressing barriers that affect participation and access to services [88]. However, a more specific focus on transport requirements remains lacking, reflecting a lack of studies on the specific mobility and transport requirements of older people in emergency situations.

The work that has been done reveals some familiar issues. For example, a recent study, based on focus group interviews with older displaced persons in Sudan, found that many older people with disabilities faced a number of physical barriers such as having to travel long distances to distribution points, a lack of accessible transport, as well as inaccessible housing, toilets and public buildings. Family and friends were identified as key providers of both physical and financial assistance, including, notably, paying transport costs, but the cost of transport to key points such as health facilities was a constant source of stress [89].

3.2.7. Ageing and displacement in urban areas

Exclusion and marginalisation are not only phenomena experienced in humanitarian disasters and emergencies. They are caused by a number of social, cultural, political and economic factors which exist in daily life for millions of urban dwellers. The role of spatial factors is less often considered, but also important. Where and how people live impacts day to day life, particularly in the urban built environment. Spatial barriers interact in complex and specific ways with the intersecting identities that individuals carry, creating unique patterns of disadvantage. For example, lower income people (in which older people, together with other disadvantaged groups such as women, children, are also disproportionately represented) are increasingly pushed to the periphery of cities in their search for affordable housing [90].

In some cases, this is as a result of deliberate government policy and this has an impact on access to affordable transport [91]. This was noted by a study of peri-urban areas in South Africa, which found that location along the urban-rural continuum significantly affects both transport expenditure levels and the perceived severity of transport affordability problems for marginalised people, notably those with disabilities and older people [92].

3.3. Young People and Mobility

Young people remain a remarkably neglected constituency in the world of transport planning globally (with the exception of road safety), despite the vital importance of their access to education, health and other services for our future progress and for sustainable development. This omission is of particular concern in the many low and middle income countries (LMICs) where well over half the population consists of people under the age of 30 and, in some, over half the population is under 18 years old. Two particularly pertinent trends for the discussion that follows are expanding urbanisation and expanding youth populations. It is estimated that by 2030, 60 per cent of the world's population will live in cities and that 37 per cent of the world's population will be under the age of 20 [1]. There will be 1.3 billion young people aged 15-24 years by 2030 [2]. Given the size and importance of the youth constituency, and growing concerns around the potential political risk implied especially by large concentrations of un/underemployed youth living in cities, attention to young people's transport and mobility needs requires urgent attention from policy makers.

Mobility and physical access to services and facilities has massive implications for young people, not only in terms of their current well being but also for their livelihood potential and life chances. The importance of transport for urban young people is specifically recognised in SDG 11.2: Access to safe, affordable, accessible and sustainable transport systems...with special attention to the needs of those in vulnerable situations (specifically including children). However, better access to mobility/transport will be crucial to achieving almost all the Sustainable Development Goals: in particular, SDG 3, Good health and well being; 4 Quality education; 5 Achieve equality and empower women and girls; 8.5 Full and productive employment and decent work for all....including for young people; and 8.6 Substantially reduce the proportion of youth not in employment, education or training. It is unlikely that current inter-generational cycles of poverty can be effectively broken without significant, sustained attention to young people's mobility and access to transport worldwide.

This paper reviews available published and grey literature on young people's transport and mobility experiences and potential in order to identify major research gaps (see Appendix A). In doing so, it draws on literature from a diversity of disciplines, extending from transport studies and health sciences through to the social sciences (notably geography and anthropology) where interest in mobilities research has expanded significantly over the last decade. Where possible, the spotlight throughout is on young people from poorer households, since poverty and mobility intersect and interact in complex ways and this needs far closer attention. Youth transport issues are set in their global context but with particular reference to LMICs, especially countries in Africa and Asia. Africa is the focus of

particular attention in this paper because it is demographically the world's youngest continent: by 2050 the estimated number of young people entering the labour force in Africa will exceed that of the rest of the world combined [3].

This paper addresses the following topics:

- *Age categories/definitions*: Age groups commonly considered under the 'young people' heading, with particular reference to those age groups commonly incorporated into policy discussions on young people and transport.
- *Youth voice*: Young people in governance and decision-making and their roles as actors in the wider development arena, with particular reference to the transport sector and the potential to promote their voices in transport planning and policy.
- *Education*: Transport and the education sector (including affordability, student discounts on urban informal public transport, harassment).
- *Employment*: Transport as youth employment and associated space for entrepreneurial and innovative practices; transport as employment constraint.
- *Safety*: Road safety and other aspects of young people's personal mobility safety.
- *Mobile technology*: The interaction between mobile technology and travel among young people (with particular reference to its potential to aid delivery of youth-equitable urban transport services).
- *Gender:* Mobility is relational – it is embedded in power relations – and gender, like age, is a critical shaper in this respect. Attention is paid throughout to gender as a critical cross-cutting factor shaping the transport and mobility experiences of the focus age groups in this review.

Key points are provided on each of these topics below.

3.3.1. Age categories/definitions: Who is included in the category 'youth' and 'young people'?

Various terms are used when identifying young people – 'child', 'young person', 'youth'. Formal definition of these terms may vary according to a country's legal code or to a particular institution/agency's decision, but it is also often informally shaped by cultural context: all these categories are, in essence, social constructs. Since the transport and mobility needs of young people can vary substantially by age it is important to achieve clarity on this point at the start.

The United Nations Convention on the Rights of the Child defines the *child* as "a human being below the age of 18 years unless, under the law applicable to the child, majority is attained earlier" (a definition ratified by almost all member countries). *Youth* is a

particularly complex term, being a more fluid category than a fixed age-group [4]. The UN, for statistical consistency across regions, defines 'youth', as people between the ages of 15 and 24 years, and all UN statistics on youth are based on this definition. However, UNESCO suggests that "youth" is best understood as a period of transition from the dependence of childhood to adulthood's independence, noting that the latter age limit has been increasing, as higher levels of unemployment and the cost of setting up an independent household puts many young people into a prolonged period of dependency [4,5]. Thus, the African Youth Charter covers "every person between the ages of 15 and 35 years"; this age range certainly fits with widespread informal understandings of the category across sub-Saharan Africa.

The terms 'young people' and 'youth' are used in this paper interchangeably, principally to refer to those who can be assumed to have reached puberty and extends through to the mid-20s, i.e. following the UN definition for 'youth' as 15-24 years. The term 'Children' is used only when speaking specifically of those aged under 15 years.

3.3.2. Youth voice

Young people's role in governance and decision-making globally is small but it is beginning to expand rapidly, associated with growing recognition of the potential political risks associated with their unmet needs. An increasingly vocal mass of youth is drawing on its expanding expertise in social media to help build extensive communities of interest and promote its growing demands for better representation in governance, whether in local, national or international contexts, and this is well characterised by youth usage of social media in the 'Arab spring'. In the transport planning sector, across the globe, young voices have played only a very small part to date (perhaps in part because transport planning has been seen largely in terms of motor-mobility and young people are usually not legally allowed to drive until their mid/late teens) [6]. However, demands for social inclusion and mobility justice are growing [7, 8]. Even in those rare cases where transport has been planned with attention to youth needs (mostly in developed country contexts), it has very rarely been planned *with* youth. Participatory planning has been mostly viewed by officialdom as a process of engagement with adults. However, given increasing recognition of the need for policy change towards low-carbon sustainable transport (more emphasis on public transport, cycling and walking), youth transport strategies that directly engage with the youth of today will be of vital importance: New travel behaviours are more likely to be learned and adopted by young people [9].

The (albeit very limited) literature available shows how young people can provide vital understanding of their transport challenges (which may be inaccessible to adults) and have valuable insights into how these can be best addressed. Early efforts to promote work with schools to develop school travel plans and to promote wider interest among schoolchildren in transport issues in UK included Transport for London and Transnet's participatory transport surveys by youth [10].

In LMICs, what appears to have been the first participatory research with children and young people (aged 9-18 years) on transport issues started in 2004 with pilots in India, Ghana and South Africa, followed by a major study across 24 sites in Ghana, South Africa and Malawi. This incorporated in-depth qualitative research taking an ethnographic approach plus an extensive survey (N=3000) [11,12,13,14]. The research went beyond adults simply asking young people for their views on transport issues. In the first place it involved training 70 school children (aged 11-19 years) as co-researchers to identify key issues and questions, mostly through in-depth interviews, photo-diaries and small surveys with their peers.

Porter and Abane documented significant benefits from the initial pilots but also potential costs and difficulties; issues which were then addressed insofar as possible in the 24-site study [13, 15, 16]. Subsequently, there has been a slow turn towards promoting young people's voices in the transport sector in LMICs through the adoption of participatory approaches, including Simpson and Collard 2019 [17]. However, the constraints which tend to minimise poorer women's voices (not least supposed lack of competence to contribute to what is perceived as the domain of middle-class male engineer experts) continue to play an even stronger role globally in the case of children and young people [14, 18, 19].

3.3.3. Education: Making the journey to school

There is a substantial literature around the journey to school in the Global North. Road safety once dominated that literature, but as private car usage expanded attention shifted towards the decline in children's independent mobility and associated concerns regarding adult social control [20]. Subsequently there has been an increasing focus around obesity and the need to expand young people's active travel [21, 22]. Recognition of the need to promote positive perceptions of active travel (walking and cycling) has also started to extend beyond the Global North [23]. Among middle-class urban children in LMICs obesity issues are emerging similar to those prevalent in the Global North, with clear linkages made to the expansion of motor transport usage for school journeys. Programmes in many developed country cities now promote the idea of 'walking school buses' and 'bicycle trains', in order to encourage more active travel [1,31]. In LMICs these are much rarer, though there have been experiments, notably in South Africa and Dar es Salaam [32].

Travel to school experiences in LMICs, especially among children from lower income families, tend to differ substantially from the UK norm (where parental escorting of younger children to school is common and private motorised transport often dominates) [33]. In many LMICs escorting is mostly a task assigned to older siblings and the journey is far less likely to involve private transport. For children from poorer households, in particular, challenges around physical access to school are closely aligned with issues of journey time and distance - in Africa mostly entirely conducted through pedestrian travel, in Asia either walking or cycling - and its associated dangers [14](chapter 3), [34]. Information per se - and particularly qualitative information - on school travel experiences is far more extensive

for African than Asian contexts where, in recent years, the focus has been principally on analysing large-scale survey data. Africa consequently dominates the discussion.

3.3.3.1. School travel within LMIC urban areas

Within LMIC urban areas motorised transport is available, but fare costs limit its use by school pupils. This is a major factor shaping the very heavy dependence on pedestrian travel (together with bicycle travel in Asia). In urban Africa, generally well over 90% of pupils travel to school on foot: 96% in a Nairobi slum according to Salon and Gulyani [43]; 98% across 8 diverse Ghana sites and 99% across 8 diverse Malawi sites studied by Porter et al. [14] (chapter 3). Journey times can be far more substantial than in Asia given such high levels of dependence on pedestrian travel and the low availability of cycles to school pupils [14[(chapter 3). In peri-urban neighbourhoods in Ghana, Malawi, South Africa and Kenya, pupils report walking considerable distances, especially where there is a preference for a (usually better) school, or where the nearest schools are full [14, 43]. In urban Asia, the sparse published material available suggests that school pupils make more substantial use of informal public transport and of bicycles. However, as cities expand in Asia, the school commuting distance is inevitably growing, as Li and Xhao and Zhang et al. show using data from Third and Fifth Travel Surveys of Beijing Inhabitants respectively (with some children travelling over 5 km) [28, 46].

3.3.3.2. Hazards of school travel

Walk-along interviews with pupils are particularly powerful in demonstrating the fear of harassment and attack for both boys and girls that are widespread in low income urban and rural neighbourhoods, as Porter et al. show for Ghana, Malawi and South Africa [47]. See also Phillips and Tossa 2017 for child-led walks in Thailand [48]. Overall, children from particularly deprived neighbourhoods tend to face the most constraints on their movement, as Adams et al. observe in a study across urban and rural neighbourhoods in Western Cape [49] but even in somewhat less deprived neighbourhoods children's mobility can be restricted by diverse factors, as Benwell points out with reference to baboon troops, domestic 'guard' dogs, traffic and the impact of family composition in suburban Cape Town [50].

Across LMICs the wider hazards of school travel by motor transport are numerous, whether dedicated school transport or informal public transport is utilised: vehicles tend to be in very poor condition, overcrowded and without seat belts, driven by poorly trained drivers, over poorly maintained roads. The situation is no different today across most of Africa and South Asia than was observed in rural Brazil two decades ago [51]. However, in South Africa, where the Safe Travel to School Programme was recently implemented by a national child safety agency, there have been some indications of improved practice [52]. This has stemmed from a focus on driver road safety awareness, defensive driver training, eye-testing, vehicle roadworthy inspections with selected upgrades, incentives for safe

performance, and implementation of a vehicle telematics tracking system with regular, individual driving behaviour information updates.

3.3.3.3. Subsidised pupil travel

Subsidised transport for pupils is far less widespread in LMICs than in the Global North and seems unlikely to advantage them significantly in many locations. Pupil reports in Cape Coast, Ghana, of being forced off the bus when seats are needed for full-fare passengers are unlikely to be unique. In Dar es Salaam, where under a government scheme children pay 33% of the adult fare (but without compensation arrangements to operators) children are often unable to even board the bus in the first place, being barred by the conductors [53]. They face similarly exclusion from buses in Karachi because of the requirement there to charge only half-fare [54]. However, even in countries like UK, pupil transport subsidy remains a sensitive, complex issue [55].

3.3.3.4. Gender issues in school travel

Girl pupils face even higher transport constraints and hazards than boys in LMICs and this contributes to girls' lower school enrolment rates. A review of children out of school using DHS surveys suggests that in Niger, where there are only 41 girls per 100 boys at school in rural areas (compared to 80:100 in town), distance of home from school is a key factor [56]. Improved road access and transport availability appear to have a significant impact on girls' attendance at school in some contexts. In Morocco, assessment of a major road programme (National Rural Roads Program (NRRP-1)) entrusted to the National Highways Authority showed that opening of a paved road increased the probability of girls attending primary school by 40% [57, 58, 59]. Road improvements in Asia appear to have similarly improved girls' access to education, even more than boys, as Mohsin et al. show for Bangladesh, and Pilgrim and Chanrith for Cambodia, in the latter case with benefits seemingly accruing principally following improvements to a provincial road and a national road, as opposed to purely local rural roads [60, 61].

The negative impacts of distance/poor transport on rural girls education in Africa and South Asia can be related to a number of factors, including girls' heavy household duties, cultural perceptions regarding female mobility in general, cultural perceptions regarding the (limited) value of girls' education, and perceived dangers for girls who have to travel a long distance to school or board away from home (as noted above) [14, 62]. The safest travel procedure in African rural and urban contexts, especially for girls, tends to be walking in a group. However, when there is heavy traffic on urban streets and no separation of pedestrians from motorised transport such group walks have the potential to cause traffic accidents.

Road traffic injuries are the first cause of death among children 5-14 and young adults 16-29 [63] (a point further discussed in the Road Safety section below). Data for low income countries are inadequate but the limited data available indicate that the vast majority of young people in such environments will be pedestrians rather than passengers in motor vehicles when they are injured [14].

Cycles play a relatively small role in school travel scenarios across Africa, in particular, and there is much evidence across Africa and Asia to show that critical mass is essential to their widespread use, especially among girls [65, 66]. Increasing emphasis on low-carbon transport may help future efforts to promote cycling to school (crucially, if accompanied by training on cycle riding and repair). However, if girls are out of school because they are needed to help fill the domestic transport gap, as is often the case in Africa, broader IMT interventions aimed at the family may be of greater significance. Other potential transport interventions, depending on local context, may include offering stipends to girls who have to travel a distance to school (an approach piloted by the World Bank in Pakistan to encourage girls in to the classroom) [67], and introducing a locally adapted version of the 'walking bus' as a safety initiative to counteract dangers of rape/harassment.

3.3.4. Youth Employment: Transport to work and transport as work

Unemployment is likely, on average, to be three times higher for youth than for adults globally, but five times as likely among youth as among adults in South Asia and South-East Asia [68]. Even in situations where open unemployment among youth is relatively low, as in most low income countries in sub-Saharan Africa, there is much 'working poverty': temporary, low-paid work in the informal sector with poor working conditions [69]. Transport's relationship with youth employment has two significant components which are explored in this section: firstly its role in getting young people to work places, secondly with regard to employment within the transport sector.

3.3.4.1. <u>Transport to work</u>

Firstly, with regard to accessing employment opportunities, young people globally, in both rural and urban locations, face considerable challenges: transport availability, reliability and cost are key factors shaping young people's access to employment. In the Global North, young people in rural areas, in particular, are regularly constrained by transport factors. In LMIC rural areas, where employment outside agriculture is often seen as key to improved incomes, accessing non-agricultural employment tends to require long daily journeys to the nearest urban centre. One of the more depressing images of rural youth mobility in the literature is of young men in western Kenya 'tarmaccing': moving endlessly to and forth between their village homes and town along the pot-holed tarmac roads in search of work [70].

Even in urban areas where transport availability is much higher, the distance from affordable suburban dwellings to central employment areas can be a particular challenge for young people in poor households, whether in the Global North or South. In many European cities such as metropolitan Madrid, for instance, the trend towards suburbanisation and urban sprawl (low density, spatially dispersed, and segregated land use) has had substantial repercussions on access to employment over the last few decades [71]. In LMIC cities, transport constraints are often even more limiting on poorer young people's access to employment. Here the urban poor often live in unplanned settlements and slums on the periphery of cities while employment densities are commonly greatest within the central area. Transport systems (including road infrastructure, formal or informal motorized transport, and non-motorized transport) linking to these opportunities are often extremely congested, unreliable and unsafe [1]. In cities such as Lagos and Manila, journeys from periphery to city centre can take hours, especially in wet weather when transport demand everywhere increases and potholed roads become impassable. Moreover, the informal para-transit that dominates motorised travel in such contexts is simply unaffordable for the very poor.

In South Africa, poor access to transport is one of a complex mix of factors that results in young people actually stopping actively searching for work. Preliminary optimism in the early post-school years is often replaced by hopelessness such that 'actively discouraged' youth not seeking work reportedly reach as high as 61 per cent in the 20–24 years cohort [72]. Elsewhere in sub-Saharan Africa, where the informal sector is much larger and there are no social grants, most young people tend to continue to search for work and to take on whatever tasks they can find because, as Filmer et al. observe, 'most Africans simply cannot afford to be idle' [69] (p.3). This also applies to many Asian contexts, though Jeffrey's observations in a north Indian city, where neoliberal economic change had cut back employment opportunities for educated (lower-) middle class young men, is somewhat reminiscent of South Africa [73].

In studies of urban transport provision in 1990s Accra, which included specific consideration of its impact on young people, Grieco et al. and Turner and Kwakye, showed how the falling off in transport provision associated with the economic reform measures in place at that time (increased cost of vehicles and spare parts due to devaluation raising the cost of imports etc.) actually increased dependence on the work of young women and children [74,75,76]. Children had become increasingly central to the economic organisation of households and would be taken in as foster-children to reduce the transport stress of middle-aged adults faced with transport under-provision: they acted as domestic anchors, compensating for the absence of adult household members delayed in distant markets by transport problems. Additionally children experienced high levels of local mobility due to domestic tasks required of them such as refuse removal, water and fuelwood collection and other activities including petty trade. Such conditions still prevail in Accra and probably also in many other African and Asian cities where traffic congestion is high and transport

provision poor. Sibling care, especially in AIDS-affected households, adds to the pressures faced by many girls across LMICs [77].

3.3.4.2. Transport to work for young women

For young women living in the poorer households of LMICs, conditions are often particularly difficult, in the absence of appropriate, inexpensive and timely transport, as Venter et al. demonstrate for rural South Africa and Esson et al. for Accra, urban Ghana [78, 79]. Cultural barriers to mobility vary (see Kjeldsberg et al. regarding variations in rural Nepal [80]) but for some young married women, these barriers can be insurmountable, especially if they cannot find reliable transport for their return journey home. This tends to be particularly important because of consequent delays to evening meal preparations, possibly coupled with male suspicions of the reason behind their delay. The *unreliability* of transport is a common but under-reported factor constraining young women's trade and entrepreneurial aspirations in both rural and urban sub-Saharan Africa [81, 82]. This uncertainty/unpredictability may encompass not only concerns about how long the journey may take, but whether the journey can be done at all. Moreover, it can as significantly affect the young urban woman trying to establish a regional trading business in farm produce or fish as the rural woman hoping to sell her perishable plantain or cassava at a city market. Uncertainty with regards to the transport of the perishable foods that so often underpin young women's early efforts to build a trading business, can have a particularly stultifying impact on emergent entrepreneurship.

In urban areas women will often have to forego potential travel to find and engage in work because males in their households have first priority on sparse funds for transport fares. Young women are more likely to be unemployed and, if they manage to find work, will walk to their place of employment (generally in very low paid service-related informal sector jobs). Globally, there is a tendency for women to focus on more local (often less well paid) employment opportunities in their neighbourhood because of the financial costs (and also often the time costs, given family caring demands) [83]. This is particularly evident in LMIC cities such as Nairobi [43], Accra [79], Delhi [84] and Tunis (author fieldwork, 2019). As Langevang and Gough emphasise, with reference to Accra, it is important to reflect on young people's movements as tactics of social navigation, recognising the importance of spatial mobility to young people's everyday well-being and their processes of social becoming [85].

In some better-provisioned cities in China, both women's and men's journeys for employment are seemingly less arduous. In Shanghai, for instance, only a small percentage

of work journeys (13.0%) are longer than 60 minutes [86]. However, here the dominantly residential zones are associated with service jobs and it is likely that women's work will predominate in such contexts. Poor access to education among girls and women in many low-income contexts meanwhile limits their ability to read maps and bus information so they unsurprisingly feel safer working close to home as has been described in both southern Ghana and Buenos Aires [87,88].

3.3.4.3. Young people's employment in the transport sector

In LMICs, the transport sector often provides an employment niche for the poorest, including young people. In both rural and urban areas the transport gap caused by inadequate or costly transport facilities can contribute substantially to children's time poverty and deficiencies in schooling because of the common requirement to help carry goods for family members: this is a crucial but overlooked issue. Children's domestic transport work is commonly subsumed under women's work rather than receiving specific acknowledgment. There is still insufficient detailed information about children's work as load carriers apart from studies of the 'kayayoo' girl porters in Accra, Ghana [75, 89] and the research referenced earlier, conducted with young people 9-18 years across 24 urban and rural sites in sub-Saharan Africa which incorporated research on load-carrying and its (negative) impacts on education and well-being [14 (chapter 4), 42].

Employment in the transport sector is highly gendered across LMICs. Headloading, for instance, especially for domestic (as opposed to commercial) purposes, is generally considered a task for girls, women and young boys in sub-Saharan Africa. Young men beyond their mid-teens are usually not expected to do such low-status work except in an emergency [14 (chapter 4), 90] though many young men work as push truck operators, for instance in Ghana's urban market centres, usually for very low returns [75]. By contrast, any work associated with technology and especially mechanised transport – driving, minibus call boy, mechanic etc. - tends to be seen as a male preserve across the LMICs. There is occasional publicity around women taxi drivers such as Ghana's MissTaxi [91] and India's motorbike taxi service Bikxie [92] but these are extremely rare, not least due to perceived safety and security issues where women operators are concerned.

For many young men in Africa and Asia, it is the motorcycle or tricycle taxi which has become the most important employment opportunity in the transport sector. Operating a motorcycle-taxi (known as *boda-boda* in much of East Africa, *okada* in much of West Africa) can offer them a relatively lucrative livelihood, whether as independent riders or, more commonly, through a renting arrangement with the motorcycle owner (usually an older,

better resourced man or woman). Young men are, in some cases, demonstrating significant entrepreneurship as they move out of less lucrative activities (for instance, charcoal production in Kibaha district Tanzania) and into motorcycle taxi operations. However, negative impacts are widely reported in some regions, commonly associated with reckless driving, increased accident rates, violent crime and expanded STDs. The latter is, in part, a product of relatively high incomes and consequent high bargaining power for sex, as noted early in their expansion by Nyanzi et al. for south-west Uganda [93] and Waage for Ngaoundere, Cameroon [94]. In rural areas of Lao PDR, Doussantousse et al. similarly found that motorbikes and mobile phones had expanded the sexual territory of indigenous youth at a time when international commerce and a cash economy along improved highways was bringing new people into the region [95]. Among the concerns for their health and safety are at-risk behaviours involving alcohol and sexual practices, especially HIV and sexually transmitted infections. Such issues, have led to much government concern, such that in Ghana motorcycle-taxis are still banned nationwide and many countries have city-centre bans in place. However, such bans do not take into account the crucial level of access that motorcycle taxis deliver for people in informal and peripheral urban areas such as the satellite towns around Abuja in Nigeria. Here the personal mobility they deliver to young people wanting to be independent is widely appreciated not only by young men but also by the many young women passengers who use them extensively (author fieldwork 2019; see also Adamu regarding the impact on northern Nigerian women of *shari'a*-related campaigns to stop them riding commercial motorcycle-taxis [96]).

There is a rapidly growing literature on motorcycle taxi operations by young men (rarely are women involved, except as passengers), for example Burge on young male entrepreneurs in Sierra Leone, Olvera et al. on west and central African cities, and Jenkins and Peters on post-conflict Liberia [97, 98, 99]. An extensive review of recent literature on this theme is now available [100]. It is important to note that motorcycle maintenance and repair is a growing support industry too, both for private and commercial motorcycles, but again mostly employs men.

3.3.5. Road safety and other aspects of young people's personal mobility safety

3.3.5.1. Road safety

The bare bones of the global road safety issue are clearly presented in a recent WHO road traffic injuries factsheet [101]. This points out that, while globally people from lower socioeconomic backgrounds are more likely to be involved in road traffic crashes, more than 90% of road traffic deaths occur in LMICs and road traffic injury death rates are highest in the African region (at 26.6/100,000 people), followed by South-East Asia (20.7/100,000 people). Africa has the highest proportion of pedestrian and cyclist mortalities at 44% of

deaths: unsurprisingly, pedestrians, cyclists and riders of 2- and 3- wheeler motorcycles are especially vulnerable as a result of being less protected than car occupants. However, vulnerable road users are still largely ignored in the planning, design and operation of roads. Across Africa and Asia most roads still lack separate lanes for cyclists or adequate crossings for pedestrians, while motor vehicle speeds are too high [102].

So far as children and young people are concerned, the statistics are particularly sobering: road traffic injuries are the leading cause of death globally for those aged 5-29 years. Younger children are more vulnerable in road traffic than adults due to their physical, cognitive and social development stage: this includes possible difficulties in judging the proximity, speed and direction of moving vehicles, impulsivity and shorter attention spans which may affect their ability to cope with simultaneous events, while their small stature makes it difficult for them to see surrounding traffic and for drivers and others to see them. If involved in a road traffic crash, their softer heads make them more susceptible to serious head injury than adults. Children of adolescent age, meanwhile, are especially prone to take risks, compromising their safety on the road [63].

In urban areas most of those injured in public transport accidents are either paratransit passengers or pedestrians (which commonly includes young people trying to hawk goods to slow moving vehicles in traffic jams at the roadside). A small study of child accident victims in Ilesa, a town in south-west Nigeria found that the majority (89%) were pedestrians and mostly over 5 years: 60% of these child pedestrians were injured either while hawking at the roadside or on an errand [103]. Motorcycles were involved in 20% of the cases. And this is all without taking into consideration the wider damage to young people's health in urban and peri-urban areas induced by vehicle-generated air pollution.

Recent work in the Global North draws attention to the value of training parents about road safety [105] but in LMICs where many children travel to school and other locations without parental accompaniment (see above) this is unlikely to have significant impact. Here, early training of children on pedestrian road safety is crucial. As Salmon and Eckersley argue, to become skilled pedestrians, children need to move 'beyond a view of traffic as rule-bound and develop dynamic adaptable strategies for crossing roads' [106] (p.729). They presented positive experience from developing a local programme in Ethiopia, based on the UK Kerbkraft concept which, through practical exercises on local streets, enables children to develop techniques for identifying safe crossing-places. FIA foundation projects such as South Africa's Safe Schools project takes a similar approach [107]. A recent project by the NGO Amend in a Lusaka school that includes addition of a raised platform pedestrian crossing, footpaths, fencing and a school zone warning, removal of vehicle parking which blocked sight lines, and reduced operating speeds of passing vehicles has reportedly had

significant impact [108]. Other examples show how high the returns from such investment can be: in Korea a school zoning scheme, together with improved school bus regulation and road safety training schemes, reportedly reduced traffic accidents among children under 14 years of age by 95% between 1998 and 2012 [101]. However, finding means to bring road safety training to the many children who either never attend school, or leave before the year in which road safety training is introduced, is also vital [109]. Here, road safety NGO interventions which support short courses for groups such as young traders (at particular risk as they rush to vehicles to sell, darting across roads and within the path of other vehicles) would be extremely valuable [14] (chapter 8).

Motorised traffic is also a growing danger for those who operate it or travel in it. In Cambodia, Kitamura et al. argue that speeding by young people is promoted by road improvements that occur alongside underdeveloped traffic legislation, and limited public awareness and knowledge of road safety [110]. They emphasise the importance of implementing the "three Es" namely Engineering, Enforcement and Education in low income countries such as Cambodia but note that the role of education to increase people's road safety awareness is neglected compared to the other two dimensions. Across LMICs in Africa and Asia, poorly regulated (privately operated) public transport, poor vehicle maintenance, limited law enforcement, poor road infrastructure, high traffic mix and little separation of vulnerable road users from high speed motorized traffic, together with lack of seat belts, overcrowding/standing passengers, and very hazardous road environments are widespread issues. The dangerous practice of transporting passengers in the cargo area of light delivery vehicles (LDVs) occurs in many countries: one small study in South Africa found that 35% of passengers treated for injury following ejection from the vehicle were children under the age of 18 (and 11% sustained a permanent disability) [111].

Much recent attention has been given to the high level of traffic injury associated with motorcycles (mostly driven by young men). Problems associated with lack of adequate body and head protection (given that helmets are uncomfortable in high temperatures and often of sub-standard manufacture), poorly regulated vehicle and driver safety, and the preponderance of young male drivers with a taste for speed, are exacerbated when two, three or more passengers are riding pillion. Phone use when operating a vehicle adds to these hazards [112]. Air pollution from motorcycles is also a growing issue in densely populated urban areas, especially in Asia.

Finally it is important to note that road injury patterns show a significant gender dimension, with nearly three quarters (73%) of all road traffic deaths occurring among males under the age of 25 years: they are almost three times as likely to be killed in a road traffic crash as young females [101]. Cordellieri et al. use a study of young drivers 18-22 years to show how, in European contexts, this can be associated with young men's lack of concern about

having accidents [113]. Recent work in Oman similarly shows the most dominant group at risk of all types of RTIs was young male drivers [114]: the probability of fatal injuries was the highest for those aged 20–24 (26.9%) years. Analysis of three-way interactions of age, gender and causes of crash show that over-speeding was the primary cause of different types of RTIs. The probability of fatal injuries among male drivers attributed to over-speeding ranged from 3%–6% for those aged 35 years and above to 13.4% and 17.7% for those aged 25–29 years and 20–24 years, respectively (ibid).

In LMICs in Asia and Africa, adequate disaggregation of data by gender is still often missing in work on road safety. This is likely to be partly a factor of overall poor reportage of road injury by accident victims, their families and carers, the police and hospitals [102]. One review of published and grey literature on road traffic injury among children and adolescents (≤ 19 years) for urban areas in sub-Saharan Africa suggested males are twice as likely to be involved as females [115]. A recent study of primary school pupils in low income neighbourhoods in Cape Town found older boys (10-15 years) were most at risk of experiencing a severe pedestrian injury [116]. In India, data for 2014-16 shows that females represented only around 15% of road accident victims [117]. Gender imbalance in RTIs in LMICs, as globally, appears to be associated not only with higher male access to and use of road transport and higher male mobility overall, but also to gender variations in attitude to risk.

3.3.5.2. Travel safety and security

Beyond road traffic accidents, travel safety and security is often regarded as primarily an issue affecting females. There is certainly substantial evidence regarding high perceptions of travel danger (from verbal harassment through to rape and murder) among girls and young women across the globe. There is also ample evidence of actual harassment of women globally and on a daily basis, with recent statistics suggesting, for instance, that over 70% of women in Karachi had experienced harassment on public transport and 90% in Sri Lanka, while 89% of women in Santiago had either seen or experienced it themselves [83](pp.15-16). Participants in a Chennai research study reported 14 years as the mean age at which they first encountered harassment in travel contexts; harassment was worst at night [118]. Jeffrey similarly reports so-called 'eve-teasing' in India [73]. This is rarely reported to the police and, as Anand and Tiwari noted for a Delhi slum [84] and Salon and Gulyani for a Nairobi slum [43], results in women travelling far less than they might otherwise do, thus contributing to their economic and social exclusion.

Lack of reportage means that it is difficult to assess the age-distributed incidence (or impact) of sexual harassment. Women worldwide have reported street harassment even in their 80s [119], so this is not purely an issue for youth. The statistics cited above are for women per se, but young girls may well be at particularly high risk of harassment and are even less likely to report such actions so their situation is often particularly dire. Young girls interviewed in the 24 site study in Ghana, Malawi and South Africa confided (especially to the peer researchers) a range of problems from catcalling and jeering by men to being groped when on public transport and actual rape [14] (pp. 184-186), [120]. Especially in locations with high HIV/AIDS prevalence, rape is clearly life-threatening. Girls' fear of travel alone often leads them to postpone travel till others can accompany them (travel in groups is usually preferred by them and their parents), to take longer journeys to avoid particular trouble spots or to simply not travel, especially during hours of darkness [14, 121 (for urban South Africa)]. However, it is important to note that boys can also face significant harassment, intimidation and, albeit very rarely, rape as they travel [14] (pp. 186-7), [122].

3.3.6. Mobile technology: interactions between mobile technology and travel among young people

Young people tend to be at the forefront in uptake and use of digital technology across the world. Consequently, there is already substantial evidence of their engagement with mobile technology - mobile phones, internet and other ICTs – in transport contexts, not least as an aid to help address transport poverty. E-learning and M-Health are expanding rapidly, while smart mobility and smart city solutions are now becoming central foci of urban planning research globally. In remote rural areas the potential for e-connectivity to reduce transport poverty can be particularly powerful, as recognised in early work by Velaga et al. with reference to remote communities in rural Scotland [123] and in broader discussion by Aguilera et al. [124]. They demonstrated the significant potential for improved service access through real-time passenger information systems accessible by smart phones where signal coverage is adequate.

In LMICs, where low cost mobile phone handsets and mobile phone networks have expanded dramatically over the last two decades, the implications for travel practices are arguably even more significant, as a growing literature attests (for example, Porter on the implications for poorer people's mobility [125], Williams et al. 2015 on the Nairobi digital matatu project [126]). When emergencies arise - not least obstetric emergencies among first time and very young mothers (where the risks of childbirth complications are higher than average) - mobile-enabled mobility can be life-saving [127]. One issue worthy of note,

however, is the varying cost of airtime and data. In countries with a highly competitive ICT sector, such as Kenya, airtime and data are relatively cheap, but in others, including South Africa, running a mobile phone, especially a smart phone, is costly. For young people with limited resources this is an issue of considerable significance, though two studies conducted with African youth indicate that many young people see these costs as a priority over other consumables, and often make considerable sacrifices in order to maintain their access [128,129, 130].

Published literature specifically concerned with *youth* use of phones in daily travel contexts (as opposed to migration contexts) is, as yet, relatively sparse globally, thought there is a huge literature on phone practices based around youth culture and social media, adult or partner surveillance etc. For UK, Line et al. emphasise how young people are embedding technology in their everyday lives to better accommodate the uncertainty in activity and travel scheduling, such that it 'lubricates' modern life without fundamentally changing travel behaviours [131]. In the Global South, technology may have more impact on travel behaviour. The extent to which mobile phones can reduce travel is a particularly important question with regard to resource-poor people and environments and to carbon reduction, especially in urban contexts. Qualitative and survey data regarding young people's perception of the extent to which their use of phones had substituted for travel in the previous year, conducted in 24 sites in Africa suggests some reductions in travel are occurring, though the precise patterning varies with location [132, 133, 134].

In urban South Africa, safety appears to be the principal factor behind the substitution of phone communication for many small daily (often pedestrian) journeys of both genders on urban streets, but financial considerations come more strongly into play when it comes to contemplating long (expensive) journeys by motor vehicle (though safety may still figure where the phone is brought to bear as a virtual escort or way-finder) [121]. Here, taken together, the perceived reductions in both long distance irregular and short everyday journeys among urban residents appear to be quite substantial. However, these reflections are based on respondents' stories and perceptions of change. The extent to which they translate into lower than might be anticipated (pedestrian and motorised) traffic flows on the ground in these low income neighbourhoods needs further investigation. Also, if there are reduced numbers of people walking on the streets, what does this mean in the longer term for health (obesity levels) and security? Will fewer people on the streets increase the dangers of pedestrian travel, thus encouraging reliance on motorised transport for essential journeys? A wider question concerns the extent to which substitution of phone communication for transport may also be occurring in high density poor urban neighbourhoods in the Global North where precarity and fear of violence is similarly widespread and safe, good quality public transport mostly absent [121].

ICT/transport connectivities can be particularly important for women. As noted earlier, many women and girls in LMICs are restricted in their physical travel by male family members, who may not only express concern for the vulnerability of womenfolk travelling alone, but also distrust the potential that independent female mobility offers for promiscuity. In such contexts, women's access to mobile phones can be seen as a potential (virtual) mobility aid. However, keeping control of a partner's mobile phone communication is now a regular male endeavour in many households (as Burrell observed for rural Uganda [135]). As handset prices drop and phone ownership increases among young women this is becoming harder to maintain, but surveillance of wives' and girlfriends' phone contact lists and calls, and use of the phone as a 'digital leash' to check their physical location and travel movements, appear to be growing features many relationships [136, 137]. It is noteworthy in this context that young men in the motor-cycle taxi business and older 'sugar daddy' male taxi drivers have become notorious in some locations for using their relative wealth built through transport operations to buy phones for their girlfriends [121].

For (mostly male) transport operators, owning a working phone is widely considered essential to running a successful business; this is the case even for bicycle-taxi operators in Malawi [133]. Across Africa, people of all ages keep the numbers of local motorcycle-taxi and taxi drivers on their phones (ibid). For young women, in particular, this is often seen as not merely as a convenience but a vital informal safety mechanism.

3.3.6.1. New forms of ICT-enabled mobility service

While mobile phone usage will continue to be interwoven in diverse ways with human corporeal mobility and with physical transport technologies in LMICs, these patterns of interweaving are constantly being re-shaped. A burgeoning array of inventive phone apps, closely tied to growing smartphone use and the development of wireless infrastructure, appear to have particularly significant potential. In Asia, where the ride-hailing app boom is currently massive, smartphones are now available cheaply; advanced fourth-generation services can be accessed for just a few dollars. In Phnom Penh, for instance, at least four services, including one named CamGo, have been launched recently. This is for tuk-tuks, which are cheap but whose popularity was somewhat marred by drivers charging unreasonably high fares or intentionally taking roundabout routes to increase the fare. CamGo is reportedly popular with young people because it offers a fixed rate per km and the route takes the shortest distance to the destination, measured by GPS, confirmed before boarding. Other recent examples include Chiang Mai, northern Thailand, where the Indonesian company Grab has launched a ride-hailing service for microbuses, now with 300

registered drivers. Ride-hailing services are also being used to book home deliveries. In India, Jugnoo, a ride-hailing service specializing in motorized tricycles, has partnered with fast-food restaurants such as Kentucky Fried Chicken and Burger King to deliver meals: it reportedly has 15,000 vehicles operating in 35 cities. We can anticipate that young people - both as customers and operators- will lead in the usage of these apps, though the returns from ownership of the vehicles involved may well go mostly to older, more established entrepreneurs [140].

In Africa, Uber and Uber-style apps are now playing a similar role. In South Africa, for instance, Uber have operated in major cities since 2013, though not without considerable hostility from metered taxi companies [141]. Subsequently in 2017 the South Africa Meter Taxi Association set up their own app, "Yookoo Rider". This benefits customers through the registration of cab drivers, comprehensive driver vetting and criminal checks with fingerprint technology [141].

Uber-style companies now operate in many Africa cities (including for motorcycle taxis in cities like Kampala). With Little Cab, a Kenyan ride-hailing app backed by telecoms operator Safaricom, customers can pay for their ride through Safaricom's mobile money service, M-Pesa, buy discounted airtime during the trip and access free Wi-Fi. It also lets women exclusively request for female drivers from 6 pm to 6 am for safety reasons [142]. Many smaller operations are now attracting young entrepreneurs – for instance, the mobile application, Tag Your Ride, was launched by a young South African university graduate [143]. Young women customers appear to derive very considerable benefits from these apps, as also can women drivers, especially if they are able to build a women-only service. Finally, however, it is necessary to refer back to the potential of phones as a causal factor in transport accidents with potential for impact on all sectors of the population.

3.3.7. Concluding summary and reflections

This paper has covered diverse aspects of mobility while taking a specific child/youth perspective and drawing on the voices and evidence of young people themselves. It has emphasised how travel experiences, needs and risks are embedded in power relations and vary with gender, age and location (urban/rural, rich country/poor country, Asia/Africa). It has also pointed to the scale and range of uncertainties that so many young people now face globally as they negotiate daily mobility (or immobility). Neoliberal economic and social changes have been radically transforming young people's experiences of youth and early adulthood across much of the world over the last decade [144], while climate change and growing environmental fragility are beginning to bring further uncertainties to the fore. In this context it is important to note that while the majority of emphasis in the literature

reviewed has been on daily mobility/immobility and travel experiences, the implication of such daily mobility experiences (physical and virtual) for migration decisions (short and long distance, short and long term) needs far stronger attention, particularly in this era of climate change.

4. Future Research Directions

4.1. Disability & Mobility

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 the emerge across the literature that offer some guidance about creating sustainable, accessible and inclusive high volume transport systems 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 Disability Report* [6] 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 lower-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 actual voices of adults and children with disabilities 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 – but without it, rights will not be attained. Understanding and appreciating the "full social benefit of mobility services" [32] (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 them as a 'transport' issue per se. 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 persons 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 [26]. 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 South Africa and elsewhere, one common theme that emerged was the need to 'twin-track' [65] 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 range of methods, including providing additional cash incentives (e.g. subsidising fares), but also providing training and education for drivers and 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 more equitably – and effectively – target resources based on evidence from the users themselves, and in turn help focus delivery of these resources.

But none of this cannot be done without listening to the voices of children and adults with disabilities themselves. To date, there is very little research from lower-income countries that genuinely includes the perspectives of persons with disabilities themselves – what the absence of transport means to them, 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. This would seem to be key to moving the inclusive transport agenda forward.

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. 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 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.

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. But 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 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 far fewer examples 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.

4.2. Older People and Mobility

This review has found that, even for middle-income countries there are very few national-level studies beyond those making use of the WHO SAGE data for six countries across Africa, Asia and Latin America (see above). Data sets comparable to the SAGE data do not exist for low-income countries [93]. Other countrywide studies are rare and those that exist use broad national data sets, such as USAID's Demographic and Health Survey. Although the DHS is conducted in around 90 LAMICs and provides data for approximately 30 indicators in the Sustainable Development Goals, its data on older people are of limited value. While interviewees are women aged 15-49 and men aged 15-49, 15-54, or 15-59, data on older people are collected only through a whole-household questionnaire. Only two countries (South Africa DHS 2016, Haiti DHS 2016) have extended or lifted the upper age cap in individual questionnaires. Thus in sub-Saharan Africa, only one significant national transport study has been undertaken with older people [94]. As we have seen, urban studies are confined to west Africa, particularly Nigeria. For rural areas the literature is very meagre [95]. As we have noted, studies in both south Asia and Latin America also concentrate heavily on urban settings.

There is equally limited consideration of the ways in which age intersects with other factors, particularly gender, differential physical and mental capacity, and poverty. Here the lack of age-disaggregated data is problematic. The imposition of upper age limits in data collection is a significant barrier to understanding the characteristics of ageing, whether at individual or population level. Furthermore, despite the diversity to be found within older populations, disaggregation by age is very little analysed. The lack of gender disaggregated data and analysis is also noticeable, notwithstanding the frequent references in policy documents to the particular challenges of public transport for older women.

As we have seen, access to services is often a strong focus of current work regarding older people's mobility. The difficulty of accessing health services is, as we have seen, frequently cited, but there is limited perspective on the wider needs of older people beyond basic health. Issues of mental health, social isolation and loneliness are rarely discussed. The roles played by older people as care-givers or recipients, and their mobility implications has become an increasingly significant area of research in Western contexts, and is also an important issue in LICs. This is an area that clearly needs greater attention. Research on mobilities across generations is also a major gap, with little attention paid to relational mobilities, despite the clear importance of intergenerational connections, notably (but not exclusively) related to care giving.

A number of studies have emphasised the important place that the continuing need to earn a livelihood has for many who enter later life in poverty. Older people's mobilities and the role of transport in relation to livelihoods is thus another important area of inquiry, but again is a significant research gap in LICs (where income earning must continue into old age in the absence of adequate pension provision). In this regard, the affordability of transport, economic needs, subsidy issues and income categories are all areas for research which require further attention [96].

The limited research undertaken on psychological effects which act to limit the mobility of older people was reviewed above. Issues ranging from concerns over road safety to harassment, personal security, stigma, shame, discrimination and the impact of crime have all been shown to pose significant barriers to older people's mobility. Many transport services, whether public or private, provide physical hazards for older people, as does poorly maintained physical infrastructure. Again, with limited exceptions, these problems are inadequately addressed in the research literature. While the potential value of virtual connectivity (through mobile phones for example) to replace or complement physical

mobilities has been examined, both the benefits and costs of virtual connectivity remain to be researched further [97].

Most research in LICs is either broad quantitative analysis based on national survey data such as the DHS or very small qualitative studies which may be dismissed by policymakers and planners as 'anecdotal' evidence. Urban studies in Nigeria demonstrate the limitations of dependence on quantitative surveys which have been conducted without an understanding of underlying issues surrounding ageing and mobility and without asking key questions (which themselves need to be identified through prior qualitative research).

More action research is needed, involving interventions followed by in-depth monitoring of impacts over a period of time, sufficient to identify changes due to factors such as seasonality. While there is a growing rhetoric around the involvement of older people in research process, and some action has been taken, older people tend to remain respondents. The value of using co-investigation approaches has been demonstrated by work in Tanzania and in Papua New Guinea [98, 99]. Speaking of the transport infrastructure development process in Papua New Guinea, Whitzman et al point out the importance of community participation (both in identifying needs and in designing responses) for sustainable, effective and efficient road infrastructure development [100]. New methodologies, such as the use of geo-mapping alongside participatory inquiry methodologies to explore the social and spatial barriers to access of urban services, also need further review and analysis [101]. To develop the necessary expertise, in academic institutions, governments and NGOs, to conduct mobility studies with older people there is also a need to build research capacity, both in-country and external expertise.

This review has indicated the importance of taking account of great diversity in the ageing experience, across widely varying contexts. Influences on ageing range from societal and political attitudes to older people, to the built environment, population density, climate, topography and land use. As this review has aimed to show, study of these differing contexts of ageing in LAMICs, particularly as they relate to older people's mobilities and use of transport, has barely begun. At the same time, as we have seen, policymaking institutions recognise these issues, and assert the importance of prioritising the widest possible inclusion in policies promoting transport and mobilities of people at all ages, so that, in the words of the Sustainable Development Goals "no one will be left behind" [102]. We have seen that those institutions which both make and influence policymaking recognise the existence of significant knowledge gaps, some of which have been discussed above. This should provide the positive context in which research agendas to answer some of these key questions can be established.

4.3. Young People & Mobility

The review points to clear research gaps and the need for a realignment of research methods and associated practices as follows:

- *The need for more in-depth research, particularly in Asia.* There is a growing body of detailed evidence regarding children and young people's specific transport and mobility needs and experiences in sub-Saharan Africa, often taking an ethnographic approach, but data remain sparse (and primarily quantitative) in Asian and MENA contexts.
- *The importance of building innovative mixed methods studies and an interdisciplinary approach to capture a full understanding of young people's complex transport needs and constraints*. There is a particular sparsity of research on mobility and transport among young people using mixed-methods approaches: The study of young people aged 9-18 years in 24 urban and rural sites in sub-Saharan Africa (Porter et al. 2017) seems, to date, to be the only extensive study in LMICs that utilises a range of mixed methods. In Asia mixed methods work is rare and a majority of research takes a quantitative survey approach that commonly fails to provide adequate understanding of the patterns that emerge. A triangulation of in-depth qualitative/ethnographic and survey research drawing on a range of disciplinary skills (possibly coupled with action research where interventions are made, and their impact then studied in depth), can be particularly powerful in understanding mobility experiences, behaviours and opportunities for positive change.
- *Greater engagement with young people themselves in research and planning processes is essential.* Community peer-research with young people as a route to more fully understanding their needs and aspirations in the transport field is gaining growing attention. The mixed-method study cited above, which brought together 70 young researchers (11-19 years) in Africa from 2006- to help build an extensive academic study, demonstrated the value of this approach. Small studies in Asia and Africa further support the importance of directly engaging young people in the research process (Lolichen 2007; Simpson and Collard 2019).
- *The need to build stronger recognition among transport professionals of the value of inputs from more vulnerable groups.* There is no point in conducting research with young people if the evidence collected is subsequently ignored. Thus greater effort is required to draw transport professionals more centrally into the research process with vulnerable groups.

- *Action research* incorporating and assessing both transport service and infrastructure interventions could aid exploration of a diversity of issues, including road safety and improved potential for active travel, for instance:
    - in LMIC cities, the potential of walking buses and other interventions such as street lighting and dedicated pedestrian and cycle lanes to aid safe active travel [e.g. safe travel skills training for young women – there would probably be broader benefits also for other sectors of the population, of course]
    - In LMIC rural areas the potential of walking buses, cycling [and cycle maintenance/repair training], dedicated contract transport and other interventions to improve girls' journey to school/journey to work security.
    - Exploring new approaches to transport subsidy for pupil/unemployed youth/young workers in urban and rural contexts that do not result in excluding them from transport.
    - Non-school based road safety training interventions for young people – notably roadside hawkers - who may have never attended school and thus never had access to any road safety curriculum.
- *Research on travel to school needs to incorporate specific studies around growing obesity problems among middle-class children in LMICs.*
- *More research is also needed around mobility aspects of out-of-school activities associated with recreation and social network building.*
- *The role of transport and mobility constraints and opportunities for shaping youth employment:* The transport/mobility elements that help shape youth employment, job search and unemployment experiences have, as yet, been little researched. This needs urgent attention across LMIC peri-urban sites where so many poorer households are located - and not least with specific reference to young women.
- *More attention to relationality across age groups* (especially the linkages between expanded older people and youth cohorts) and the mobility implications.
- *In-depth research into how mobile technology is reshaping travel practices in low income contexts in both the Global South and North, including its potential to reduce motorised transport usage, and the extent to which young people may experience negative elements of exploitation or surveillance through digital technology.*

  Mobile technology is now supporting young people's efforts at distance management across the world, both in emergency and everyday travel contexts, and in urban as well as rural settings. The potential for apps (including those developed by young people themselves) to reshape the transport arena globally is very exciting and opens up a potentially dramatic new phase of development. However, the extent to which less powerful groups in society, especially young people, are able to benefit in the longer term, while evading potential threats of exploitation (for instance in the gig economy) or the wider surveillance and control also posed by increasingly smart technological innovation, is uncertain; the evolving scene will merit careful observation.

- *The linkages between daily mobility experiences and migration decisions needs far closer investigation globally, but especially in the context of conflict, climate change and growing environmental fragility in many LMICs.*

Finally, however, it is important to look beyond the transport sector if we are to make significant improvements in young people's travel experiences and opportunities. Regarding LMICs, far greater attention is needed to youth transport issues from development practitioners working in other sectors, particularly education, youth employment, ICT and energy (though recent moves in the health sector to incorporate both transport and ICT considerations in their analyses are very encouraging[2]). This will require more sustained efforts among transport practitioners and researchers to reach cross-sectorally and engage productively with those sectors if youth opportunities that are so central to achieving progress across the SDGs are to be fully realised.

[2] There is substantial evidence regarding the importance of transport services for the health of children and young people (beyond traffic accident issues), for instance re vaccination, maternal health, access to TB, malaria and eye treatment, to ARVs and sexual and reproductive health (for instance, for SRH in South Africa see Mathews 2015); also in terms of the effect transport and road infrastructure has on health professionals' decisions re work place selection. This literature is not covered in the paper as it was not included in the ToR.

5. Conclusions and Next Steps

In order to develop an understanding of the knowledge in this widely defined area, a series of contractors have delivered a series of focused pieces of work related to specific areas and gaps in knowledge in the area of inclusion and transport. The work described in this final report covers three specific areas of work:

- Disability and Transport
- Older People and Transport
- Young People and Transport

All three studies have found some common themes. All studies have found very limited levels of specific research addressing the issues concerned on developing countries. They have as a result drawn parallels from the much greater amount of literature related to the context of the Global North and drawn parallels where appropriate to global phenomena or patterns.

All three studies have highlighted the need to understand any particular issue of inclusion in a holistic and inter-sectoral manner. They highlight the difficulty of just focusing on ageing without an understanding of the impact that gender plays on the experience on growing older in developing contexts, for example. As a result, they make the case for research in these areas to be undertaken in an integrated manner in order to understand and incorporate these cross-sectional concerns.

All studies also highlight the need to improve methodological approaches to measuring degrees of inclusion and equity. These include issues around the need to disaggregate travel patterns by gender, systems to capture the level and scope of sexual harassment women encounter on urban public transport or improve road crash data collection methods. Furthermore, there is an overall agreement across the studies on the need for more in-depth detailed social and behavioural science research on needs and patterns of different vulnerable groups that features methods that includes them in the development of the research understanding.

The initial draft recommendations from the State of the Knowledge reviews in this theme highlight four main themes:

- Data issues
- Technology
- Inclusive HVT Planning
- Intersectionality

Data

- Data needs to map and highlight scale of sexual harassment on public transport
- In-depth social research to identify the issues facing young and older people and people with disabilities across transport systems in developing countries
- Developing consistent methods to address data gaps and addressing the under-reporting of road traffic crashes
- Social and behavioural approaches to understanding traffic safety
- Data to support effective Road crash costing

Technology

- What scope is there for enabling technologies for people with disabilities and older people, appropriate for low and middle-income country use?
- How can we design the smart mobility and smart-city solutions with particular focus on creating inclusive settlements?
- What is the impact of mobility as a service and uber-type transport service delivery for inclusion and equity issues in urban areas?

Inclusive HVT Planning:

- What kind of capacity, knowledge and cooperation modalities need to be built to include both formal and informal public transport systems in the National Transport plans? How to design specific programs on the tax structure for PT and fund allocation to prioritize PT?
- What are the exact policies, programs and tools needed to enhance women's personal safety on public transport?
- How can we insert economic support systems in the transport (welfare) domain to address affordability issues for low-income women of the developing economies
- How can we encourage more female participation in the spatial planning and transportation sector?
- Linked to this, persons with a range of impairments must be included in planning discussions, on access panels, and in audits;
- How does road safety address the expected increase in traffic volume and its implications?
- How does Vehicle safety and dumping old vehicles in LICs interact?
- How can we take an effective proactive approach to road safety?

- How can the common narrative emerging on the topic of Gender and Transport be supported by non-complex indicators for the benefit of policy makers?
- Governments need to develop a locally and contextually appropriate set of standards, targets and indicators, in collaboration with local disability organisations (e.g. DPOs), which also measure access, inclusion, acceptability, as well as safety and security, independence, and autonomy;

Intersectionality

- In-depth research needed to understand the interaction between gender, age and disability and road danger. The role of road safety in causing disability. The role of disability in extenuating poverty. The interaction between older age and disability all need to be understood in the context of mobility as no one area of inclusion is isolated.
- How to fuse spatial development and relocation policies to cater to women's opportunities – wrt education, health and employment?
- How to frame a multi-sectoral approach - ensure mobility for women (both urban and rural) to ensure their access to employment/markets, education, health centers?
- Vulnerable road users and gender disaggregation
- The impact of road safety on disabilities
- Planners need to consider a 'twin-track' approach to inclusive transport - travel and access needs change over time and vary according to a range of factors – 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;
- Planners much consider access from a holistic perspective – the whole journey approach, not just transit routes etc;

6. References

3.1 Disability & Mobility,

1. UNDP. *A Review of International Best Practice in Accessible Public Transportation for Persons with Disabilities*; UNDP: New York, 2010.

2. Frye, A. *Disabled and Older Persons and Sustainable Urban Mobility*; UN-HABITAT: New York, 2013.

3. Frye, A. *Inclusive Public Transport: Meeting the Mobility Needs of Disabled Citizens*. Policy Brief prepared for High Volume Transport Applied Research Programme, 2018

4. Kuneida M, Roberts P. *Inclusive access and mobility in developing countries*; World Bank: Washington, 2006.

5. United Nations. Convention on the Rights of Persons with Disabilities. UN, New York, 2007.

6. WHO/World Bank *World Report on Disability Report*; WHO: Geneva, 2011.

7. United Nations *UN Flagship Report on Disability and Development*. UN: New York, 2018

8. United Nations Economic and Social Commission for Asia and the Pacific. *Incheon Strategy to "Make the Right Real" for Persons with Disabilities in Asia and the Pacific*. UNESCAP: Bangkok, 2012

9. UNDESA, *11th session of the Conference of States Parties to the CRPD, 12 to 14 June 2018*. UNDESA: New York, 2018

10. GAATES Survey of Local Transport Needs and Priorities: Analysis of Results. Available online: https://drive.google.com/file/d/1mDzAdxDhKPnqd0tlty4GtqbUvMlUV8da/view (accessed on 13 May 2019)

11. Access Exchange International. *Bridging the Gap: Your role in transporting children with disabilities to school in developing countries*. Access Exchange International: San Francisco, 2017.

12. Kett, M.; Deluca, M. Transport and Access to Inclusive Education in Mashonaland West Province, Zimbabwe. *Social Inclusion* **2016**, 4, 61-71.

13. Davies, D.K.; Stock, S.E.; Holloway, S.; Wehmeyer, M. Evaluating a GPS-Based Transportation Device to Support Independent Bus Travel by People with Intellectual Disability. *J. Intellect. Dev. Disabil.* **2010** 48, 454-463.

14. Grisé, E.; Boisjoly, G;, Maguire. M.; El-Geneidy, A. Elevating access: Comparing accessibility to jobs by public transport for individuals with and without a physical disability. *Transport. Res. A Pol.* **2018** (in press)

15. Porter, G.; Tewodros, A.; Gorman, M. Mobility, transport and older people's well being in sub-Saharan Africa: review and prospect. In *Geographies of transport and ageing*. Curl, A., Musselwhite. C., Eds.; Palgrave Macmillan: Heidelberg, 2018, pp. 75-100.

16. Kamruzzaman, M.; Yigitcanlar T.; Yang, J.; Mohamed, M.A. Measures of transport-related social exclusion: A critical review of the literature. *Sustainability* **2016**, 8, 696.

17. European Disability Forum. *EDF report on the situation of passengers with disabilities*. EDF: Brussels, 2015.

18. Butcher, L. Access to transport for disabled people. *UK Parliament Briefing Paper Number CBP 601*, 30 October, 2018. URL: https://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN00601 (accessed on 13 May 2019)

19. Sze, N.; Christensen, K. Access to urban transport system for individuals with disabilities. *IATSS* **2017**, 41, 66-73

20. Mindell, J. HEALTH on the MOVE 2: Policies for Health Promoting Transport. *Journal of Transport & Health* **2014**, 1:2

21. Mindell, J. Transport and inequalities (editorial). *Journal of Transport & Health* **2018**, 8, 1-3

22. Behrens, R.; Görgens, T. Challenges in Achieving Universal Access to Transport Services in South African Cities In *The Palgrave Handbook of Disability and Citizenship in the Global South.* Watermeyer, B., McKenzie, J., Swartz, L., Eds.; Palgrave Macmillan: Heidelberg, 2019

23. Dejeammes, M. Boarding Aid Devices for Disabled Passengers on Heavy Rail: Evaluation of Accessibility. *TRR Journal* **2000**, 1713,48-55

24. Lister, H.; Dhunpath, R. The taxi industry and transportation for people with disabilities: Implications for universal access in a metropolitan municipality. *Transformation* **2016**, 90, 28-48

25. Mattson, J.; Hough, J.; Varma, A. Estimating demand for rural intercity bus services. *Research in Transportation Economics* **2018**, 71, 68-75.

26. Venter, C. Transport expenditure and affordability: The cost of being mobile, *Dev. South. Afr.* **2011**, 28, 121-1

27. Mitra, S.; Palmer, M.; Kim, H.; Mont, D.; Groce, N. Extra Costs of Living with a Disability: A Review and Agenda for Research. *Dis. & Health* **2017**, 10, 475-4828.

28. Wheeler, K.; Yang, Y.; Xiang, H. Transport use patterns of US children and teenagers with disabilities. *Dis. & Health* **2009**, 2, 158 -164

29. Li, H.; Raeside, R.; Chen, T.; McQuaid, R. Population ageing, gender and the transportation system. *Research in Transportation Economics* **2012**, 34, pp. 39-47.

30. King, J.A.; King, M.J.; Edwards, N.; Hair, S.A.; Cheang, S.; Pearson, A.; Coelho, S. Addressing transport safety and accessibility for people with a disability in developing countries: a formative evaluation of the Journey Access Tool in Cambodia, *Glob. Health Action* **2018**, 11, 1.

31. Soltania, S.H.K.; Shamb, M.; Awangb, M.; Yamanb, R. Accessibility for Disabled in Public Transportation Terminal. *Procedia* **2012**, 35, 89-96

32. Mulley, C.; Nelson, J.D.; Wright, S. Community transport meets mobility as a service: On the road to a new a flexible future. *Research in Transportation Economics* **2018**, 69, 583-591

33. Grisé, E.; Boisjoly, G.; Maguire. M.; El-Geneidy, A. Elevating access: Comparing accessibility to jobs by public transport for individuals with and without a physical disability. *Transport. Res. A Pol.* **2018** (in press)

34. Hansson, L.; Holmgren, J. Cost effect of reorganising – A study of special transport services. *Research in Transportation Economics* **2018**, 69, 453-459.

35. Rickert, T. Paratransit for Mobility-Impaired Persons in Developing Regions: Starting Up and Scaling Up. *San Francisco: Access Exchange International* **2012**.

36. Sammer, S.; et al. Identification of Mobility-Impaired Persons and Analysis of Their Travel Behavior and Needs. *Transportation Research Record: Journal of the Transportation Research Board* **2012**, 2320, 46-54.

37. Neven, A.; et al. Viamigo Monitoring Tool to Support Independent Travel by Persons with Intellectual Disabilities. *Transportation Research Record: Journal of the Transportation Research Board* **2017**, 2650, 25-32.

38. Schlingensiepen, J.; Naroska, E.; Bolten, T.; Christen, O.; Schmitz, S.; Ressel, C. Empowering People with Disabilities Using Urban Public Transport. *Procedia Manufacturing* **2015**, 3, 2349-2356.

39. Cendana, D.I.; et al. E-Purse Transit Pass: The Potential of Public Transport Smart Card System in the Philippines. Conference paper: 3rd IEEE International Conference on Computer and Communications, 2016.

40. Øksenholt, H.V.; Aarhaug, J. Public transport and people with impairments – exploring non-use of public transport through the case of Oslo, Norway. *Disability & Society* **2018**, 33(8), 1280-1302.

41. Sustrans. Locked Out: Transport Poverty in England. Available online: https://www.sustrans.org.uk/lockedout (accessed on 13 May 2019)

42. Lucas, K.; Mattioli, G.; Verlinghieri, E.; Guzman, A. Transport and Its Adverse Social Consequences. Proceedings of the Institution of Civil Engineers – Transport **2016**, 169 (6), 353-365. Available online: ISSN 0965-092X https://doi.org/10.1680/jtran.15.00073

43. Mackett, R. Impact of Concessionary Bus Travel on the Well-Being of Older and Disabled People. *Journal of the Transportation Research Board* **2013**, 2352, 114–119.

44. Behrens R, Görgens, T. Challenges in Achieving Universal Access to Transport Services in South African Cities. In *The Palgrave Handbook of Disability and Citizenship in the Global South*. Brian Watermeyer, Judith McKenzie and Leslie Swartz (Eds.), Palgrave.

45. Mont, D.; Palmer, M.; Mitra, S.; Groce, N. Disability Identification Cards: Issues in Effective Design. *Leonard Cheshire Research Centre Working Paper Series* **2016**, 29, 1-13

46. Deka, D.; Lubin, A. Exploration of Poverty, Employment, Earnings, Job Search, and Commuting Behavior of Persons with Disabilities and African-Americans in New Jersey. *Transportation Research Record: Journal of the Transportation Research Board* **2012**, 2320, 37-45.

47. Navarrete-Reyes, A.P.; et al. Correlates of subjective transportation deficiency among older adults attending outpatient clinics in a tertiary care hospital in Mexico City. *Geriatrics & Gerontology International* **2017,** 17.

48. Mutwali, R.; Ross, E. Disparities in physical access and healthcare utilization among adults with and without disabilities in South Africa. *Disability and Health* **2019***,* 12, 35-42.

49. Carew, M.T.; Colbourn, T.; Cole, E.; Ngufuan, R.; Groce, N.; Kett, M. Inter- and Intra-Household Relative Inequality among Disabled and Non-Disabled People in Liberia. *PLOS ONE* **2019**, under review

50. Eide, A.H.; Mannan, H.; Khogali, M.; van Rooy, G.; Swartz, L.; Munthali, A.; Hem, K.; MacLachlan, M.; Dyrstad, K. Perceived barriers for accessing health services among individuals with disability in four African countries. *PLoS ONE* **2015**, 10:e0125915

51. Green, S.; Mophosho, M.; Khoza-Shangase, K. Commuting and communication: An investigation of taxi drivers' experiences, attitudes and beliefs about passengers with communication disorders. *African Journal of Disability* **2015**, 4, 1-8.

52. Porter, G. Mobilities in Rural Africa: New Connections, New Challenges. *Annals of the Association of American Geographers* **2016**, 106, 434-441.

53. Ahmad, M. Independent-Mobility Rights and the State of Public Transport Accessibility for Disabled People: Evidence From Southern Punjab in Pakistan. *Administration & Society* **2013***,* 47, 197-213.

54. HELPAGE International. *Learning with Older People about their Transport and Mobility Problems in Rural Tanzania.* HAI: Thame, United Kingdom, 2015.

55. Thompson, P. Challenges and Successes in the Application of Universal Access Principles in the Development of Bus Rapid Transport Systems in South Africa. *Studies in health technology and informatics* **2016**, 229, 629-38

56. Zającab, P. City Accessible for Everyone – Improving Accessibility of Public Transport Using the Universal Design Concept. *Transportation Research Procedia* **2016**, 14, 1270-1276.

57. Rama, S. Gendered mobilities: The methodology, theory and practice disjuncture. *Agenda* **2018**, 32, 113-12.

58. Desapriya, E.; et al. Vision screening of older drivers for preventing road traffic injuries and fatalities. *Cochrane Database of Systematic Reviews* **2014**, 2.

59. Li, H.; Raeside, R.; Chen, T.; McQuaid, R.W. Population ageing, gender and the transportation system. *Research in Transportation Economics* **2012**, 34, 39-47.

60. Ross, T.; Buliung, R. A systematic review of disability's treatment in the active school travel and children's independent mobility literatures. *Transport Reviews* **2018**, (38):349-371

61. Lubin, A.; Alexander, K.; Voorhees, A.M. Achieving Mobility Access for Older Adults Through Group Travel Instruction. *Transportation Research Record: Journal of the Transportation Research Board* **2017**, 2650, 18-24.

62. Macagnano, E.V. Intelligent urban environments: towards e-inclusion of the disabled and the aged in the design of a sustainable city of the future. A South African example, *WIT Transactions on Ecology and the Environment* **2008**, 117, 537-547

63. Macagnano, EV (2009) Wireless Portable Computer Systems and Technologies for the Disabled and the Aged towards an Accessible, Inclusive and Intelligent Metropolis of the Future: the South African Context. *Inclusion between past and future AT from adapted equipment to inclusive environment* conference, Florence, Italy August 31 – September 2 2009

64. Vancampfort, D.; et al. Associations between active travel and physical multimorbidity in six LMICs among community-dwelling older adults: A cross-sectional study. *PLoS ONE* **2018**, 13.

65. DFID. Disability, Poverty and Development; DFID: London, 2000.

3.2 Older People & Mobility

1. Manchester Institute for Collaborative Research on Ageing, Ageing, Transport and Mobility: New approaches from researchers and providers, MICRA Seminar, 2013, https://www.micra.manchester.ac.uk/connect/events/events-archive/2013/ageing-transport-and-mobility (accessed on 3rd March 2019).

2. Schwanen, T.; Paez, B. The mobility of older people – an introduction, *Journal of Transport Geography* 2010, Vol. 8, pp. 591-5.

3. Curl, A; Musselwhite, C., Geographical perspectives on transport and ageing. In Curl, A; Musselwhite, C., Eds., *Geographies of Transport and Ageing* (Palgrave Macmillan, Basingstoke, UK, 2018), pp. 3-24.

4. Parker, S.; Khatri, R.; Cook I.G.; Pant B., Theorizing Aging in Nepal: Beyond the bio-Medical Model. *Canadian Journal of Sociology*, 2014, Vol. 39:2, pp. 231-53.

5. Pettersson, P.; Schmöcker, J-D. Active ageing in developing countries? – trip generation and tour complexity of older people in Metro Manila, *Journal of Transport Geography*, September 2010 *Vol.* 18, pp. 613-623.

6. Ibid.

7. Aboderin, L., Understanding and Advancing the Health of Older Populations in sub-Saharan Africa: Policy Perspectives and Evidence Needs, *Public Health Reviews*, 2010, *Vol.* 32:2, pp. 357-376.

8. Parker, S.; Khatri, R.; Cook I.G.; Pant B. Theorizing Aging in Nepal: Beyond the bio-Medical Model, *Canadian Journal of Sociology*, 2014, *Vol.* 39:2, pp. 231-53.

9. HelpAge International, Global AgeWatch Insights Report, HelpAge International, London, UK, 2018, p. 33.

10. World Health Organization, Study on global AGEing and adult health. Available online: URL https://www.who.int/healthinfo/sage/en/ (accessed on 3rd March 2019).

11. Szeto, W.Y., Spatio-temporal travel characteristics of the elderly in an ageing Society, *Travel Behavior and Society*, 2017, Vol. 9, pp. 10-20.

12. See, for example, B. Wilunda, B; Ng, N.; Stewart Williams, J. Health and ageing in Nairobi's informal settlements-evidence from the International Network for the Demographic Evaluation of Populations and Their Health, *BMC Public Health*, 2015. Available online: URL 10.1186/s12889-015-2556-x, (date accessed 5th April 2019);

13. Ipingbemi, O., Travel characteristics and mobility constraints of the elderly in Ibadan, Nigeria, *Journal of Transport Geography*, 2010, 18:2, pp. 285–291.

14. Ahmad Z.; Batool, Z.; Starkey, P, Understanding mobility characteristics and needs of older persons in urban Pakistan with respect to use of public transport and self-driving. *Journal of Transport Geography,* 2019, Vol. 74, pp. 181-90.

15. Hanson, S., Gender and mobility: new approaches for informing sustainability. *Gender, Place and Culture*, 2010, Vol. 17:1, pp. 5-23.

16. Schwanen, T.; Paez, B., The mobility of older people – an introduction, *Journal of Transport Geography,* 2010, Vol. 8, pp. 591-5.

17. Phillipson, C., The social construction of old age: perspectives from political economy. *Reviews in Clinical Gerontology*, 1991, Vol. 1:4, pp. 403-41.

18. Curl, A; Musselwhite, C., Geographical perspectives on transport and ageing. In *Geographies of Transport and Ageing* (Palgrave Macmillan, Basingstoke, UK, 2018) pp. 3-24.

19. United Nations Development Programme, Ageing, Older Persons and the 2030 Agenda for Sustainable Development. (UNDP, New York, USA, 2017), p.7

20. Kalache, A.; Keller, I., The greying world: a challenge for the twenty-first century. *Science Progress*, 2000, Vol. 83:1, pp. 33-54.

21. United Nations, Madrid political declaration and international plan of action on ageing. (Madrid, 2002). Available online: URL https://www.un.org/development/desa/ageing/madridplan-of-action-and-its-implementation.html. (Date accessed 1st March 2019).

22. United Nations, *New Urban Agenda*. United Nations Habitat 3 Conference, Quito, Ecuador, 2017, paragraphs 113, 157. Available online; URL http://habitat3.org/the-new-urban-agenda/ . (Accessed 25th February 2019).

23. Beard, J.; Officer, A.; Cassels, A., Eds.; *World Report on Ageing and Health.* World Health Organization, Geneva, Switzerland, 2015, p.180.

24. World Bank, *Sustainable Mobility for All, Global Mobility Report 2017: Tracking Sector Performance*, World Bank, Washington DC, USA, 2017, p.25.

25. Mason, J.; P.Turner, P.; Steriu, M., Universal Access in Urban Areas: Why Universal Access in Urban Areas Matters for Sustainable Mobility Transport and ICT connections. World Bank Group, Washington, D.C. : Available online: URL http://documents.worldbank.org/curated/en/221451537381407483/Universal-Access-in-Urban-Areas-Why-Universal-Access-in-Urban-Areas-Matters-for-Sustainable-Mobility, (Accessed 10th March 2019).

26. Ibid.

27. Parker, S.; Khatri, R.; Cook I.G.; Pant B. Theorizing Aging in Nepal: Beyond the Bio-Medical Model. *Canadian Journal of Sociology*, 2014, *Vol.* 39:2, pp. 231-53.

28. See, for example, Olawole, M.O.; Aloba, O., Mobility characteristics of the elderly and their associated level of satisfaction with transport services in Osogbo, southwestern Nigeria. *Transport Policy*, 2014, Vol.35, pp.105-116.

29. Ahmad Z.; Batool, Z.; Starkey, P, Understanding mobility characteristics and needs of older persons in urban Pakistan with respect to use of public transport and self-driving. *Journal of Transport Geography,* 2019, Vol. 74, pp. 181-90.

30. United Nations Population Fund (UNFPA), and HelpAge International, *Ageing in the Twenty-First Century: A Celebration and A Challenge*. UNFPA, New York, USA, 2012, p.42.

31. Porter, G.; Tewodros, A.; Gorman, M., Mobility, transport and older people's well-being in sub-Saharan Africa: review and prospect. In Curl ,A., Musselwhite, C., Eds., *Geographies of Transport and Ageing* (Palgrave Macmillan, Basingstoke, UK, 2018), pp. 75-100.

32. Institute for Transportation and Development Policy, *Is Your City Really Made for You?* ITDP, February 2017. Available online:, URL https://www.itdp.org/2017/02/14/mag-city-made-for-you/. (Accessed 15th March 2019).

33. Litman,T., *Evaluating Transportation Equity: Guidance For Incorporating Distributional Impacts in Transportation Planning*. Victoria Transport Policy Institute, Victoria, Canada, 2014, p.20.

34. Berthe, A.; Berthe-Sanou, L.; Konate, B.; Hien, H., Functional disabilities in elderly people living at home in Bobo-Dioulasso, Burkina Faso. *Sante Publique*, 2012, Vol. 24:5, pp.439-51.

35. Lima-Costa, M.F; Facchini, L.; Matos, D.; Macinko, J., Changes in ten years of social inequalities in health among elderly Brazilians (1998-2008). *Revista De Saúde Pública*, 2012, Vol. *46, pp.* 100-107.

36. Capistrant, B.D.; Glymour, M.M.; Berkman, L.F., Assessing Mobility Difficulties for Cross-National Comparisons: Results from the World Health Organization Study on Global Ageing and Adult Health. *Journal of the American Geriatrics Society*, 2014, Vol. 62:2, pp. 329-35.

37. Zunzunegui, M-V.; Alvarado, B-V.; Beland, F.; Vissandjee, V., Explaining health differences between men and women in later life: a cross-city comparison in Latin America and the Caribbean*. Social Science and Medicine*, 2009, Vol. 68:2, pp. 235-242.

38. Gómez, J.; Corchuelo-Ojeda, J.; Curcio, C-L.; Calzada, M-T. ; Mendez, F., SABE Colombia: Survey on Health, Well-Being, and Aging in Colombia—Study Design and Protocol. *Current Gerontology and Geriatrics Research*. 2016. Vol. 24, pp. 1-7.

39. GBD 2015 Disease and Injury Incidence and Prevalence Collaborators, Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *The Lancet*, 2016, Vol. 388, pp. 1545-1602.

40. Laverty A.A.; Palladino, R.; Lee, J.T.; Millett, C., Associations between active travel and weight, blood pressure and diabetes in six middle-income countries: a cross-sectional study in older adults. *International Journal of Behavioral Nutrition and Physical Activity*, 2015, 12:65. Available online: DOI:10.1186/s12966-015-0223-3 (accessed 12th March 2019).

41. Ng, N.; Hakimi, M.; Van Minh, H.; Juvekar, S.; Razzaque, A.; Ashraf, A.; Masud, A.S.; Kanungsukkasem, U.; Soonthornthada, K.; Huu Bich, T., Prevalence of physical inactivity in nine rural INDEPTH Health and Demographic Surveillance Systems in five Asian countries. *Global Health Action*, 2009, Vol. 2:1, pp. 44-53.

42. Vaidya; A.; Krettek, A., Physical activity level and its socio-demographic correlates in a peri-urban Nepalese population: a cross-sectional study from the Jhaukhel-Duwakot health demographic surveillance site. *International Journal of Behavioral Nutrition and Physical Activity*, 2014, Vol. 11:39. Available online: DOI:10.1186/1479-5868-11-39. (Accessed 12th March 2019).

43. Wandera, S.O; Kwagala B.; Ntozi J., Determinants of access to healthcare by older persons in Uganda: across-sectional study. *International Journal for Equity in Health*, 2015, Vol. 14:26, doi: 10.1186/s12939-015-0157-z. (Accessed 12th March 2019).

44. World Health Organization, *WHO World Health Survey: 2002–2004*. World Health Organization, Geneva, Switzerland, 2015. Available online: URL http://www.who.int/healthinfo/survey/en/. (Accessed 10th March 2019).

45. Sleap, B., *The Rights of Older People in Kyrgyzstan.* HelpAge International, London, UK, 2013, p.5.

46. Knight, L.; Schatz, E.; Mukumbang, C., "I attend at Vanguard and I attend here as well": barriers to accessing healthcare services among older South Africans with HIV and non-communicable diseases. *International Journal for Equity in Health*, 2019, Vol. 17:147.

47. Lecompte, M.C.; Bocarejo, J.P.,Transport systems and their impact on gender equity. *Transportation Research Procedia*, 2017, Vol. 25, pp. 424–425.

48. HelpAge International, *Gender and transport for older people*. HelpAge International, London, UK, 2002, p. 1.

49. World Bank, *Making Transport Work for Women and Men: Challenges and Opportunities in the Middle East and North Africa, Lessons from Case Studies*. World Bank, Washington, DC. USA. Available online: URL https://openknowledge.worldbank.org/handle/10986/17648. (Accessed 2nd March 2019).

50. UN Economic Commission for Europe, *Inland Transport Committee and gender issues in transport*. UN ECE, 2009, ECE/TRANS/2009/7. Available online: URL https://www.unece.org/trans/theme_gender.html. (Date accessed 10th March 2019).

51. Porter, G.; Tewodros, A.; Gorman, M., Mobility, transport and older people's well-being in sub-Saharan Africa: review and prospect. In Curl ,A., Musselwhite, C., Eds., *Geographies of Transport and Ageing* (Palgrave Macmillan, Basingstoke, UK, 2018), pp. 75-100.

52. Ahmad Z.; Batool, Z.; Starkey, P, Understanding mobility characteristics and needs of older persons in urban Pakistan with respect to use of public transport and self-driving, *Journal of Transport Geography,* 2019, Vol. 74, pp. 181-90.

53. Soltani, A.; Pojani, D.; Askari, S.; Masoumi, H.E., Socio-demographic and built environment determinants of car use among older adults in Iran. *Journal of Transport Geography* 2018, Vol.68, pp. 109-117.

54. Nurdden, A.; Rahmat, R.A.; Ismail, A.B.; Effect of Transportation Policies on Modal Shift from Private Car to Public Transport in Malaysia. *Journal of Applied Sciences*, 2017, Vol. 7:7, pp.1013-18.

55. Olawole, M.O. Analysis of Intra-Urban Mobility of the Elderly in a Medium-Size City in Southwestern Nigeria. *Mediterranean Journal of Social Sciences*, 2015, Vol. 6:3, 2015, pp. 90-104.

56. Mulongo, G.; Tewodros, A.; Porter, G., *Impacts and implications of gender mainstreaming in the rural transport sector in Tanzania with particular reference to women with multi-dimensional vulnerabilities*. HelpAge International, London, 2017, pp. 43-47.

57. J. Beard; Officer, A.; Cassels, A., Eds.; *World Report on Ageing and Health.* World Health Organization, Geneva, Switzerland, 2015, p. 180.

58. Madani, M.; Sibai, , M.A., Assisted Living Facilities' Accessibility Challenge in the Beirut Area. *The International Journal of Architectonic, Spatial and Environmental Design*, 2017: 12:3. Available online: DOI: 10.18848/2325-1662/CGP/v11i03/1-14. (Accessed 13th March 2019).

59. Munshi, T.; Out-of-Home Mobility of Senior Citizens in Kochi, India. In Curl, A; Musselwhite, C., Eds., *Geographies of Transport and Ageing* (Palgrave Macmillan, Basingstoke, UK, 2018), pp. 153-70.

60. Schwanen, T.; Lucas, K.; Akyelken, N.; Cisternas Solsona, D.; Carrasco, J-A.; Neutens, T., Rethinking the links between social exclusion and transport disadvantage through the lens of social capital. *Transportation Research Part A; Policy and Planning* 2015, Vol.74, pp. 123-135.

61. Lucas, K., Making the connections between transport disadvantage and the social exclusion of low income populations in the Tshwane Region of South Africa. *Journal of Transport Geography*, 2011, Vol. 19:6, pp. 320-1334.

62. Porter, G., Living in a walking world: rural mobility and social equity issues in sub-Saharan Africa. *World Development* 2002, Vol. 30:2, pp. 285-300;

63. Porter, G., Transport planning in sub-Saharan Africa. Progress report 2, Putting gender into mobility and transport planning in Africa. (*Progress in Development Studies* 2008, Vol. 8:3, pp. 281-289; 50.

64. Porter, G., Mobilities in rural Africa: new connections, new challenges. *Annals of the American Association of Geographers*, 2016, Vol. 106:2, pp. 434-4.

65. Mudege, N.N.; Eze, A.C., Gender, aging, poverty and health: Survival strategies of older men and women in Nairobi slums. *Journal of Aging Studies*, 2009, Vol. 23:4, pp. 245-57.

66. Schwanen, T.; Lucas, K.; Akyelken, N.; Cisternas Solsona, D.; Carrasco, J-A.; Neutens, T., Rethinking the links between social exclusion and transport disadvantage through the lens of social capital. *Transportation Research Part A; Policy and Planning* 2015, Vol.74, pp. 123-135.

67. Knodel, J.; Teerawichitchainan, B.P., Aging in Myanmar. *The Gerontologist*, 2017, Vol.57: 4, pp. 599–605.

68. Aboderin, I.; Epping-Jordan, J., *Towards long-term care systems in sub-Saharan Africa* (World Health Organization, Geneva, Switzerland, 2017), p.15.

69. Chepngeno-Langlat, G.; Madise, N.; Evandrou, M.; Falkingham, J., Gender differentials on the health consequences of care-giving to people with AIDS-related illness among older informal carers in two slums in Nairobi, Kenya. *AIDS Care*, 2011, Vol. 23:12, pp. 1586-1594.

70. Ssengonzi, R., The impact of HIV/AIDS on the living arrangements and well-being of elderly caregivers in rural Uganda. *AIDS Care*, Vol. 21:3, 2009 pp. 309-14.

71. Hanrahan, K.B., Caregiving as mobility constraint and opportunity: married daughters providing end of life care in northern Ghana. *Social and Cultural Geography*, 2018, Vol. 19:1, pp. 59-80.

72. Plyushteva, A.; Schwanen, T., Care-related journeys over the life course: Thinking mobility biographies with gender, care and the household. *Geoforum*, 2018, Vol.97, pp. 131-141.

73. Beard, J.; Officer, A.; Cassels, A., Eds.; *World Report on Ageing and Health*, (World Health Organization, Geneva, Switzerland, 2015) p.180.

74. Jones, S.E., *Ageing and the city: making urban spaces work for older people*. HelpAge International, London, UK, 2016, p.9.

75. Shrestha, B.P.; Millonig, A.; Hounsell, N.B.; McDonald, M., Review of Public Transport Needs of Older People in European Context. *Journal of Population Ageing* 10:2017, pp. 343-61.

76. K. Kamenov, K.; Caballero, F.F.; Miret, M.; Leonardi, M.; Sainio, P.; Tobiasz-Adamczyk, B.; Haro, J.M.; Chartterji, S.; Avuso-Mateos, J.L.; Cabello, M., Which Are the Most Burdensome Functioning Areas in Depression? A Cross-National Study. *Frontiers in Psychology*, 2016: Vol. 7. Available online: URL https://dx.doi.org/10.3389%2Ffpsyg.2016.01342. (Accessed 19th March 2019).

77. Lloyd-Sherlock, P.; Agrawal, S.; Minicuci, N., Fear of crime and older people in low- and middle-income countries, *Ageing and Society*, 2016, 36:5, pp. 1083-1106.

78. Knodel, J.; Teerawichitchainan, B.P., Aging in Myanmar. *The Gerontologist*, 2017, Vol.57: 4, pp. 599–605.

79. Whitzman, C.; James, K.; Powaseu, I., *Travelling Together: Disability Inclusive Road Development in Papua New Guinea*. University of Melbourne/Ausaid, Australia, 2013. Available online: URL https://msd.unimelb.edu.au/research/projects/completed/travelling-together. (Accessed 21st March 2019).

80. Curcio, C.L.; Gomez, F.; Reyes-Ortiz, C.A., Activity Restriction Related to Fear of Falling Among Older People in the Colombian Andes Mountains Are Functional or Psychosocial Risk Factors More Important? *Journal of Aging and Health*, 2009, Vol. 21:3, pp.460-79.

81. S.Z. Kalula, S.Z.; Ferreira, M.; Swingler, G.H.; Badri, M., Risk factors for falls in older adults in a South African Urban Community. *BMC Geriatrics*, 2016, Vol. 16:51, doi: 10.1186/s12877-016-0212-7 (Accessed 21st March 2019).

82. Romli, A.S.; Tan, M.P.; Mackenzie, L.; Lovarini, M.; Suttanon, P.; Clemson, L., Falls amongst older people in Southeast Asia: a scoping review. *Public Health* 2017, Vol. 145, pp. 96-112.

83. See, for example, Wismans, J.; Skogsmo, I.; Nilsson-Ehle, A.; Lie,A.; Thynell, M.; Lindberg, G., Commentary: Status of road safety in Asia. *Traffic Injury Prevention*, 2016, Vol. 17:3, pp.217-25.

84. Mabunda, M.M.; Magnitude and categories of pedestrian fatalities in South Africa. *Accident Analysis & Prevention*, 2008, Vol. 40:2, pp. 586-93.

85. Odofuwa, O., Enhancing mobility of the elderly in Sub-Saharan African cities through improved public transportation. IATSS Research, 2006, pp. 60-6.

86. Amosun S.L.; Burgess, T.; Groeneveldt, L.; Hodgson, T., Are elderly pedestrians allowed enough time at pedestrian crossings in Cape Town, South Africa? *Physiotherapy Theory and Practice*, 2007 Vol. 23:6, pp. 325-32.

87. Available online: URL https://doi.org/10.1186/s12939-018-0863-4. (Accessed 28th February 2019).

88. Hartog, J., *Disaster resilience in an ageing world: How to make policies and programmes inclusive of older people*. HelpAge International, London, 2014, pp. 9-11.

89. World Health Organization, *Older Persons in Emergencies: an Active Ageing Perspective.* World Health Organization, Geneva, Switzerland, 2008, pp. 1-41.

90. Age and Disability Capacity Programme, *Humanitarian inclusion standards for older people and people with disabilities*. ADCAP, London, UK, 2018, pp. 9-13.

91. Sheppard, P.; Polack, S.; McGivern, M., *Missing millions: how older people with disabilities are excluded from humanitarian response*. HelpAge International, London, 2018), p.4 and p.32.

92. Institute for Transportation and Development Policy, *Is Your City Really Made for You?* ITDP, February 2017. Available online: URL https://www.itdp.org/2017/02/14/mag-city-made-for-you/. (Accessed 15th February 2019).

93. B. Harriss-White, B.; Olsen, W.; Vera-Sanso, P.; Suresh, V., Multiple shocks and slum household economies in South India. *Economy and Society*, 2013, Vol.42:3, pp. 398-429.

94. Venter, C., Transport expenditure and affordability: The cost of being mobile. *Development Southern Africa*, 2011, Vol. 28:1, 2011, pp. 121-40.

95. HelpAge International, **Global AgeWatch Insights: The right to health for older people, the right to be counted. (HelpAge Interntioanl, London, UK, 2018), p.37.**

96. Venter, C., Transport expenditure and affordability: The cost of being mobile. *Development Southern Africa*, 2011, Vol. 28:1, 2011, pp. 121-40.

97. Porter, G.; Tewodros, A.; Gorman, M., Mobility, transport and older people's well-being in sub-Saharan Africa: review and prospect. In Curl ,A., Musselwhite, C., Eds., *Geographies of Transport and Ageing* (Palgrave Macmillan, Basingstoke, UK, 2018), pp. 75-100.

98. Venter, C., Transport expenditure and affordability: The cost of being mobile. *Development Southern Africa*, 2011, Vol. 28:1, 2011, pp. 121-40.

99. Porter, G.; Tewodros, A.; Gorman, M., Mobility, transport and older people's well-being in sub-Saharan Africa: review and prospect. In Curl ,A., Musselwhite, C., Eds., *Geographies of Transport and Ageing* (Palgrave Macmillan, Basingstoke, UK, 2018), pp. 75-100.

100. Ibid.

101. Whitzman, C.; James, K.; Powaseu, I., *Travelling Together: Disability Inclusive Road Development in Papua New Guinea*. University of Melbourne/Ausaid, Australia, 2013. Available online URL https://msd.unimelb.edu.au/research/projects/completed/travelling-together (Accessed 21st March 2019).

102. Ibid.

103. HelpAge International, *Geo-Mapping Social and Spatial Barriers to Urban Service Access in Old Age – Nairobi and Delhi.* (HelpAge International, internal report, 2019).

104. United Nations, 2030 Agenda for Sustainable Development. United Nations, New York, 2015), URL https://www.un.org/sustainabledevelopment/development-agenda/. (Accessed 3rd March 2019).

3.3 Young People & Mobility

1. McMillan, T. 2011. *Children and Youth and Sustainable Urban Mobility.* Thematic study prepared for Global Report on Human Settlements 2013. http://www.unhabitat.org/grhs/2013

2. UNDESA (United Nations Department of Economic and Social Affairs) 2018. The World Youth Report: Youth and the 2030 Agenda for Sustainable Development. New York, UNDESA: https://www.un.org/development/desa/youth/world-youth-report/wyr2018.html

3. Brookings Institution 2018. Foresight Africa: top priorities for the continent in 2019. chapter 3 [Harnessing Africa's Youth Dividend].

4. See http://www.unesco.org/new/en/social-and-humansciences/themes/youth/youth-definition/

5. Honwana, A. 2012. *The time of youth – work, social change and politics in Africa.* Boulder: Kumarian Press.

6. Barker, J. 2003. Passengers or political actors? Children's participation in transport policy and the micro-political geographies of the family. *Space and Polity* 7,2: 135-151.

7. Sheller, M. 2018 *Mobility justice: the politics of movement in an age of extremes.* London and New York: Verso.

8. Martens, K. and Lucas, K. 2018. *Perspectives on transport and social justice. In G.Craig (ed) Handbook on global social justice*. Cheltenham: Edward Elgar, pp. 351-370.

9. Grieco, M. 2007. Youth and transport: the emergence of youth transport strategies. https://www.ssatp.org/sites/ssatp/files/publications/HTML/Gender-RG/Source%20%20documents/Issue%20and%20Strategy%20Papers/G&T%20Rationale/ISGT14%20Youth%20and%20transport%20Grieco.pdf

10. Documentation of these projects is no longer available on the internet. Current internet searches suggest that school travel plans in UK still tend to engage more with parental rather than child inputs into travel surveys and that where children are included they will be surveyed rather than being full participants in the research *process*. See for instance, http://www.brake.org.uk/facts-resources/21-resources/566-developing-a-school-travel-plan-that-caters-for-the-needs-of-pupils-with-sen This website indicates that "surveying children (to assess how pupils are

currently travelling to school, how they would like to travel, and risks they may be facing) is a crucial initial step in drawing up an STP" (last accessed 29th May 2019).

11. https://assets.publishing.service.gov.uk/media/57a08c6ee5274a27b20011d1/R8373a.pdf

12. Lolichen, P. 2007 Children in the drivers' seat: children conducting a study of their transport and mobility problems. *Children, Youth and Environments* 17,1:238-256.

13. Porter, G. and Abane, A. 2008. Increasing children's participation in African transport planning: reflections on methodological issues in a child-centred research project. *Children's Geographies* 6,2:151-167. DOI: 10.1080/14733280801963086

14. Porter, G. with Hampshire, K., Abane, A., Munthali, A., Robson, E., Mashiri, M. 2017. *Young people's daily mobilities in sub-Saharan Africa. Moving young lives.* London: Palgrave Macmillan.

15. Porter, G., Hampshire, K. Bourdillon, M., Robson, E., Munthali, A., Abane, A., Mashiri, M. 2010a. Children as research collaborators: issues and reflections from a mobility study in sub-Saharan Africa. *American Journal of Community Psychology* 46,1: 215-227.

16. Porter, G. 2016a. Reflections on co-investigation through peer research with young people and older people in sub-Saharan Africa. *Qualitative Research* 16,3: 293-304.

17. Simpson, E. and Collard, N. 2019. *Thinking with young people: transport experiences and aspirations in sub-Saharan Africa and South Asia.* Unpublished paper, January 2019.

18. Barker J 2012. A free for all? Scale and young people's participation in UK transport planning, in Kraftl P, Horton J, Tucker F (eds) *Critical geographies of childhood and youth: contemporary policy and practice* Bristol: Policy Press pp.169-184.

19. Mulongo, G., Porter, G., Tewodros, A. 2019. Gendered politics in rural roads: gender mainstreaming in Tanzania's transport sector. *Proceedings of the institution of civil engineers – transport.* https://doi.org/10.1680/jtran.18.00153.

20. Barker, J., Kraftl, P., Horton, J., et al. 2009. The Road Less Travelled? New Directions in Children's Mobility. *Mobilities* (special issue) 4,1.

21. Southward, E., Page, A, Wheeler, B. Cooper, A. 2012. Contribution of the School Journey to Daily Physical Activity in Children Aged 11–12 Years. *American Journal of Preventive Medicine* 43,2: 201-204. 10.1016/j.amepre.2012.04.015

22. Chaufan, C., Yeh, J. Ross, L. Fox, P. 2015. You can't walk or bike yourself out of the health effects of poverty: active school transport, child obesity, and blind spots in the public health literature *Critical Public Health*, 25, 1: 32-47.

23. Loo, BPY, Siiba, A. 2019. Active transport in Africa and beyond: towards a strategic framework. *Transport Reviews* 39,2:181-203.

24. Malone, K., Rudner, J. 2011. Global Perspectives on Children's Independent Mobility: a socio-cultural comparison and theoretical discussion of children's lives in four countries in Asia and Africa. *Global Studies of Childhood* 1,3. https://doi.org/10.2304/gsch.2011.1.3.243

25. Roya, S., Hanif, N.R., Dali, M. 2012. Influence of the socio-economic factors on children's school travel. *Soc. Behav. Sci.,* 50: 135-147.

26. Andegiorgish, A.K., Wang, J., Zhang, X., Liu X, Zhu, H. 2012. Prevalence of overweight, obesity, and associated risk factors among school children and adolescents in Tianjin, China. *Eur J Pediatr* 171:697–703. DOI 10.1007/s00431-011-1636-x

27. Yusoff, Z.M., Shamin, F., Arif, H., Adnan, N.A., Nordin, N.A. 2016. *School Location and Mobility Effects to Obesity Cases Among Primary School Children.* International Conference on Architecture and Built Environment (ICABE), Oct 05-06, 2016, Kuala Lumpur.

28. Li, S. and Zhao, P. 2015. The determinants of commuting mode choice among school children in Beijing. *Journal of Transport Geography* 46: 112-121. https://doi.org/10.1016/j.jtrangeo.2015.06.010

29. Muthuri, S.K., Wachira, L.J.M., Onywera, V.O., Tremblay, M.S. 2016. Associations Between Parental Perceptions of the Neighborhood Environment and Childhood Physical Activity: Results from ISCOLE-Kenya. *Journal of Physical Activity and Health* 13, 3: 333-343.

30. Onywera, VO, Larouche, R, Oyeyemi, AL, Prista, A, Akinroye, KK, Heyker, S, Owino, GE, Tremblay, MS. 2018. Development and convergent validity of new self-administered questionnaires of active transportation in three African countries: Kenya, Mozambique and Nigeria. *BMC Public health* 18. DI 10.1186/s12889-018-5954-z

31. Kingham, S. and Ussher, S. 2007. An assessment of the benefits of the walking school bus in Christchurch, New Zealand. *Transportation Research Part A* 41: 502-510.

32. Bwire, H., Muchaka, P., Behrens, R., Chacha, P. 2017. Implementation and evaluation of walking buses and cycle trains in Cape Town and Dar es Salaam. In

Mitullah, W. Vanderschuren, M., Khayesi, M. (eds) 2017. *Non-Motorized Transport Integration into Urban Transport Planning in Africa,* Abingdon: Routledge, pp.150-169. https://www.researchgate.net/publication/321680296_Implementation_and_evaluation_of_walking_buses_and_cycle_trains_in_Cape_Town_and_Dar_es_Salaam

33. Barker, J. 2011. 'Manic Mums' and 'Distant Dads'? Gendered geographies of care and the journey to school. *Health & place* 17, 2: 413-421.

34. Porter, G., Hampshire, K., Abane, A., Munthali, A., Robson, E., Mashiri, M., Tanle, A. 2010b. Youth transport, mobility and security in sub-Saharan Africa: the gendered journey to school. *World Transport Policy and Practice* 16,1: 51-71.

35. Owen, D., Hogarth, T., Green, A.E. 2012. Skills, transport and economic development: evidence from a rural area in England. *Journal of Transport Geography* 21: 80-92.

36. Hine, J. 2014. *Good Policies and Practices on Rural Transport in Africa Planning Infrastructure & Services*. SSATP Working paper 100.

37. Avotri, R., Owusu-Darko, L. Eghan, H., Ocansey, S. 1999. *Gender and primary schooling in Ghana.* Sussex: Institute of Development Studies.

38. Department of Transport (Republic of South Africa) 2005. The first South African National Household Travel Survey 2003: Technical report.

39. Matin, N., Mukib, M., Begum, H., Khanam, D. 2002. Women's empowerment and physical mobility: implications for developing rural transport, Bangladesh. In P. Fernando and G. Porter (eds) 2002. 2002 *Balancing the load: women, gender and transport.* London: Zed.

40. Cook, C., Duncan, T., Jitsuchon, S, Sharma, A., Guobau, W. 2005. *Assessing the impact of transport and energy infrastructure on poverty reduction.* Metro Manila: Asian Development Bank.

41. https://www.weforum.org/agenda/2017/12/indias-women-are-choosing-to-go-to-worse-colleges-than-men.

42. Porter, G. Hampshire, K., Abane, A., Munthali, A., Robson, E., Mashiri, M., Tanle, A., Maponya G. and Dube, S. 2012. Child porterage and Africa's transport gap: evidence from Ghana, Malawi and South Africa. *World Development* 40,10:2136-2154.

43. Salon, D. and Gulyani, S. 2011. Mobility, poverty, and gender: travel 'choices' of slum residents in Nairobi, Kenya. *Transport Reviews* 30,5: 641-657.

44. de Kadt, J; Norris, SA; Fleisch, B; Richter, L; Alvanides, S 2014. Children's daily travel to school in Johannesburg-Soweto, South Africa: geography and school choice in the Birth to Twenty cohort study. *Children's Geographies* 12, 2: 170-188.

45. Hunter, M. 2010. Racial desegregation and schooling in South Africa: contested geographies of class formation. *Environment and Planning* A. 42, 11: 2640-2657.

46. Zhang, R. Yao, E. Liu, Z. 2017. School travel mode choice in Beijing, China. *Journal of Transport Geography* 62: 98-110. https://doi.org/10.1016/j.jtrangeo.2017.06.001

47. Porter, G., Hampshire, K., Abane, A. Munthali, A., Robson, E., Mashiri, M., Maponya, G. 2010c. Where dogs, ghosts and lions roam: learning from mobile ethnographies on the journey from school. *Children's Geographies* 8,2: 91-105.

48. Phillips, LG, Tossa, W 2017. Intergenerational and intercultural civic learning through storied child-led walks of Chiang Mai. *Geographical Research* 55, 1: 18-28.

49. Adams, S; Savahl, S; Fattore, T. 2017. Children's representations of nature using photovoice and community mapping: perspectives from South Africa *International journal of qualitative studies on health and well-being* 12, 1: 1333900.

50. Benwell, M. 2009. Challenging Minority World Privilege: Children's Outdoor Mobilities in Post-apartheid South Africa. *Mobilities* 4, 1: 77-101.

51. Vasconcellos, E. A. 1997. Rural transport and access to education in developing countries: policy issues. *Journal of Transport Geography* 5,2: 127-136.

52. Van Niekerk, A., Govender, R., Jacobs, R., van As, A.B. 2017. Schoolbus driver performance can be improved with driver training, safety incentivisation, and vehicle roadworthy modifications. *South African Medical Journal* 107, 3:188-191.

53. Sohail, M., Mitlin, D., Maunder, D.A.C. 2003. *Partnerships to improve access and quality of public transport.* Loughborough: WEDC.

54. Sohail, M. et al. 2000. *Urban public transport and sustainable livelihoods for the poor: a case study, Karachi, Pakistan*. Loughborough: WEDC.

55. Van Ristell, J., Quddus, M.A., Enoch, M.P.; Wang, C., Hardy, P. 2015. Quantifying the impacts of subsidy policies on home-to-school pupil travel by bus in England *Transportation* 42:45–69. DOI 10.1007/s11116-014-9525-6

56. DFID [UK Department for International Development] 2001. *Children out of school.* London: DFID, October 2001.

57. Khandker, S.R., Lavy, V. and Filmer, D. 1994. *Schooling and cognitive achievements of children in Morocco*. Discussion paper no. 264. World Bank, Washington D.C.

58. Levy, H. and Voyadzis, C. 1996. *Morocco impact evaluation report: socio-economic influence of rural roads.* Operations Evaluation Department, Report no. 15808-MOR, World Bank, Washington, D,C.

59. Levy, H. 2004. *Rural Roads and Poverty Alleviation in Morocco*. World Bank, Washington, D.C. http://web.worldbank.org/archive/website00819C/WEB/PDF/ (last accessed 29 May 2019).

60. Mohsin, S.M., Mallorie, E., Roy, M.A. 2012. Construction of village roads by villagers: creating jobs for women and men in Sunamganj, Bangladesh. In K. Kusakabe (ed.) *Gender, roads and mobility in Asia.* Rugby: Practical Action, pp. 182-191.

61. Pilgrim, J. and Chanrith, N. 2012. Road improvement in Cambodia: livelihood, education, health, and empowerment. In K. Kusakabe (ed.) *Gender, roads and mobility in Asia.* Rugby: Practical Action, pp. 192-204.

62. Government of Nepal 2010. *Gender policy and operational guidelines for local transportation sector.* Khatmandu: Department of local infrastructure development and agricultural roads.

63. WHO 2015: *World Health Organization, Global Health Estimates,* 2014.

64. Singh, N and Vasudevan, V. *2018.* Understanding school trip mode choice – The case of Kanpur (India). *Journal of Transport Geography* 66: 283-290.

65. Starkey, P. 2001 *Promoting the use of Intermediate Means of Transport - vehicle choice, potential barriers and criteria for success.* https://pdfs.semanticscholar.org/2969/9a6cfc3fbf3c234fe7fcf2a3966c2dad6caf.pdf

66. Rao, N. 2002. Cycling into the future: the Pudukkotttai experience, Tamil Nadu, India. In In P. Fernando and G. Porter (eds) *Balancing the load: women, gender and transport.* London: Zed.

67. Gatnet communication, 21/06/2006. This documentation is no longer available on the internet.

68. ILO 2012. The youth employment crisis: Time for action. International Labour Organisation, Geneva.

69. Filmer, D.,Fox, L., Brooks, K., Goyal,A., Mengistae, T., Premand, P, Ringold, D., Sharma, S., Zorya, S. 2014. *Youth Employment in sub-Saharan Africa*. The World Bank: Washington DC.

70. Prince, R. 2006. Popular music and Luo youth in western Kenya. In C. Christiansen et al. (eds) *Navigating youth, generating adulthood*. Uppsala: Nordiska Afrikainstitutet, pp.117-152.

71. Garcia-Palomares, J. C. 2010. Urban sprawl and travel to work: the case of the metropolitan area of Madrid. *Journal of Transport Geography* 18, 2: 197-213.

72. Graham L, Mlatsheni C. 2015. Youth unemployment in South Africa: understanding the challenge and working on solutions. In de Lannoy A et al. (eds) *South African Child Gauge*, Children's Institute, University of Cape Town; 51–59.

73. Jeffrey, C. 2010. Youth, class and time among unemployed young men in India. *American Ethnologist* 37,3: 465-481.

74. Grieco, M, Turner, J. and Kwakye, E. 1995. A tale of two cultures: ethnicity and cycling behaviour in urban Ghana. *Transport Research Record* 1441, Washington DC.

75. Grieco, M., Apt, N. and Turner J. 1996. *At Christmas and on rainy days: transport, travel and the female traders of Accra.* Aldershot: Avebury.

76. Turner, G. and Kwakye, E. 1996. Transport and survival strategies in a developing economy: case evidence from Accra, Ghana. *Journal of Transport Geography* 4,3: 161-168.

77. Evans, R. 2012. Sibling caringscapes: Time-space practices of caring within youth-headed households in Tanzania and Uganda. *Geoforum* 43, 4: 824-835.

78. Venter, C., Molomo, M., Mashiri, M. 2014. Supply and pricing strategies of informal rural transport providers. *Journal of Transport Geography,* 41: 239-248.

79. Esson, J., Gough, K.V., Si, D. 2016. Livelihoods in motion: Linking transport, mobility and income-generating activities. *Journal of Transport Geography,* 55: 182-188.

80. Kjeldsberg, C, Shrestha, N Patel, M, Davis, D, Mundy, G, Cunningham, K 2018. Nutrition-sensitive agricultural interventions and gender dynamics: A qualitative study in Nepal. *Maternal and child nutrition* 14, 3. https://onlinelibrary-wiley-com.ezphost.dur.ac.uk/doi/full/10.1111/mcn.12593.

81. Porter, G. 2011. 'I think a woman who travels a lot is befriending other men and that's why she travels': Mobility constraints and their implications for rural women and girl children in sub-Saharan Africa. *Gender, Place and Culture* 18,1: 65-81. DOI: 10.1080/0966369X.2011.535304

82. Seedhouse, A., Johnson, R., Newbery, R. 2016. Potholes and pitfalls: The impact of rural transport on female entrepreneurs in Nigeria. *Journal of Transport Geography* 54: 140-147.

83. Allen, H. 2018. *Approaches for gender responsive urban mobility*. Bonn: GiZ-SUTP.

84. Anand, A. and Tiwari G. 2006. A gendered perspective of the shelter-transport-livelihood link. the case of poor women in Delhi. *Transport Reviews* 26,1: 63-80.

85. Langevang, T. & Gough, K.V., 2009. Surviving through movement: the mobility of urban youth in Ghana. *Social & Cultural Geography* 10,7: 741–756.

86. Li, M., Kwan, M-P, Wang, F., Wang, J. 2018. Using points-of-interest data to estimate commuting patterns in central Shanghai, China. *Journal of Transport Geography* 72: 201-210.

87. Porter, G. and Blaufuss, K. 2003. Children, transport and traffic in southern Ghana. Paper presented at the workshop on Children and Traffic, Copenhagen, May 2-3, 2002. Available at www.dur.ac.uk/child.mobility/

88. Mark, L 2017. *Daily (im)mobility in slums. A female perspective from the Villa 20 in Buenos Aires.* Masters thesis, Technisches Universitat, Berlin/ Universidade de Buenos Aires.

89. Agarwal, S., Attah, M., Apt, N., Grieco, M., Kwakye, EA and Turner, J. 1997. Bearing the weight: the kayayoo, Ghana's working girl child. *International Social Work* 40,3: 245-56.

90. Malmberg-Calvo, C. 1994. *Case studies on the role of women in rural transport: access of women to domestic facilities*. Washington DC: World Bank, SSATP Working Paper 11.

91. https://medium.com/beam-blog/driving-change-the-story-of-miss-taxi-one-of-ghana-s-first-female-taxi-drivers-42e98deeff81

92. https://www.bbc.co.uk/news/av/world-asia-india-38326781/india-s-two-wheel-taxi-service-by-women-for-women

93. Nyanzi, S, Nyanzi, A., Kalina, B, Pool, R. 2004. Mobility, sexual networks and exchange among bodaboda men in southwest Uganda. *Culture, Health and Sexuality* 6, 3: 239-254.

94. Waage, T. 2006. Coping with unpredictability: "preparing for life" in Ngaoundere, Cameroon. In C. Christiansen et al. (eds) *Navigating youth, generating adulthood.* Uppsala: Nordiska Afrikainstitutet, pp. 61-87.

95. Doussantousse, S, Sakounnavong, B., Patterson, I. 2011. An expanding sexual economy along National Route 3 in Luang Namtha Province, Lao PDR. *Culture health and sexuality* 13, 2: 279-291.

96. Adamu. F. 2008. Gender, Hisbah and enforcement of morality in northern Nigeria. *Africa,* 78,1: 136-152.

97. Burge, M. 2011. Riding the Narrow Tracks of Moral Life: Commercial Motorbike Riders in Makeni, Sierra Leone. *Africa Today* 58, 2: 58-95.

98. Olvera, L., Plat, D., Pochet, P., Maidadi, S. 2012. Motorbike taxis in the "transport crisis" of West and Central African cities. *Echogeo* 20. https://journals.openediton.org/echogeo/13080

99. Jenkins, J.T. and Peters, K. 2016. Rural connectivity in Africa: motorcycle track construction. *Proceedings of the Institution of Civil Engineers – transport* 169, 6: 378-386.

100. http://www.transaid.org/wp-content/uploads/2018/05/Bishopetal-AmendTransaid-2017 EnhancingUnderstandingMotorcyclesThreeWheelers-LiteratureReview-AfCAP-RAF2114A-180319.pdf.

101. WHO 2018: *Road Traffic Injuries Factsheet*, December 2018. https://www.who.int/news-room/fact-sheets/detail/road-traffic-injuries

102. Wismans, J., Skogsmo, I., Nilsson-Ehle, A., Lie, A., Thynell, M., Lindberg, G. 2016. Commentary: Status of road safety in Asia. *Traffic Injury Prevention* 17, 3: 217-225.

103. Adesunkanmi, A.R.K et. al. 2000. Road traffic accidents to African children. *Injury* 31:225-228.

104. https://www.roadsafety.fia-grants.com/about-us.php

105. O'Toole, S., Christie, N. 2019. Educating parents to support children's road safety: a review of the literature. *Transport Reviews* 39,3: 392-406. DOI: 10.1080/01441647.2018.1499678

106. Salmon, R., Eckersley, W. 2010. Where there's no green man: child road-safety education in Ethiopia. *Development in Practice* 20,6:726-733.

107. http://www.fiafoundation.org/media/45780/safe-to-learn-report.pdf

108. https://www.irap.org/media-centre/case-studies/

109. Bradbury, A. and Quimby, A. 2008. Community road safety education: an international perspective. Proceedings of the institution of civil engineers- *Municipal Engineer* 161, 2: 137-143.

110. Kitamura, Y., Hayashi, M., Yagi, E. 2018. Traffic problems in Southeast Asia featuring the case of Cambodia's traffic accidents involving motorcycles *IATSS Research* 42, 4: 163-170.

111. Howlett, J.B.; Aldous, C.; Clarke, D.L.; Howlett, J. B.; Aldous, C.; Clarke, D. L. 2014. Injuries sustained by passengers travelling in the cargo area of light delivery vehicles. *South African Journal of Surgery* 52, 2: 49-52.

112. Oyedemi, T., Kgasago, T.J. 2018. Always-available communication and technological distractions: technology use, texting and driving. *Communicatio-South African journal for communication theory and research* 43, 3-4: 36-53.

113. Cordellieri, P., Baralla, F., Ferlazzo, F., Sgalla, R., Piccardi, L., Giannini, A.M. 2016. Gender Effects in Young Road Users on Road Safety Attitudes, Behaviors and Risk Perception. *Front Psychol.* 7: 1412. doi: 10.3389/fpsyg.*2016*.01412

114. Al-Aamri AK, Padmadas SS, Zhang L, et al. 2017. Disentangling age–gender interactions associated with risks of fatal and non-fatal road traffic injuries in the Sultanate of Oman. *BMJ Global Health* 2017;2:e000394.

115. Hyder, A.A. Labinjo, M. and Muzaffar, S. 2006. A new challenge to child and adolescent survival in urban Africa: an increasing burden of road traffic injuries. *Traffic Injury Prevention* 7,4: 381-388.

116. Koekemoer, K.,Van Gesselleen, M., Van Niekerk, A., Govender, R., Van As, A.B. 2017. Child pedestrian safety knowledge, behaviour and road injury in Cape Town, South Africa. *Accident analysis and prevention* 99: 202-209.

117. Elango S, Ramya AB, Renita A, Ramana M, Revathy S, et al. 2018. An Analysis of Road Traffic Injuries in India from 2013 to 2016: A Review Article. *J Community Med Health Educ* 8: 601. doi:10.4172/2161-0711.1000601

118. Mitra-Sarkar, S. and Partheeban, P. 2011. Abandon all hope, you who enter here: understanding the problem of 'Eve Teasing' in Chennai, India. In *Women's Issues in Transportation, Summary of the 4th International Conference, vol2, technical papers*. Washington DC: Transportation Research Board, pp. 74-84.

119. Logan, L.S. 2015. Street Harassment: Current and Promising Avenues for Researchers and Activists. *Sociology Compass* 9,3: 196-2011.

120. Hampshire K. Porter, G. Mashiri, M. , Maponya, M. and Dube, S. 2011. Proposing love on the way to school : mobility, sexuality and youth transitions in South Africa. *Culture, Health & Sexuality* 13,2: 217-231.

121. Porter, G., Hampshire, K. de Lannoy, A., Gunguluza, N., Mashiri, M., Bango, A. 2018. Exploring the intersection between physical and virtual mobilities in urban South Africa: reflections from two youth-centred studies. In T.P. Uteng and K. Lucas (eds), *Urban mobilities in the Global South*, pp. 59-75. London: Routledge.

122. Banks, N. 2016. Youth poverty, employment and livelihoods: social and economic implications of living with insecurity in Arusha, Tanzania. *Environment and urbanization* 28, 2: 437-454.

123. Velaga, N. R., Beecroft, M., Nelson, J. D., Corsar, D.,& Edwards, P. 2012. Transport poverty meets the digital divide: accessibility and connectivity in rural communities. *Journal of Transport Geography* 21:102-112.

124. Aguilera, A., Guillot, C., Rallet, A. 2012. Mobile ICTs and physical mobility: review and research agenda. *Transportation Research Part A* 46: 664-672.

125. Porter, G. 2012. Mobile phones, livelihoods and the poor in sub-Saharan: review and prospect. *Geography Compass* 6: 241–259. DOI: 10.1111/j.174 8198.2012.00484.x.

126. Williams, S., White, A., Waiganjo, P., Orwa, D., Klopp, J. 2015. The digital matatu project: Using cell phones to create an open source data for Nairobi's semi-formal bus system. *Journal of Transport Geography* 49: 39-51.

127. Green, C., Adamu, F., Rahman, I.A, 2013. The Role of a Transport Union in Increasing Rural Women's Access to Emergency Maternal Care in Northern Nigeria. *World Transport Policy and Practice*, 19.2: 29-45.

128. Porter, G. Hampshire, K., Abane, A., et al. 2012. Youth, mobility and mobile phones in Africa: findings from a three-country study. *Journal of Information Technology for Development* 18,2:145-162.

129. Porter, G., Hampshire, K., Milner, J., Munthali, A., Robson, E., de Lannoy, A., Bango, A. , Gunguluza, N., Mashiri, M., Tanle, A., Abane, A. 2015a. Mobile phones and education in sub-Saharan Africa: from youth practice to public policy. *Journal of International Development* 28: 22-39.

130. Porter, G., Hampshire, K., Abane, A., Munthali, A., Robson, E., Bango, A., de Lannoy, A., Gunguluza, N., Tanle, A., Owusu, S., Milner, J. 2015b. Intergenerational relations and the power of the cell phone: Perspectives on young people's phone usage in sub-Saharan Africa. *Geoforum* 64:37–46.

131. Line, T, Jain, J., Lyons, G. 2011. The Role of ICTs in Everyday Mobile Lives. *Journal of Transport Geography* 19, 6: 1490–1499.

132. Porter, G. 2015. Mobile phones, mobility practices and transport organisation in sub-Saharan Africa. *Mobility in History* 6, 81-88.

133. Porter, G. 2016b. Mobilities in rural Africa: new connections, new challenges. *Annals of the American Association of Geographers,* 106,2: 434-441.

134. http://www.ifrtd.org/index.php/component/k2/item/23-rural-transport-news-december-2015

135. Burrell, J. 2010. Evaluating shared access: social equality and the circulation of mobile phones in rural Uganda. *Journal of Computer-Mediated Communication* 15:230–250.

136. Archambault J.S. 2012. 'Travelling while sitting down': mobile phones, mobility and the communication landscape in Inhambane, Mozambique. *Africa* 82,3:393-412.

137. Stark, L. 2013. Transactional sex and cellphones in a Tanzanian slum. *Suomen Antropologi* 38,1:12-36.

138. Duncombe RA. 2014. Understanding the impact of mobile phones on livelihoods in developing countries. *Development Policy Review* 32,5: 567–588.

139. Kibere FN. 2016. The paradox of mobility in the Kenyan ICT ecosystem: an ethnographic case of how the youth in Kibera slum use and appropriate the mobile phone and the mobile internet. *Information Technology for Development* 22,1: 47–67.

140. https://asia.nikkei.com/Business/Ride-hailing-apps-a-boon-for-Asia-s-motorcycle-taxis.

141. https://static1.squarespace.com/static/52246331e4b0a46e5f1b8ce5/t/56521e01e4b0e332af41071b/1448222209348/CCRED+Review7.4-6.pdf

142. https://www.itnewsafrica.com/2018/06/top-7-african-taxi-hailing-apps-giving-uber-a-run-for-its-money/

143. https://www.itnewsafrica.com/2018/06/top-7-african-taxi-hailing-apps-giving-uber-a-run-for-its-money/].

144. Porter, G., Hampshire, K., Abane, A., et al., 2010. Moving young lives: mobility, immobility and inter-generational tensions in urban Africa. *Geoforum* 41:796-804.

[i] http://theconversation.com/have-we-reached-peak-car-107847

[ii] https://tfl.gov.uk/transport-accessibility/

[iii] https://accessibility.uber.com/

[iv] http://accessibleindia.gov.in/content/makeaccessible/transport-systems.php

[v] https://www.hindustantimes.com/editorials/with-just-3-of-india-s-buildings-accessible-our-disabled-are-at-a-huge-disadvantage/story-Rh2rd4QzNzw9kHpmaTPV1H.html

[vi] Including a dedicated journal – see: https://www.iospress.nl/journal/technology-and-disability/

[vii] https://www.sustrans.org.uk/sites/default/files/images/files/migrated-pdfs/Transport%20Poverty%20England%20FINAL%20web.pdf