



Economic and social impacts of public transport investments: A scoping literature review

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Abstract

This chapter reviews the wider economic, social, and health impacts of investments and disinvestments in public transport. Most studies on economic impacts have analysed the case of high-speed rail, with fewer analysing conventional intercity railways or urban public transport systems. The economic impacts of high-speed rail tend to be positive, although they are not equally distributed among the regions served. Investments in public transport have also been linked to an increase in housing prices and gentrification. Research on social and health impacts of public transport is limited and fragmented. Studies have found that the accessibility increase provided by new public transport connections contributes to increased participation in social activities. At the same time, public transport infrastructure can disconnect communities on opposite sides of the infrastructure. Research on public transport disinvestment is limited. The few available studies have shown that disinvestment is linked to several negative health and social

impacts. Insufficient consideration of equity aspects also limits our understanding of the complexity of the full economic and social effects of investments and disinvestments in transport.



1. Introduction

The potential economic and social benefits of investments in public transport are widely recognized. If the investments lead to a shift from the use of private to public transport, they can reduce road congestion, energy use, air pollution, noise, and greenhouse gas emissions. Public transport also facilitates people's mobility and accessibility, allowing them to reach places where they can access resources and opportunities, perform activities, and meet others. This can have wider economic, social, and health benefits on people's lives. The ability to travel and connect with others is also a fundamental human capability and can be seen as a sign of wellbeing in itself.

Good public transport accessibility is linked to better employment prospects, increasing the probability of being employed and working full-time (Kawabata, 2003; Johnson et al., 2017). The availability of public transport in an area can also increase economic activity because some workers would not participate in the labour market otherwise (Mackie et al., 2012; KPMG, 2017). The accessibility provided by public transport can also improve productivity and attract investment. Improvements in public transport also have a positive impact on retail businesses in the areas served (Living Streets, 2018). From a city or region's perspective, a shift from a transport system based on private cars to one based on public transport and active travel would also be economically advantageous, as it would reduce average travel costs; release land that is now used for multi-lane roads or parking spaces; and reduce the costs of congestion, air pollution, noise, and urban sprawl (APTA, 2020).

Public transport also has several social benefits. Better access to public transport has been linked to having more social contacts (Frei et al., 2009) and having more frequent connections with those contacts (Hine and Mitchell, 2003; Utsunomiya, 2016; Utsunomiya, 2020). In turn, social interaction has been recognized as a powerful determinant of health (Berkman and Syme, 1979; Holt-Lunstad et al., 2010). Public transport also facilitates social interaction during travel (Currie and Stanley, 2008; Green et al., 2014) and provides accessibility to opportunities for volunteering (Naegele and Schnabel, 2010; KPMG, 2017). Access to fast and reliable public transport reduces the

probability of social exclusion (Lucas et al., 2009; Currie et al., 2010; Lucas, 2011), especially in rural areas (McDonagh, 2006), and among older populations (Mackett, 2015). Better transport also affects the opportunities that individuals have during the life course, such as enhanced employment participation and improved access to social and economic resources, possibly reducing social inequality (Ohnmacht et al., 2009) and gender imbalances (Dobbs, 2007; Uteng and Cresswell, 2008).

Good public transport improves accessibility to health facilities, which is linked to a lower probability of risk of death from some diseases (Jones et al., 2008; Kelly et al., 2016). The ability to meet friends and family, provided by access to good transport, has also been linked with better self-rated health (Anciaes and Metcalfe, 2023). People who use public transport are also more likely to walk (Coronini-Cronberg et al., 2002; Lachapelle and Noland, 2012) and less likely to become obese (Webb et al., 2012; Mattisson et al., 2018). The ability to access places also contributes to wellbeing as it reduces time constraints (Currie et al., 2010; Delbosc and Currie, 2011) and allows individuals to perform activities and maintain employment and relationships (Bergstad et al., 2011, 2012; Friman et al., 2017, 2018). A shift from private to public transport can also reduce noise and air pollution.

This evidence on the benefits of public transport is persuasive and has contributed to increased interest in investment in public transport. Usually this has happened in cities. However, some countries have also invested in medium and long-distance public transport networks. A notable example is China, where the high-speed rail network grew from 0 to 42,000 km in just 12 years. Spain has also invested heavily in its high-speed rail network (Santos et al., 2017). Countries in the Global South are also increasingly investing in urban public transport. Latin American cities such as Bogotá, Medellín, and Curitiba are good examples (Hidalgo and Huizenga, 2013). Some large African cities are also investing in Bus Rapid Transit (Wood, 2020).

Despite this increasing trend in investment in public transport around the world, many rural areas, especially in the Global North, have seen considerable public transport disinvestment, including the complete closure of some railway lines, closures of individual stations, and reduction in the frequency of rail or bus services. Waves of railway closures happened in the United Kingdom in the 1960s (Patmore, 1966), Australia in the 1980s (Parolin, 1996), Eastern European countries in the 1990s (Taylor, 2006), and Greece and Portugal in the 2010s (Anciaes, 2013). More recently, bus services have been removed from rural areas in several countries, often as part of austerity measures, particularly where governments face budget deficits (Alhassan et al. 2022). The

Covid pandemic caused several dramatic changes in social and economic policy and accelerated this process. Public transport disinvestment is usually justified with lack of demand, although in some cases the closed public transport services still served many communities (Ancaies, 2013). The main response to public transport disinvestment is either use of private transport or not travelling (Whitelegg, 1987). This affects access to healthcare, social networks and wellbeing, particularly for populations that may already be experiencing other forms of vulnerability (Alhassan et al., 2023).

The empirical evidence on the wider economic, social, and health benefits of public transport should lead to increased investment and to reconsideration of disinvestment. However, the studies cited in this section were mostly based on surveys to individuals or households about public transport in general. Furthermore, those studies used cross-sectional data, which limits the identification of causation. As such, the results of these studies cannot easily be linked to the effects of particular investments or disinvestments in the public transport network.

This chapter fills this gap, by reviewing the wider economic, social, and health impacts of investments and disinvestments in public transport. Although walking, cycling, and water- and air-based public transport also have societal benefits, we focus on land-based public transport. The review excludes benefits (or costs) that arise through public transport's impact on land use and demographics (i.e. population increase). Furthermore, we review only the evidence from studies that evaluate (ex-post) the effects of identifiable investments or disinvestments in public transport. This excludes ex-ante forecast and appraisal studies, and cross-sectional studies. Our findings from the included studies (mostly reported at the city and region level) generally reveal that investments in public transport have economic and social benefits, although these are often not equally distributed across all regions and social groups. More balanced, equity-focused public transport investments are needed.



2. Methods

This review was guided by the five-stage methodological framework proposed by Arksey and O'Malley (2005). A scoping review approach was chosen because it can systematically determine the state of evidence on what is a diverse body of literature (encompassing Economics, Sociology, Geography, and other fields). The approach includes the following steps: (1) identify the research question; (2) identify studies that are relevant to the

research question; (3) review and select a subset of studies for inclusion in the final review; (4) analyse information of the selected studies; and (5) summarize and present the results (Arksey and O'Malley, 2005).

This review set out to examine wider impacts of investments and disinvestments in public transport from around the world. Specifically, the review focused on economic, social, and health impacts of investments and disinvestments. This review also included a secondary research question exploring equity dimensions of the investments and disinvestments under review.

Four databases were searched systematically as part of the review in March 2023: Web of Science, SCOPUS, PubMed, and PsychInfo Ovid. The following search terms were used to extract studies from the databases:

((transit OR 'public transport*' OR tram OR bus OR train OR rail* OR ferry).

AND (employment OR 'economic activity' OR 'economic benefits' OR productivity OR accessibility OR 'social capital' OR 'social inclusion' OR 'social exclusion' OR equity OR 'poverty' OR 'environmental justice' OR 'social capital' OR 'social benefits' OR social interaction' OR 'social connect*')).

The inclusion criteria for the review included:

- 1) publication in the English language;
- 2) full text, peer reviewed journal articles;
- 3) the study analysed impacts of a specific investment or disinvestment in public transport; and
- 4) the study analysed wider economic, social, and/or health impacts of the investment or disinvestment.
- 5) published in the last 20 years.

The search findings from the databases were exported into COVIDENCE, a literature review application. This was followed by a systematic de-duplication, title and abstract screening and final selection of studies which was conducted independently by the two authors. The authors discussed any discrepancies in selected studies and arrived at final selection through consensus. The reference lists of relevant articles were also searched to identify further studies which were reviewed and added to the records. The relevance of studies selected for the final review was agreed by both authors.

For included studies, we extracted data on study methods, location, economic and social impacts, and equity aspects (see table in Appendix). We did not systematically assess the quality of the studies, as they are diverse in terms of questions answered and methods. However, in the results section that follows, we draw attention to the limitations of the studies, where pertinent.



3. Results

3.1 Studies found by the literature search

Fig. 1 shows the literature search process. Initial searches produced 2809 records from the three databases. After adding one other identified source, 395 duplicates were removed at this stage and 2415 titles and abstracts screened. A total of 2313 records were excluded during the abstract and title screening stage, leading to 102 records identified for full text screening. In total, 74 irrelevant studies were excluded, for: being a review (5),

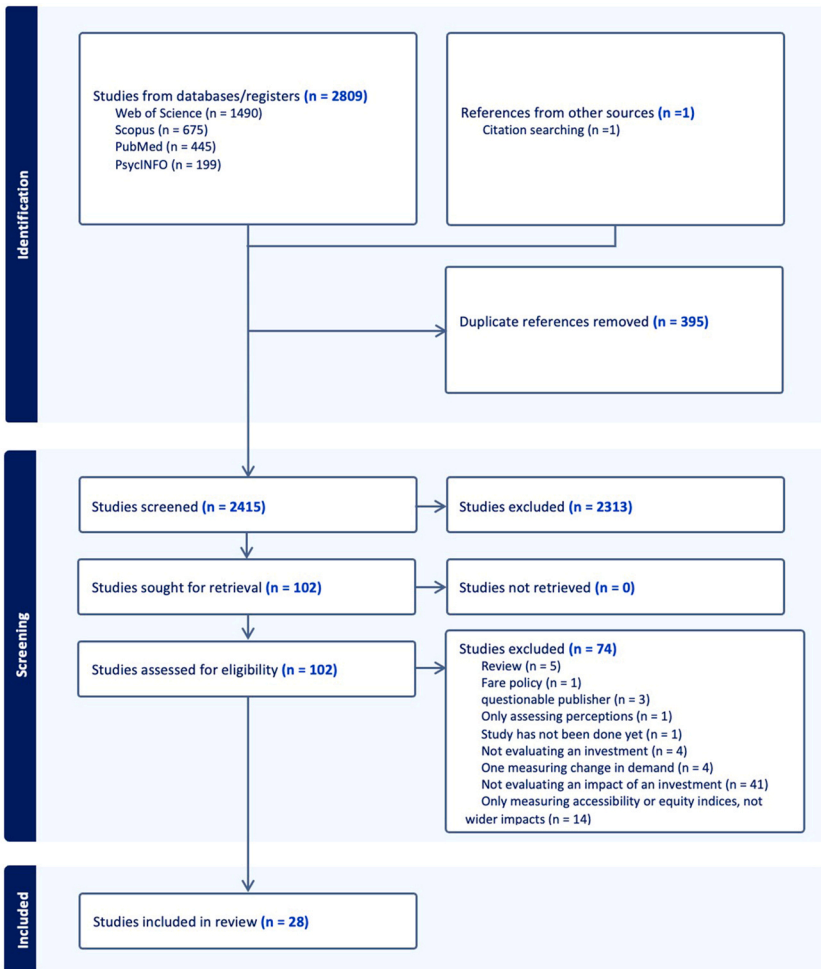


Fig. 1 Process to select studies.

focusing only on a fare policy change (1), not being peer-reviewed (3), focusing only on social perceptions (1), being a protocol (1), not specifically evaluating investments or disinvestments (4), measuring only changes in demand/not evaluating the impacts of transport investments (41), or measuring only accessibility or equity indices without describing wider impacts of investments/disinvestments in public transport (14). A total of 28 studies met all inclusion criteria and were therefore used for data extraction, analysis and write up.

The included studies were mostly from high-income countries (Germany, USA, Spain, Italy, Canada, Austria, Singapore, South Korea) with others from low- and middle-income countries (China, Colombia, India, Ethiopia). Geographically, most studies were focused on urban areas, with only a few focusing on rural areas (Alhassan et al., 2021; Utsunomiya, 2020) or combinations of the two. The geographic scale of most studies ranged widely, from those focusing on neighbourhood level analysis to nationwide studies. The temporal scale of the studies ranged from analyses of data from a single year to studies that analysed data over multiple decades (Gao and Li, 2022). Most studies employed quantitative methods, often using difference-in-difference analyses. One study employed qualitative methods. Table 1 in the appendix is a summary of the included studies. The sections that follow describe the main findings, beginning with economic impacts of investments and disinvestments in transport (Section 3.2). Given the large number of studies analysing the case of high-speed rail investments in China, we begin by describing the economic benefits of these investments (Section 3.2.1), before describing the impacts of high-speed rail investments in other countries (Section 3.2.2) and then the impacts of other modes of public transport (Section 3.2.3 and Section 3.2.4). Sections 3.3 and 3.4 describe the findings on social and equity impacts, respectively.

3.2 Economic impacts of public transport investments

3.2.1 High-speed rail – China

Several recent studies have analysed the economic impacts of the fast and massive investment in the Chinese high-speed rail network, each looking at different types of economic outcomes. The approach adopted by most studies included investigating the opening of high-speed rail networks from the perspective of increased accessibility (i.e. decrease in travel time), which was then linked to wider economic impacts.

One of the economic variables affected by accessibility is property prices. [Liu et al. \(2021\)](#) showed that the expansion of high-speed rail in China increased each city's accessibility to other cities, which was then linked to an increase of property prices. On average, a decrease in average travel time by 100 min was linked to an increase in property prices by 17%. However, the size of the increase varied by region and housing type, being stronger in what authors called 'underdeveloped regions' and prices of residential and office properties, compared with business properties. The study used estimated rail travel times (based on assumed speeds), rather than actual ones, and thus did not consider travel times of alternative modes (road and air). In addition, it did not include variables such as the average age of the properties, and/or the proportion that are second hand.

Other studies looked at broader indicators of economic activity. [Huang and Xu \(2021\)](#) showed that the opening of high-speed rail lines had indirect impacts on economic development by promoting regional integration and reducing travel time between cities, improving commercial flows and accessibility to economic opportunities. Similarly, [Li et al. \(2020\)](#) showed that high-speed rail improved urban economic efficiency (measured as a function of the ratio of actual economic output to the maximum output possible with the available inputs). The improvement of efficiency was due to reallocation of labour and other economic resources across cities, whereby more people have access to higher paying jobs and firms have a wider market. In addition, the longer the service was in operation, the stronger the effect. The opening of the high-speed rail services had a stronger effect on the efficiency in the service sector, compared with other sectors. Service frequency was also related with economic efficiency, especially in cities with high population density. [Yu et al. \(2020\)](#) showed that a 10% reduction in travel time to the nearest high-speed rail station was associated with a 0.44% increase in the local gross domestic product (GDP). Focusing on a single line (Beijing–Shanghai), [Yang et al. \(2022\)](#) showed that the opening of the high-speed railway increased GDP per capita and optimized the use of resources across cities along the line.

Using data on night-time lighting as an indicator of economic activity, [Wang et al. \(2020\)](#) showed that the opening of high-speed rail lines had diffusion effects and not agglomeration effects, as expected. In other words, economic activity did not only benefit communities that received rail lines but diffused activity from cities with high-speed rail to cities without high-speed rail. However, it only accelerated economic growth in big cities, not

in small and medium-sized cities. According to the authors, the increased connectivity allowed by high-speed rail facilitated the outflow of labour and economic activities.

All the studies above used regions or cities as units of analysis. The only study using individual-level data was the one by [Sun and Mansury \(2016\)](#). Using data from the Chinese Family Panel Survey, they found that travel time to a high-speed rail station and probability of living near a station was linked to increased household income, especially in larger cities with stronger service sectors.

3.2.2 High-speed rail – Other countries

We found only three studies analysing the economic effects of the introduction of high-speed rail in countries other than China. All studies suggest positive economic benefits in the areas served by new high-speed rail lines.

In Spain, [Matas et al. \(2020\)](#) found that the opening of high-speed rail stations was linked to an increase in the number of firms created, at the province level. Excluding outliers, being connected to the high-speed rail network can boost firm creation by 1–18%, depending on the province and the sector. This effect happened only in the service, tourism, and knowledge-intensive sectors, not in the manufacturing sector. It also varied widely from province to province, with some provinces not seeing any effect at all. In addition, the effect varied with the economic dynamism of each province, measured by number of firms created before the opening of the high-speed rail lines. Authors concluded that high-speed rail can reinforce the concentration of firms in some parts of the country (where the largest cities are located).

In Germany, [Ahlfeldt and Feddersen \(2018\)](#) found significant agglomeration effects of the high-speed rail line connecting Cologne and Frankfurt. The counties in intermediate stops of this line experienced a 8.5% uplift in GDP in the 6 years after the opening of the line. The economic growth was driven mainly through an increase in labour force productivity. This was explained by the increased attractiveness of locations close to high-speed rail.

In Italy, [Cascetta et al. \(2020\)](#) found that the opening of high-speed rail lines was associated with a 2.6% increase in the country's GDP over 10 years. The increase was 5.6% in the areas served by the high-speed rail lines. However, the increase was also visible, although lower (2.1%), in areas that were not served by the high-speed railway lines (but served by conventional lines).

3.2.3 Other inter-city rail investments

Only one study was found analysing the economic effects of investments in conventional intercity railways. [Gao and Li \(2022\)](#) showed that the Qinghai–Tibet Plateau railway network increased economic linkages (i.e. the extent of the exchange of funds, people and information across cities) marginally within the region, but unequally across cities. No study was found analysing the macroeconomic effects of specific disinvestments in public transport (e.g. closure of railway lines or reduction of bus services).

3.2.4 Urban public transport

Five studies analysed economic impacts of investments in urban public transport systems. Some focused on a single impact (e.g. employment, housing), while others analysed several impacts.

An example of the latter group of studies is the analysis by [Kim et al. \(2021\)](#), which estimated the simultaneous impacts of light rail transit access on employment and housing costs in 12 metropolitan areas in the USA. The opening of light rail transit significantly increased labour market participation by up to 43%, compared with control areas without light rail transit. This effect arose through increases in the average number of weeks worked, which happened due to the increase in the proportion of full-time and year-round workers in the workforce. There was no significant change in the housing rents in the areas with access to light rail transit compared with other areas. The study of [Yu and Huang \(2021\)](#), focusing on a single city (Orlando, USA), showed that the expansion of a railway line increased house prices. However, the increases were lower nearer (within 1 mile) to the station, compared with areas further away (1–2 miles). The reasons for this pattern are not clear, and may depend on the cut-off values used to define the distances (1 and 2 miles), which may or may not be good indicators of the accessibility benefits brought by the rail stations. A possible reason is that areas nearer to stations may be more exposed to railway noise, which has a negative influence on house prices ([Chang and Kim, 2013](#)).

Two other studies, focusing on large Asian cities, confirmed that urban public transport investment can increase house prices in the areas served. In Singapore, [Diao et al. \(2017\)](#) showed that a new mass rapid transit line increased house prices by 10.6%. The changes in house prices occurred as early as a year before the opening of the line. In Seoul, [Lee \(2022\)](#) showed

that investments in the Seoul Metro Line increased residential and commercial land values, especially in the case of offices and apartments.

Bocarejo et al. (2014) compared various indicators in neighbourhoods served and not served by Metrocable, a cable car public transport system in Medellín, Colombia. Travel expenditures increased in both types of neighbourhood, but increased more in the neighbourhoods that were not served by the system. In the neighbourhoods served, the proportion of income spent on housing decreased by 9%, compared with 5% in other neighbourhoods partly because housing prices increased more slowly in the served neighbourhoods.

Deyas and Woldeamanuel (2020) reported generally positive economic impacts following the opening of the Addis Ababa Light Rail Transit. This was the first modern urban rail transit system in Sub-Saharan Africa. A total of 16% of survey respondents reported an increase in the volume of house renters in their communities. This was understood by the authors as a positive economic effect as it increased the income of homeowners in the area adjacent to stations. In total, 35% reported an increase in travel distance. At the same time, 63% reported a reduction in travel time and there was a significant reduction in travel costs. A total of 23% of respondents reported a positive impact on livelihoods. However, the project also had some negative social impacts (community severance), as reported in the following section.

3.3 Social impacts of public transport investments

Few studies have looked at social impacts of public transport investments. The ones that did analysed gentrification, social capital, social participation, community severance, and access to health care.

Gentrification and home unaffordability are effects that may follow the property price increase associated with the public transport investments. Baker and Lee (2019) tested this hypothesis by modelling the relationship between opening of light rail transit stations and changes in neighbourhood residential characteristics in selected US cities. The stations did not consistently lead to gentrification. In some cities (San Francisco, Denver), there was an increase in the proportion of white and higher-qualified individuals and households with higher income. However, in other cities (Portland, Los Angeles, Buffalo), there was an increase in the proportion of households with lower income. According to Baker and Lee (2019), this diversity of outcomes could be explained by urban and housing

policies. For example, incentives to developers and property tax abatements for affordable housing in Portland could have acted as a counter-gentrification measure. This is also consistent with the results of [Dong \(2017\)](#), who found that opening rail transit lines in Portland did not lead to gentrification. There was no strong or consistent evidence that opening lines was associated with changes in income, ethnic mix, housing tenure, and home affordability (either for owners or tenants) in the communities served.

These mixed effects of public transport investment on gentrification in US cities, however, may be specific to this country, where public transport captures only a small proportion of trips, when compared with cities in other countries, especially in Europe. In this context, the availability of public transport may not be enough to trigger residential relocation processes that lead to gentrification.

Public transport can improve the quality of life of the populations served, due to the increase in accessibility and participation in activities that become possible due to that increase. This was confirmed in two studies by the same author, and using similar methodology, in Japan and Austria. In Japan, the introduction of the first light rail transit system in the country (in the city of Toyama) led to accessibility benefits among older people ([Utsunomiya, 2016](#)). In total, 19% of respondents in a survey (with average age of 66) reported they go out “just for a change of air” more often than before. About 10% and 15% reported they go for shopping and entertainment more often, respectively, and 20% reported they meet their friends and acquaintances more often. This proportion rises to 27% among participants aged over 70. Similar results were found in relation to improvements in two regional railways in Austria ([Utsunomiya, 2020](#)). Unlike the survey in Japan, the surveys in Austria were stratified by age group. However, the age effect in the results is still visible: the proportion reporting meeting friends and acquaintances was 20% among the whole sample, but 34% among participants aged above 70.

At the same time, some types of public transport require large physical infrastructure that may disconnect people from places as it may prevent people from crossing to the other side. This reduces walking accessibility, which may impact on people’s ability to reach employment, facilities, and other people on the other side of the infrastructure. This effect is known as community severance, and has mainly been studied in the context of roads ([Ancaes and Nascimento, 2022](#)). However, severance may also apply to

public transport infrastructure such as railways. In the [Deyas and Woldeamanuel \(2020\)](#) study of the Addis Ababa Light Rail Transit, cited in the previous section, 23% of local residents reported negative effects of the light rail transport system on social interactions. However, an almost equal number (21%) reported positive effects and the rest reported mixed effects or no change. This result could indicate that this type of transport infrastructure may segregate some communities but contribute to connecting others. The segregated communities may be the ones living along the route of the infrastructure but far from the stations, or the ones where people cannot afford using the infrastructure. Inside each community, different indicators may also be affected differently, that is, those with more difficulties walking or climbing stairs may report worse connectivity. However, these hypotheses were not tested in the [Deyas and Woldeamanuel \(2020\)](#) study, as results were not disaggregated by location, income, or mobility restrictions. What was disaggregated by location was the impact on livelihoods. The results show that the proportion of respondents reporting negative impacts on livelihoods, following the opening of the system, was higher in the areas closer to stations, which may suggest severance caused by the infrastructure.

Only one study was found analysing the social effects of disinvestment in public transport. [Alhassan et al. \(2021\)](#) assessed the impacts of the closure of a 70-year-old bus company in Saskatchewan (Canada), using interviews with 100 former bus riders and focus group discussions with 24 service providers. Closing the bus company was linked to multiple negative health and social outcomes, through a 'web' of negative impacts, at the individual, family, community, and macrosocial level. It reduced access to health care and was linked to missed health care appointments and decisions not to seek health care. It also forced some individuals to use alternative transport, including, in extreme cases, unsafe modes such as hitchhiking and walking for days to travel between cities. It contributed to psychosocial and mental health issues linked to feelings of shame in asking for help to travel and stress and loneliness due to not being able to connect with family and social networks. These effects were worse for those living in rural and remote areas (which became even more remote due to the lack of transport), indigenous communities, older people, and those with disabilities. The study also showed various public sector costs resulting from the closure, which may be greater than the savings made by the closure. This study confirms the findings of an earlier study, prior to our search period, in South Yorkshire, UK ([Nicholl et al., 1987](#)).

3.4 Equity dimensions of the economic and social impacts of transport investments

Beyond the several impacts described previously, an equity analysis further reveals the distributional impacts of transport investments or disinvestments (Markovich and Lucas, 2011). Only a fraction of included studies explored equity dimensions of public transport investments, but where they did they revealed differences in the impacts according to area or social group. The ways in which transport investments are experienced unequally range from benefits to people in low social and economic positions to disbenefits to these same groups. In other cases, regional and geographic inequalities may emerge in countries and regions based on their location relative to transport investments.

One of the important ways investments in transport might affect societies is through gentrification. In their analysis of the impacts of light rail transit investments across major cities (Denver, Portland, San Francisco, Buffalo and Los Angeles) in the USA, Baker and Lee (2019) demonstrate that in areas where planners emphasized equity as part of transit oriented development plans (by focusing on equitable access to transit) it led to a neighbourhood level counter-gentrification effect. This involves light rail transit station areas attracting low-income and minority households who have more needs for transit rather than the typical experience of gentrification where they might be priced out. Nonetheless Dong (2017) has argued that while it is generally expected that transit induced development can be positive for property owners by increasing house values, in other cases such investments might trigger gentrification in neighbourhoods further away. Additionally, neighbourhoods closer to light rail transits may experience densification, characterized by such neighbourhoods becoming more densely populated primarily by low-income people, with no increase in house values.

In a number of cases, we find that transport investments can disproportionately benefit marginalized people by creating new economic opportunities. Bocarejo et al. (2014) show, for example that the introduction of Metrocable in Medellín significantly benefited people from low-income households by offering them job opportunities and reduced spending on transport. Similarly, disinvestments in transport do not affect everyone equally and are often worse for Indigenous communities, people in rural areas, seniors and those with disabilities since they face greater transport barriers in the first place as Alhassan et al., (2021) found in Canada. In Austria, Utsunomiya, (2020) found similarly

that investments in railways have benefits for social capital particularly among older adults.

Some studies have identified geographical differences in the benefits gained from investments. In Italy, [Cascetta et al. \(2020\)](#) have argued that provinces closer to high-speed rail have greater reductions in travel time than those further away, hence the popular saying that Italy is a ‘country of two speeds’. Similarly, [Gao and Li \(2022\)](#) have argued that while the Qinghai–Tibet Plateau railway network positively influenced accessibility, several regions did not benefit from the economic linkages as much as others do. These findings all reveal that investments must also be subjected to equity analyses to gain a full picture of their social and economic impacts. Spatial inequities may also emerge in the benefits of investments in railway network across cities, requiring further analyses of geographic impacts of investments in transport.



4. Discussion and conclusions

4.1 Overview of findings

This chapter has reviewed the evidence on the wider economic, social, and health effects of investments and disinvestments in public transport. While several of the included studies focused on evaluating the economic impacts of investments in transport, we found a general lack of studies analysing social and health effects. Additionally, while there are several studies looking at economic effects, most have focused on the effects of high-speed rail (especially in China), with fewer focusing on conventional inter-city railways or urban public transport systems.

Some common messages can be derived from the reviewed studies. For example, economic impacts of high-speed rail tend to be positive, although they are not equally distributed among the cities served. In addition, it is possible that economic benefits in the areas served may imply costs in other areas of the country, as some of the increased economic activity may be displaced from those areas. In addition, there is some evidence that investments in public transport are linked to an increase in housing prices. In some studies, this is implicitly used as a proxy for economic prosperity in an area. However, it can be a negative impact for house buyers and renters unless their incomes have risen to match. It can also lead to gentrification.

Research on social impacts of public transport is fragmented, with a small number of studies analysing specific topics. These studies have found,

for example, that the accessibility increase provided by new public transport connections contributes to increased participation in social activities. At the same time, public transport infrastructure can disconnect communities on opposite sides of the infrastructure.

The general paucity of studies using qualitative methodologies to amplify the lived experience of those who benefit or are negatively impacted by transport investments and disinvestments makes it difficult to understand the human impacts of these investment decisions. Insufficient consideration of equity aspects also limits our understanding of the complexity of the full economic and social effects of investments and disinvestments in transport.

4.2 Strengths and limitations

This study used a validated systematic process to find and review studies. It should be noted, however, that generalizations of the results of these studies are limited by the diversity of geographic and economic contexts, type of investments and outcomes assessed, and methods used. This diversity also limits the use of a systematic process to assess the quality of the reviewed studies.

4.3 Future research needs

Although disinvestment in transport, including closure of railway lines or stations, and reduction in the frequency of rail or bus services, have become more common over the last few decades, few studies have explored the wider impacts of these disinvestments. The limited evidence suggests that disinvestments can have wide social impacts ranging from those experienced by individuals (feeling isolated, walking dangerous distances), to macrosocial effects such as the disruption of healthcare system delivery or disconnection of entire communities. Disinvestment in public transport is particularly impactful among individuals with no access to a private vehicle or other means of transport. Further research is needed to understand the full extent of the social and economic impacts that follow disinvestment in transport.

Future research should respond to the identified methodological and conceptual gaps by giving more attention to equity, adding qualitative analyses to the existing base of quantitative work and exploring how policies to invest or disinvest in transport are made. More analyses from low- and middle-income countries could increase our understanding of the contexts within which public transport investments can be the most beneficial and how and why disinvestment can be harmful.

Appendix

Table 1 Information extracted from selected studies.

Authors/Date	Methods	Country, urban/rural, spatial scale	Impacts	Time scale	Equity aspects
Ahlfeldt and Feddersen (2018)	Difference-in-differences analysis to examine the agglomeration effects of high-speed rail connecting Cologne and Frankfurt	Germany, urban, states	Counties in intermediate stops of the line saw 8.5% more increase in GDP. Economic growth was driven by an increase in labour force productivity connected with increased attractiveness of locations close to the line to workers	16 years	None described
Baker and Lee (2019)	Spatial autoregressive lag models to examine relationships between light rail transit (LRT) stations and changes in neighbourhood residential characteristics	USA, urban, neighbourhoods	LRT stations with transit-oriented development do not consistently lead to gentrification. In San Francisco and Denver LRT station areas became occupied by whiter, richer and better educated residents. In Portland, LA, and Buffalo, LRT areas had more poverty and less privilege	30 years	In areas where planners emphasized equity, there was some counter-gentrification

(continued)

Table 1 Information extracted from selected studies. (cont'd)

Authors/Date	Methods	Country, urban/rural, spatial scale	Impacts	Time scale	Equity aspects
Bocarejo et al. (2014)	Difference-in-differences analysis of spatial and economic factors that influence accessibility and house prices in 73 neighbourhoods. Compared neighbourhoods benefiting from Metrocable to neighbourhoods that did not	Colombia, urban, neighbourhoods	The percentage of income spent on work trips increased from 24% to 27% in beneficiary areas, compared to 21% to 26% in control groups. Job accessibility increased from 0.33 to 0.62 jobs per individual in beneficiary areas and from 0.23 to 0.38 in the control group. The percentage of income spent on housing decreased by 9% in beneficiary areas and by 5% in the control group	5 years	Increased accessibility to jobs and housing market for low-income target population
Cascetta et al. (2020)	An accessibility gravity type model and economic analyses (cost benefit analysis, computable general equilibrium and econometric analyses) are used to estimate impacts of high-speed rail in Italy.	Italy, urban, provinces	High-speed rail increased accessibility of transport by 32% and increased GDP by 2.6% in Italy (0.3% per year). These positive impacts are not equitably distributed in the population. There was a 11% reduction in equity with respect to travel time, with beneficiary provinces seeing significant reductions in travel time compared to other regions	10 years (2008–2018)	Provinces served by the lines saw dramatic reduction in travel time but other provinces did not enjoy this benefit.

Deyas and Woldeamanuel (2020)	Descriptive statistical analyses on data from 432 respondents, to examine social, economic and livelihood impacts of the Addis Abba Light Rail Transit launched in 2015	Ethiopia, urban, cities	The project has led to physical separation of communities, with 23% of respondents reporting negative effects on social interactions. The project led to a 16% increase in the volume of house renters in surrounding communities. It reduced travel time for 63% of respondents but increased travel distance for 35%. Majority of respondents reported a positive impact on livelihoods	Not stated	None described
Diao et al. (2017)	Used spatial difference-in-differences analyses to estimate the impact of the creation of a mass rapid transit line on housing prices before and after the establishment of the mass rapid transit line	Singapore, urban, cities	The implementation of the circle new line mass rapid transit significantly increased housing prices and some of these effects are 'anticipation effects' whereby house price changes occur a year before the actual investment. Housing prices in the treatment zone increased 11% compared to control houses. Houses located within 600 m to the line saw increased prices	6 years	None described

(continued)

Table 1 Information extracted from selected studies. (*cont'd*)

Authors/Date	Methods	Country, urban/rural, spatial scale	Impacts	Time scale	Equity aspects
Dong (2017)	Used a quasi-experimental design and propensity score matching to examine the impacts of rail transit on suburban gentrification in Portland	USA, urban, neighbourhoods	Rail transit did not significantly influence patterns of gentrification in the treatment neighbourhoods compared to controls. Changes in household income, proportion of minority populations, home values and tenure and household affordability indices did not change drastically in treatment neighbourhoods when compared to controls	14 years	Neighbourhoods served by the oldest rail lines attracted older and less educated people
Gao and Li (2022)	Calculated average shortest travel time and weighted average travel time to examine the impact of the Qinghai-Tibet Plateau railway network on accessibility and economic linkage in the region	China, urban, cities	The railway network significantly increased accessibility and economic linkage within the region. More than half of the cities saw an average shortest travel time reduce by up to 30 h. Accessibility in the region increased by 20%. The weighted average travel time reduced by 55% in the region. The investment increased economic linkage marginally but unequally across cities	46 years	There are spatial inequities in the benefits of the railway network across cities

Huang and Xu
(2021)

Used a spatial econometric model to explore how the implementation of high-speed rail in Chinese cities impacted urban economic development between 2008 and 2018

China, urban,
national

The implementation of high-speed rail in Chinese cities improved accessibility by increasing daily accessibility and potential accessibility although location accessibility reduced comparatively such that cities closer to the lines experienced increased accessibility compared to others. High-speed rail has indirect impacts on economic development by promoting regional integration

10 years

Geographical
inequities are
created

Kim et al. (2021)

Propensity score matching and difference of mean tests were used to estimate the impacts of light rail transit (LRT) access on labour market participation and housing affordability across 260 stations in 12 metropolitan areas in the USA

USA, urban,
national

The availability of LRT significantly increases labour market participation by up to 43% compared to controls. This effect arises through increases in average number of weeks worked and percentage of fulltime year-round workers. There was a statistically insignificant increase in rent in the areas with access to LRT compared to other areas.

10 years

None described

(continued)

Table 1 Information extracted from selected studies. (*cont'd*)

Authors/Date	Methods	Country, urban/rural, spatial scale	Impacts	Time scale	Equity aspects
Lee (2022)	Spatial autoregressive difference in difference analysis is used to examine effects of the Seoul Metro Line 9 investments on land values in Seoul, Korea	South Korea, urban, cities	Residential and commercial land values increased due to the transit investments. Office and apartment lands received the highest economic benefits. The wider economic benefits of the transit lines increase as distance to the lines decreases	10 years	None described
Liu et al. (2021)	Measures accessibility (point degree, closeness centrality and average travel time) and network structure to examine the impact of high-speed rail on urban housing prices in China drawing on data from 285 cities	China, urban, national	Increase in the high-speed rail network accessibility leads to increasing housing prices by 10% with heterogeneity in these increases by region and housing type. The positive relationship between network accessibility and housing prices is stronger in underdeveloped regions. High-speed rail had a stronger effect on prices of villas and office building prices	8 years	None described

Alhassan et al. (2021)	Evaluates impacts of the closure of a 70-year-old bus company in Saskatchewan using interviews with 100 former bus riders and focus group discussions with 24 service providers	Canada, rural, provinces	Disinvestment leads to multiple negative health and social outcomes experienced as a web. Disinvestment negatively affects health care delivery and access, social networks and family relationships and these are worse for those living in rural and remote areas	4 years	Negative effects of disinvestment are worse for Indigenous communities, people in rural areas, older people, and people with disabilities
Li et al. (2020)	Difference-in-differences and threshold effect model	China, urban, cities	The opening of high-speed rail has increased urban economic efficiency. The effect is stronger in the service sector and in cities with higher population density	14 years (2003–2017)	None described
Matas et al. (2020)	Dynamic panel data models	Spain, urban and rural, provinces	Opening of stations is linked to increased number of firms created – but only in the service, tourism, and knowledge-intensive sectors, not manufacturing	22 years (1995–2017)	None described
Sun and Mansury (2016)	Difference in differences	China, urban and rural, households	Travel time to high-speed rail station and probability of living near a station linked to increased household income, especially in larger cities with stronger service sectors	3 years (2009–2012)	None reported

(continued)

Table 1 Information extracted from selected studies. (*cont'd*)

Authors/Date	Methods	Country, urban/rural, spatial scale	Impacts	Time scale	Equity aspects
Utsumomiya (2020)	Descriptive analysis, logistic regression	Austria, rural, individuals	30% of survey respondents reported improvement in relationships with others	2018	More reports of improvement by older participants
Wang et al. (2020)	Difference in differences	China, urban cities	The opening of high-speed rail only accelerated economic growth in big cities, not in small/medium-sized cities. It also increased the share of services in the economy.	9 years (2004–2013)	None reported
Yang et al. (2022)	Difference-in-differences	China, urban, cities	The opening of high-speed railway increased GDP per capita and optimized the use of resources across cities along the line	11 years (2008–2018)	None reported
Yu and Huang (2021)	Pre-post and intervention-control design	Orlando (USA), urban, properties	The construction of the line increased house prices, but the increases were lower near the station (1-mile buffer) than further away (1–2 miles buffer)	2 years (2008–2016)	None reported
Yu et al. (2020)	Spatial filtering panel data analysis	China, urban and rural, counties	Reduction in travel time to nearest high-speed rail station associated with increase in local GDP per capita	7 years (2008–2015)	None reported

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