Geografia-Malaysian Journal of Society and Space 21 issue 3 (223-240)
 https://doi.org/10.17576/geo-2025-2103-14

Smart city development: A systematic literature review on the impact on urban poor

Nurulain Bachok, Jalaluddin Abdul Malek, Noordeyana Tambi, Zurinah Tahir

Center for Research in Development, Social and Environment,
Faculty of Social Sciences and Humanities, Universiti Kebangsaan Malaysia

Correspondence: Nurulain Bachok (email: sryope58@gmail.com)

Received: 2 August 2024; Accepted: 2 July 2025; Published: 20 August 2025

Abstract

Smart city development offers numerous benefits, such as enhancing efficiency, improving connectivity and promoting innovation to address various urbanization challenges. Nevertheless, there are concerns regarding the inclusivity of smart city development, particularly for marginalized communities. This paper explores the impact of smart city development on the urban poor, a significant demographic in urban areas worldwide. It employs the Systematic Literature Review (SLR) method, incorporating insights from 36 related articles to present a comprehensive understanding of smart city implications for this demographic. Through thematic analysis, the positive impacts of smart city development are identified and categorized into four main themes: access to services and information, participation and engagement, economic opportunities and liveability. Meanwhile, the negative impact can be grouped into 6 major themes consisting of exclusion and marginalization, inequalities, displacement, livelihood, resistance and privacy and security. The findings reveal that the negative impact of smart city development is more dominant, with studies mainly carried out in the Global South countries in the Asia and African region. This paper emphasizes the importance of understanding the challenges experienced by the urban poor and offers valuable insights to policymakers in formulating a more inclusive smart city. This study concludes by suggesting a clear direction for future research in the smart city and urban poor discourse.

Keywords: Global South, smart city, social impact, systematic literature review, urbanization, urban poor

Introduction

Smart cities have sparked extensive debate since emerging in the 1990s. The term ‘smart’ has conjured varied definitions, interpretations, visions and projects (Pali & Schuilenburg, 2020), rendering it a fuzzy concept with no absolute nor one-size-fits-all definition (du Toit & Stimie, 2023; Szczepańska et al., 2023). In its early years, the primary focus and core of smart cities was Information and Communication Technologies (ICT) which undergirds a wide range of network infrastructures such as transport, business services and housing (Hollands, 2008). Caragliu et al. (2011) affirm that smart cities promote the concept of a wired city as the primary development

model and connectivity as the source of growth. The smartness lies in the principle that cities are instrumented, interconnected and intelligent with integrated platforms and sophisticated analytics for better operational and decision-making processes (Harrison et al., 2010) while commercial ICT players like IBM, Cisco and Siemens are significantly involved and influenced urban ideologies (Greenfield, 2013).

Critics argue that overemphasis on digital and technology neglects the human dimensions of urban development (Sanchez et al., 2022). Beretta (2018) emphasizes that technology addresses only specific, temporary issues but cannot grasp complex ecological and social relationships. Oliveira and Campolargo (2015) affirm that people, not technology, are the true drivers of urban smartness. In this context, smart cities in developed countries are more citizen-centric, sophisticated and robust due to advanced economic and scientific development (Singh et al., 2022). Developing nations, however, encounter additional challenges as smart city development requires simultaneous socio-economic, legal and regulatory reforms alongside technological advancements (Tan & Taeihagh, 2020) and exacerbated by the gap between theoretical approaches and practical implementation (Fernandez-Anez et al., 2020). Nevertheless, many developing countries continue to pursue smart cities to achieve sustainability, modernization, economic development and enhanced quality of life by reducing environmental impact, improving energy efficiency and urban safety, encouraging public participation and enhancing city services (Chang & Smith, 2023; Mishra & Chakraborty, 2020; Mohbey, 2017; Shayan et al., 2020).

As smart city projects gain momentum, concerns arise about their inclusivity and ability to address the challenges faced by marginalized communities, including the urban poor. Scholars argue that technology widens the economic, social and cultural divides by favoring elite groups (Beretta, 2018; Mishra, 2021; Pali & Schuilenburg, 2020; Sengupta & Sengupta, 2022). Curran and Smart (2021) conclude that the distribution of smart cities benefits and risks vary by socio-economic status. Despite the extensive literature on smart cities, little attention has been given to their impact on the urban poor, a significant urban demographic burdened by economic vulnerability and limited access to urban services (Mohd Zain et al., 2020).

This study addresses this gap by examining the challenges and experiences of the urban poor in smart city development. Through a systematic literature review (SLR), it synthesizes existing knowledge, identifies patterns and uncovers gaps, offering valuable insights for urban policy and academic discourse, in line with the 2030 Agenda for Sustainable Development's commitment to 'Leaving No One Behind.'

Research methodology

This research employed SLR to locate, assess and synthesize previous work in the subject area, focusing on relevant literature published up to and including 2023 using extensive search methods, predetermined search strings and established inclusion and exclusion criteria (Robinson & Lowe, 2015). The research design follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, as shown in Figure 1. The use of PRISMA aims to improve the reporting of systematic reviews and meta-analyses (Moher et al., 2009), ensuring transparency and reproducibility in the review process.

© 2025, e-ISSN 2682-7727 https://doi.org/10.17576/geo-2025-2103-14

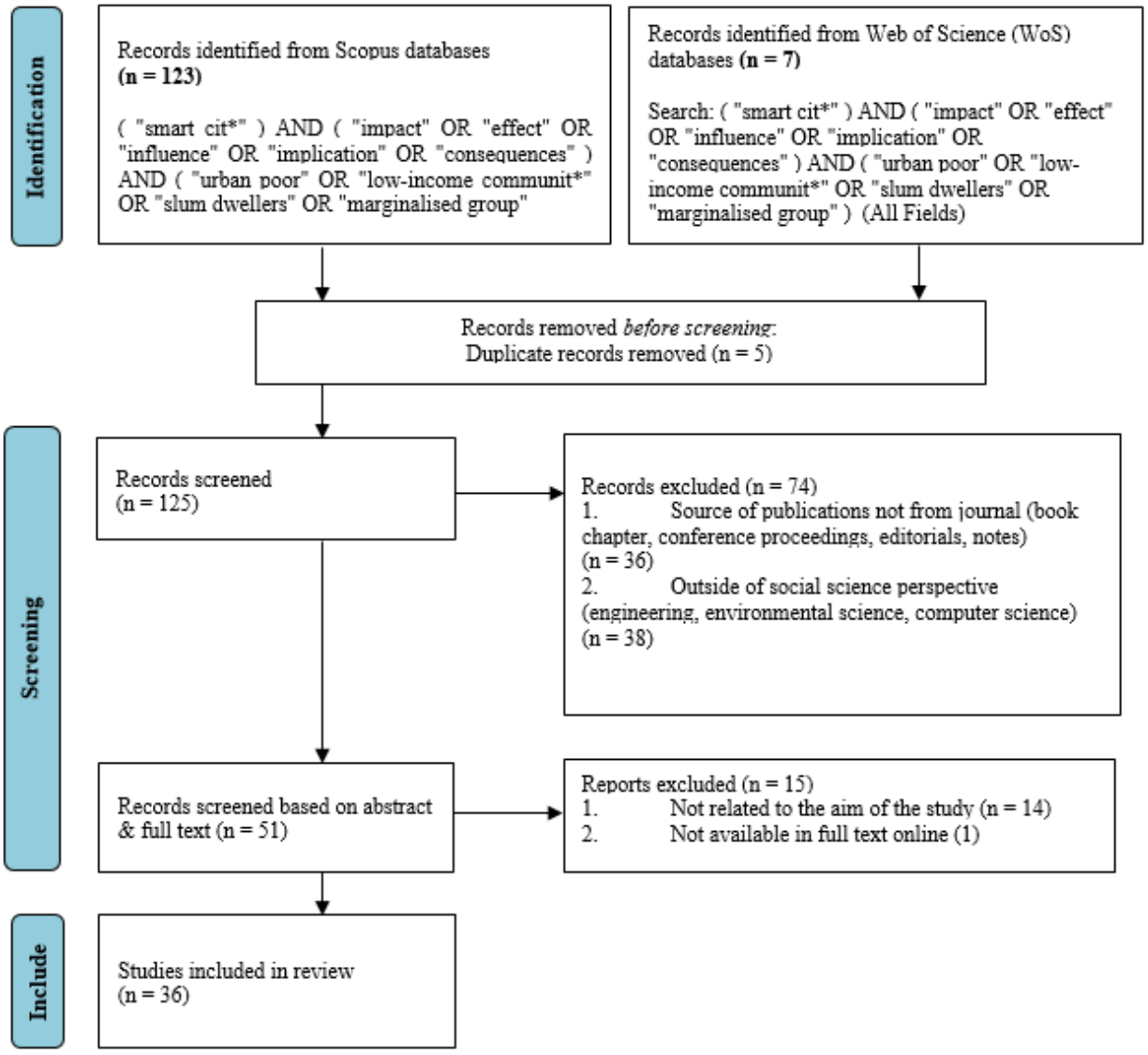

Figure 1. PRISMA framework for systematic literature review

Formulation of research questions

The PICo method, which stands for Population, Interest and Context, is a framework utilized to formulate focused research questions. (Lockwood et al., 2015). The PICo method intends to facilitate the development of precise research questions that can lead to a more structured and efficient literature review process. For this study, the research question, formulated using the PICo method is: "What is the impact of smart city development on the urban poor?" In this question, population refers to the urban poor, smart city development as the phenomena of interest and the impact of smart city as the context of this research.

Identification

The search utilized two electronic databases: Scopus, which hosts the largest source of peer-reviewed articles from over 5,000 publishers and Web of Science (WoS), which includes over 9,000 impactful journals across 178 disciplines (Shayan et al., 2020). The keywords used were “smart city,” “smart cities,” "impact," "effect," "influence," "implication," "consequences," "urban poor," "low-income community," "low-income communities," "slum dwellers," and "marginalised group," combined with “OR” and “AND” Boolean connectors to create additional search strings. These same keywords ensured consistent findings in both databases, as shown in Table 1.

Table 1. The search strings

Database	Search string	Result
Scopus	TITLE-ABS-KEY (("smart cit*") AND ("impact" OR "effect" OR "influence" OR "implication" OR "consequences") AND ("urban poor" OR "low-income communit*" OR "slum dwellers" OR "marginalised group"))	123
WoS	Results for ALL=(("smart cit*") AND ("impact" OR "effect" OR "influence" OR "implication" OR "consequences") AND ("urban poor" OR "low-income communit*" OR "slum dwellers" OR "marginalised group"))	7

Screening

After removing 5 duplicate articles, 125 papers were included in the screening process. Inclusion and exclusion criteria were then introduced to maintain the research boundaries, as shown in Table 2. Three main criteria—language, source of publications and subject area—were established to determine each article’s suitability for inclusion in this study

Table 2. Systematic literature review inclusion and exclusion criteria

No	Criteria	Inclusion	Exclusion
1	Language	English	Other languages than English
2	Source of publications	Journal	Book chapter, conference proceedings, editorials, notes
3	Subject area	Social Science	Engineering, environmental science, computer science

Eligibility

All 125 papers were written in English, therefore none were excluded based on language criteria. To ensure the quality and reliability of the publications, the second eligibility criterion limited the source type to journals, recognised as essential sources of information for research (Prashanthan, 2022). Additionally, this study takes a predominantly social science viewpoint, specifically on the

effect of smart cities on the urban poor, excluding papers with a technical focus. This refinement process resulted in 51 articles eligible for further screening.

The remaining articles were carefully read and reviewed to ensure alignment with the research questions and objectives. One article was removed as its full text was not available online. Ultimately, 36 articles were deemed eligible for inclusion in the review.

Data abstraction and analysis

During the analysis, relevant information was extracted from the 36 articles for both quantitative and thematic analysis. The quantitative analysis examined the characteristics of the records, while the thematic analysis identified common themes by assessing the positive and negative impacts of smart city development on the urban poor.

Results and discussions

Characteristics of the records

a. Publication trend

The following section analyses all 36 articles in terms of their publication years and the geographical locations where the research was conducted. Figure 2 illustrates the publication trend, revealing that discussions on smart cities and the urban poor within a social science context began recently. However, there has been a gradual increase in publications since 2018, with more than 75% of the articles published in the last four years.

According to Wikström (2013), the effects of changes on urban systems take a relatively long time to emerge and it may take even longer for the social implications of smart cities to manifest in communities (Shayan et al., 2020). Furthermore, smart city in most developing countries is also a recent trend; India's Smart Cities Mission (SCM) was launched in 2015 (Hoelscher, 2016); and South Africa introduced new smart city developments in 2021 (du Toit & Stimie, 2023). These factors can reasonably explain the generally late publication on the impact of smart cities on the urban poor.

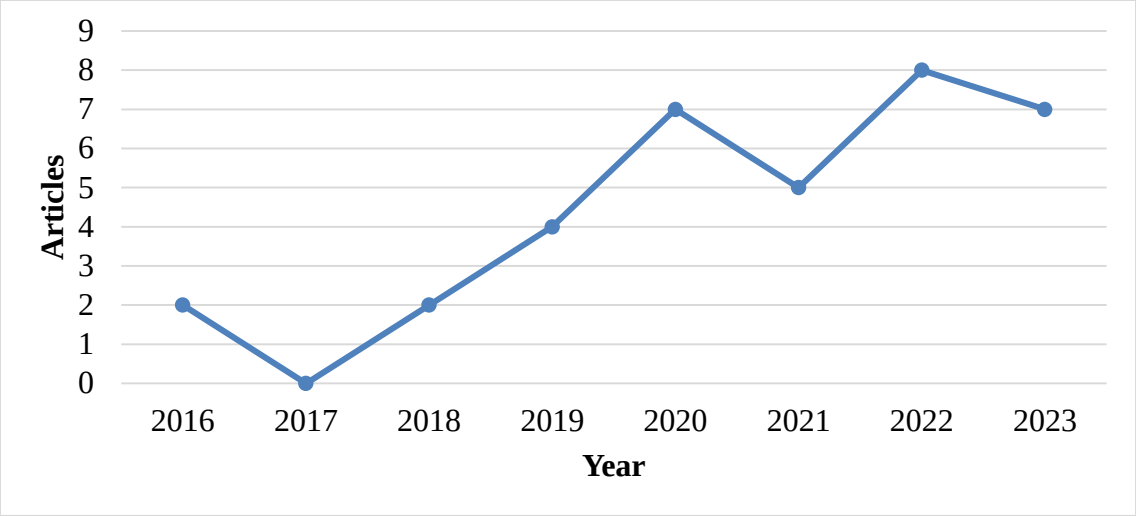

Figure 2. Number of publications by year

b. Case study location

Table 3 details the locations of the case studies included in this review by country, region and socioeconomic category. The review encompasses case studies from 13 countries. Seven studies involved multiple locations, while four studies provided general information without specifying a location. India had the highest number of studies, with 10 articles (28%) discussing the effect of smart cities on the urban poor. Geographically, nearly half (44%) of the studies were conducted in Asia, followed by Africa (14%) and various locations (14%). 69% of the case study countries were categorized as Global South, compared to only 17% from the Global North.

Literature on smart city development predominantly focuses on high-income countries in Europe and Central Asia (Lim et al., 2019). However, focusing on the urban poor shifts the attention to the Global South, particularly Asia and Africa, which are home to a significant portion of the world's urban poor. Compared to the Global North, Global South countries experience lower productivity, wages and wealth (Graves & Kalafsky, 2017). These regions face distinct challenges in smart city development, including high financial costs, substantial informal economies and the need to address basic infrastructure needs (Tan & Taeihagh, 2020). The emphasis on technology in their smart city initiatives often overshadows the human-centered considerations (Luterek, 2020). These factors contribute to the growing body of research on smart cities and the urban poor in these regions (Table 3).

© 2025, e-ISSN 2682-7727 https://doi.org/10.17576/geo-2025-2103-14

Table 3. Case study location by countries, region and global socio-economic category

Criteria	Category		No	%
Case study location	By countries	Colombia	1	3
		Ghana	1	3
		India	10	28
		Indonesia	1	3
		Kenya	2	6
		Peru	1	3
		Philippines	1	3
		Romania	1	3
		South Korea	1	3
		Tanzania	1	3
		Thailand	2	6
		Turkey	1	3
		USA	2	6
		Various	7	19
		Undefined	4	11
	By region	Africa	5	14
		Asia	16	44
		Europe	2	6
		Latin America and the Caribbean	2	6
		Northern America	2	6
		Various	5	14
		Undefined	4	11
	By global socio-economic category	Global North	6	17
		Global South	25	69
		Various	1	3
		Undefined	4	11

Thematic analysis

Research Question: What is the impact of smart city development on the urban poor?

This study has determined the various implications of smart city development for the urban poor. Based on the viewpoint of each article, the 36 articles were categorized into positive, negative, or both positive and negative impacts (Figure 3). The majority (18 articles or 50%) suggest that smart cities can have both positive and negative impacts on the urban poor. Meanwhile, 14 articles (39%) observe that smart cities negatively impact the urban poor and only 4 articles (11%) highlight the positive implications.

© 2025, e-ISSN 2682-7727 https://doi.org/10.17576/geo-2025-2103-14

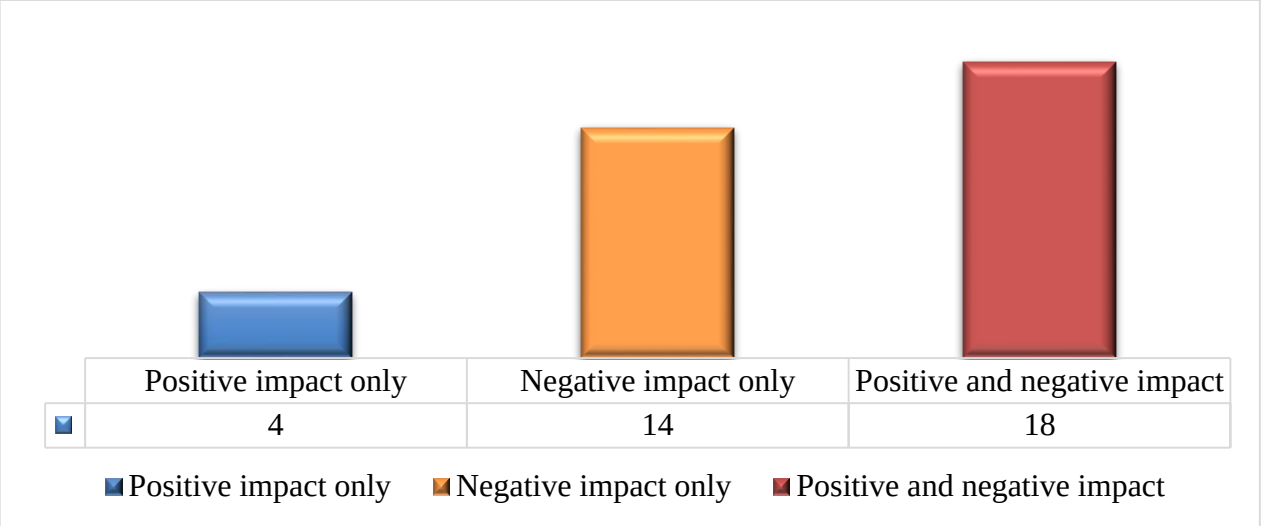

Figure 3. Impact of smart city development on the urban poor

The main themes of smart city impact on the urban poor that emerge from the 36 articles were identified based on the positive or negative impacts as shown in Table 4.

Table 4. The positive and negative impact of smart city development by themes

Impact	Theme	References
Positive	Access to services & information	(Asavanirandorn et al., 2023); (Bardhan et al., 2020); (Chambers & Evans, 2020); (Fabusuyi & Johnson, 2022); (Guma & Wiig, 2022); (Hoelscher, 2016); (Jain & Korzhenevych, 2022); (Kashem & Gallo, 2023); (Kim, 2022); (Lepore et al., 2023); (Médard de Chardon, 2019); (Mossberger & Tolbert, 2021); (Offenhuber & Schechtner, 2018); (Schmidt, 2020); (Shamsuddin & Srinivasan, 2021); (Sudhipongpracha & Dahiya, 2019); (van Gils & Bailey, 2023); (van Hoof et al., 2021)
	Participation & engagement	(Asavanirandorn et al., 2023); (Guma & Wiig, 2022); (Hoelscher, 2016); (Jagganath, 2022); (Kashem & Gallo, 2023); (Lepore et al., 2023); (Martinez & Masron, 2020); (Offenhuber & Schechtner, 2018); (Poku-Boansi et al., 2020); (Reuter, 2019); (van Hoof et al., 2021)
	Economic opportunities	(Jagganath, 2022); (Mossberger & Tolbert, 2021); (Sudhipongpracha & Dahiya, 2019)
	Liveability	(Bardhan et al., 2020; Jagganath, 2022; Poku-Boansi et al., 2020; Sudhipongpracha & Dahiya, 2019)
Negative	Exclusion & marginalisation	(Bloch, 2019); (Chambers & Evans, 2020); (Datta, 2018); (Ghosh & Arora, 2022); (Guma & Wiig, 2022); (Gupte & Mitlin, 2021); (Hoefsloot et al., 2020); (Hoyng, 2016); (Jain & Korzhenevych, 2022); (Kashem & Gallo, 2023); (Kim, 2022); (Kovacic, 2022); (Kylasam Iyer &

	Kuriakose, 2023); (Martinez & Masron, 2020); (McElroy, 2020); (Médard de Chardon, 2019); (Mossberger & Tolbert, 2021); (Offenhuber & Schechtner, 2018); (Poku-Boansi et al., 2020); (Prasad et al., 2023); (Smith et al., 2023); (Sudhipongpracha & Dahiya, 2019); (Todd et al., 2019); (Uteng & Turner, 2019); (van Gils & Bailey, 2023)
Inequality	(Bloch, 2019); (Datta, 2018); (Fabusuyi & Johnson, 2022); (Ghosh & Arora, 2022); (Gupte & Mitlin, 2021); (Hoyng, 2016); (Kashem & Gallo, 2023); (Kim, 2022); (Kylasam Iyer & Kuriakose, 2023); (Martinez & Masron, 2020); (Mossberger & Tolbert, 2021); (Poku-Boansi et al., 2020); (Poster, 2022); (Prasad et al., 2023); (Reuter, 2019); (Schmidt, 2020); (Shamsuddin & Srinivasan, 2021); (Sudhipongpracha & Dahiya, 2019); (Todd et al., 2019); (van Gils & Bailey, 2023); (van Hoof et al., 2021)
Displacement	(Bloch, 2019); (Hoelscher, 2016); (Hoyng, 2016); (Jain & Korzhenevych, 2022); (McElroy, 2020); (Prasad et al., 2023); (Sudhipongpracha & Dahiya, 2019); (van Hoof et al., 2021)
Loss of livelihood	(Bloch, 2019); (Kylasam Iyer & Kuriakose, 2023); (McElroy, 2020); (Poku-Boansi et al., 2020)
Resistance to technology	(Hoelscher, 2016); (Kovacic, 2022); (Schmidt, 2020)
Privacy & security	(Poster, 2022); (Smith et al., 2023); (van Gils & Bailey, 2023)

a. Smart city impact on the urban poor: The positive impact

The positive impact of smart city development on the urban poor can be classified into four main themes, namely 1) access to services and information; 2) participation and engagement; 3) economic opportunities; and 4) liveability.

i. Access to services and information

In this systematic review, improved access to services and information was found to be the main positive impact of smart cities on the urban poor. Water Automated Teller Machines or water ATMs in India (Schmidt, 2020) and Kenya (Guma & Wiig, 2022) provide a convenient and reliable source of clean drinking water. IoT technologies such as the Liquefied Petroleum Gas (LPG) smart meters and smart water systems enable users in informal areas to access LPG and water more efficiently and reliably (Chambers & Evans, 2020). In cities like Boston, Dublin and Toronto, the bike-sharing systems enhance access to cycling for the urban poor by providing convenient and affordable transportation (Médard de Chardon, 2019). Meanwhile, Bardhan et al. (2020) hypothesize that the implementation of rooftop solar photovoltaics will enhance energy access for low-income communities in Global South countries.

Smart city development was also found to enhance information access for the urban poor. Online job search empowers the urban poor with job opportunities and educational resources (Asavanirandorn et al., 2023). In disaster management, early warning systems and real information can increase access to information so that the urban poor are better prepared to face flood disasters (Poku-Boansi et al., 2020).

ii. Participation and engagement

The second most emphasized positive impact of smart city development is the enhancement of participation and engagement among the urban poor. Lepore et al. (2023) identified the crucial role of Digital Innovation Hubs (DIH) in empowering the urban poor and low-income communities in developing inclusive smart cities by encouraging co-creation and their active participation in designing and testing smart solutions. Meanwhile, smart engagement approaches such as online outreach initiatives, can potentially overcome barriers to participation and create a more inclusive and accessible platform for the urban poor to engage in civic and political discussions (Kashem & Gallo, 2023). Offenhuber and Schechtner (2018) suggested that smart infrastructure can potentially create participatory infrastructure governance models. In Nairobi, IoT technology has improved communication and facilitated a two-way flow of credibility, reliability and trust between users and infrastructure operators (Chambers & Evans, 2020).

iii. Liveability

Smart city initiatives can enhance environmental sustainability and improve the liveability of the urban poor. Implementing smart waste management systems and green infrastructure creates cleaner, healthier environments for low-income communities (Sudhipongpracha & Dahiya, 2019). Jagganath (2022) noted that urban agriculture using smart solutions provides the urban poor with access to fresh, nutritious produce, addressing malnutrition and improving livability. Bardhan et al. (2020) argue that sustainable energy solutions and energy-efficient designs help the urban poor combat climate change, while smart flood management solutions enhance resilience and preparedness for disasters (Poku-Boansi et al., 2020).

iv. Economic opportunities

Another benefit of smart cities is the economic opportunities they bring. Jagganath (2022) argues that urban agriculture enables the urban poor to grow and sell produce, generating income and improving livelihoods. Mossberger and Tolbert (2021) observed that broadband subscriptions in low-income households can foster entrepreneurship and small businesses, leading to economic empowerment and job creation. Additionally, smart city programs can provide digital skills training and education, allowing the urban poor to access digital job opportunities and participate in the digital economy (Sudhipongpracha & Dahiya, 2019).

In a nutshell, smart cities that focus on inclusivity, accessibility, and human-centric solutions can be beneficial to the urban poor. Smart technologies can provide easier access to services and information, overcome participation barriers and create more inclusive platforms to engage the urban poor and other marginalized groups, enhancing livability and offering economic opportunities to improve their quality of life. A carefully planned and designed smart city

considering local conditions such as population, resources, and issues (McFarlane & Söderström, 2017) can greatly contribute to a more sustainable and livable urban environment.

b. Smart city impact on the urban poor: The negative impact

This study has also identified 6 main themes relating to smart cities' disadvantages or negative impact on the urban poor which are 1) exclusion and marginalization; 2) inequality; 3) displacement; 4) loss of livelihood; 5) resistance to technology; and 6) privacy and security.

i. Exclusion and marginalization

Exclusion and marginalization of the urban poor emerged as the most prominent negative impact of smart cities highlighted in more than two-thirds of the articles. Jain and Korzhenevych (2022) argue that India's Smart Cities Mission's focus on infrastructure over affordable housing has excluded the urban poor and marginalized communities. Smart city plans in India also prioritize middle-class needs (van Gils & Bailey, 2023) and filter out the voices of the poor and vulnerable citizens to align with the city's vision (Ghosh & Arora, 2022). In Dar es Salaam, the income gap causes poor people to be marginalized in accessing better services from private entities (Todd et al., 2019). Smith et al. (2023) contend that Medellin's top-down approach limits community involvement and ignores the views and needs of low-income communities. Reuter (2019) concurs that exclusion and marginalization occur when smart city initiatives do not consider the needs and perspectives of the urban poor. In Enkanini, South Africa, solar panels do not effectively address the resident's needs for reliable electricity, instead further excluding them from essential infrastructure (Kovacic, 2022). Furthermore, a shift towards smart technology may require access to smart tools, posing barriers for the urban poor and excluding them from its benefits (Uteng & Turner, 2019).

ii. Inequality

In smart cities, inequality manifests through unequal distribution of benefits, resulting in social and economic disparities (Hoyng, 2016; Kim, 2022). Gupte and Mitlin (2021) observed that technological solutions for COVID-19 created a class bias against the urban poor in policy and program interventions, exacerbating pre-existing inequalities. Shamsuddin and Srinivasan (2021) found that ICT in the housing sector can reinforce social inequalities, as profit-oriented private businesses owning housing data may not reach out to vulnerable groups. Furthermore, ICT can catalyze unequal spatial development, reinforcing existing inequalities based on class, race, gender, and other identities.

The digital divide, or unequal access to ICT and technology, also exacerbates inequalities in smart city development. In Jakarta, Indonesia, online public engagement platforms have raised issues of elite capture, limiting participation to those with technical know-how (Martinez & Masron, 2020). Digitalisation and tech-driven innovation can perpetuate disparities in access to digital technologies and exacerbate social inequalities (Datta, 2018; Fabusuyi & Johnson, 2022). Concerns about the digital divide are also echoed by Hoyng (2016), Kashem and Gallo (2023), Kim (2022b), Kylasam Iyer and Kuriakose (2023) and van Hoof et al. (2021). Inequality also arises when surveillance technologies disproportionately impact marginalized communities, such as

Black, Latinx and Muslim Uyghur populations, leading to differential impacts based on race, ethnicity and class (Poster, 2022).

iii. Displacement

McElroy (2020) discovers that the siliconization of Cluj, Romania has led to gentrification, resulting in the displacement of marginalized communities as they are forced out of their homes and neighborhoods to accommodate new development. Similarly, in India, the development of smart cities and industrial corridors has displaced poor urban communities and slum dwellers from their land (Hoelscher, 2016; Jain & Korzhenevych, 2022; Prasad et al., 2023). Without careful planning and implementation, smart city initiatives risk exacerbating gentrification and displacement, disproportionately affecting low-income communities (Bloch, 2019; Hoyng, 2016; van Hoof et al., 2021).

iv. Loss of livelihood

The urban poor also experience loss of livelihood due to smart city development (Bloch, 2019; Kylasam Iyer & Kuriakose, 2023; McElroy, 2020; Poku-Boansi et al., 2020). McElroy (2020) explains that smart city ride-sharing services such as Uber have displaced traditional taxi services in Cluj, Romania, impacting the livelihood of taxi drivers and causing protests and lawsuits. During the pandemic, the inadequacy of built-in and physical infrastructure in India's smart cities contributed to the loss of livelihood among the urban poor (Kylasam Iyer & Kuriakose, 2023). Residents of the Charan Khad slum were evicted to make way for smart city developments, causing them to disperse and lose their informal social support networks, significantly impacting their livelihood, well-being and resilience (Bloch, 2019). Furthermore, the adoption of smart waste management and transportation systems in Accra, Ghana may displace waste pickers and transport operators who depend on these activities for their living (Poku-Boansi et al., 2020).

v. Resistance to technology

The urban poor often resist technology in smart city discourse. Schmidt (2020) reported a slow uptake of water ATMs due to residents' lack of trust or knowledge about the technology and the agency maintaining the units. In Enkanini, residents resisted and vandalized the solar panels provided to the slum in protest of their unmet demands (Kovacic, 2022). Hoefsloot et al. (2020) observed that the introduction of digital infrastructure in Lima altered the residents' norms by requiring them to act as responsible users rather than auto-constructors, making their adaptation to the new system difficult.

vi. Privacy and security

Privacy and security issues are also significant concerns regarding the negative impacts of smart cities on the urban poor. Poster (2022) emphasizes that enhanced state surveillance technologies often disrupt the privacy and security of individuals labelled as "high risk" in marginalized communities. Van Gils and Bailey (2023) highlight the deployment of a security surveillance network in Bengaluru, including the installation of 5,000 CCTV cameras and its potential consequences for the privacy and security of the urban poor. In Medellin, low-income communities

have raised concerns about the ethical issues and privacy impacts of the dominance of technology and extensive data management (Smith et al., 2023).

To summarize, the high incidence of negative implications of smart cities for these populations can be attributed to their unique challenges. They are often excluded from city development, denied rights to the city (Chigwenya & Simbanegavi, 2020) and face additional vulnerability in accessing urban spaces and resources. They struggle to even gain access to basic services such as water, sanitation, housing and healthcare amidst rapid urbanization (Nandi et al., 2016). The integration of ICT and advanced technology in cities can exacerbate inequalities for the urban poor due to the digital divide. This divide includes not only access to technology but also the ability and knowledge to use it effectively (Riggins & Dewan, 2005). Digital literacy and lower education levels are barriers that prevent the urban poor from fully participating in smart city initiatives (Kim, 2022). As Reuter (2019) argues, those unable to adapt to smart city living, such as the poor and the elderly, often miss out on the benefits.

Furthermore, top-down and corporate-driven smart city development limits the participation of marginalized groups in the planning and execution process (van Gils & Bailey, 2023). This approach fosters authoritarianism and technocratic governance, which overlook the complexities of cities and the needs of their inhabitants (Kitchin, 2014). It tends to favor corporate interests, creating the perception that cities are produced by corporate-government-financial bureaucracies rather than by their residents (Reuter, 2019). The emphasis on technology over people neglects human-centered solution (Dashkevych & Portnov, 2023; Hu et al., 2023) and fails to consider the intricate social and cultural dynamics of urban communities (Haque et al., 2021; Kim, 2023). This may result in unequal distribution of services and resources, disproportionately benefiting affluent areas while leaving the urban poor and slum dwellers with inadequate infrastructure and services (Prasad et al., 2023).

Conclusion

Inclusivity in smart cities is crucial to ensuring that all segments of the population, including marginalized and vulnerable communities benefit from smart city initiatives. This study identifies four key positive impacts on the urban poor: access to services and information, participation and engagement, economic opportunities and liveability. In contrast, the predominant negative impacts fall into six themes: exclusion and marginalization, inequality, displacement, loss of livelihood, resistance and privacy and security. The study revealed an upward trend in related publications and identifies key case study locations where smart city development intersects with urban poverty.

By examining the role of ICT and technology in shaping social dynamics, this study contributes to the social science discourse, highlighting the challenges faced by the often-overlooked urban poor in smart cities. The findings offer valuable insights for policymakers in formulating inclusive urban policies that address diverse population needs and enables more effective resource allocation to support social inclusion and sustainable urban development. This aligns with the Sustainable Development Goals, particularly Goal 1 (No Poverty), Goal 10 (Reduced Inequalities) and Goal 11 (Sustainable Cities and Communities).

Studies focusing on vulnerable groups remain limited despite growing research on smart city impact. This study lays the foundation for further research of the complex relationship between smart cities and the urban poor. Future research could investigate factors influencing the urban

poor's support for smart cities, their resilience to technological challenges and comparative strategies for fostering inclusive smart city development across different socio-economic contexts.

Acknowledgement

We thank the Public Service Department Malaysia for financing Hadiah Latihan Persekutuan (HLP) - Cuti Belajar Bergaji Penuh (CBBP 2023).

References

Asavanirandorn, C., Pechdin, W., Ngamsomsak, R., & Bhula-Or, R. (2023). What influences older urban poor's attitude towards online job search? Implications for smart cities development. *Smart Cities*, *6*(1), 614–625.

Bardhan, R., Debnath, R., Gama, J., & Vijay, U. (2020). REST framework: A modelling approach towards cooling energy stress mitigation plans for future cities in warming Global South. *Sustainable Cities and Society*, *61*, 102315.

Beretta, I. (2018). The social effects of eco-innovations in Italian smart cities. *Cities*, *72*(A), 115–121.

Bloch, N. (2019). Refugees as donors: 'Rich' tibetan refugees, evicted Indian Slum Dwellers and a smart city. *Journal of Refugee Studies*, *34*(2), 1840–1858.

Caragliu, A., del Bo, C., & Nijkamp, P. (2011). Smart cities in Europe. *Journal of Urban Technology*, *18*(0048), 45–59.

Cavada, M., Hunt, D. V. L., & Rogers, C. D. F. (2014). Smart cities: Contradicting definitions and unclear measures. Proceedings of The 4th World Sustainability Forum, Switzerland.

Chambers, J., & Evans, J. (2020). Informal urbanism and the Internet of Things: Reliability, trust and the reconfiguration of infrastructure. *Urban Studies*, *57*(14), 2918–2935.

Chang, S., & Smith, M. K. (2023). Residents' quality of life in smart cities: A systematic literature review. *Land*, *12*(4), 876.

Chigwenya, A., & Simbanegavi, P. (2020). Including urban informality for economic development in Masvingo City, Zimbabwe. *Indonesian Journal of Social and Environmental Issues (IJSEI)*, *1*(3), 137–150.

Curran, D., & Smart, A. (2021). Data-driven governance, smart urbanism and risk-class inequalities: Security and social credit in China. *Urban Studies*, *58*(3), 487–506.

Dashkevych, O., & Portnov, B. A. (2023). Human-centric, sustainability-driven approach to ranking smart cities worldwide. *Technology in Society*, *74*, 102296.

Datta, A. (2018). The digital turn in postcolonial urbanism: Smart citizenship in the making of India's 100 smart cities. *Transactions of the Institute of British Geographers*, *43*(3), 405–419.

de Chardon, C. M. (2019). The contradictions of bike-share benefits, purposes and outcomes. *Transportation Research Part A: Policy and Practice*, *121*, 401–419.

du Toit, B. R., & Stimie, J. E. (2023). Towards smart cities in South Africa: Evolution, definitions, and future cities. *South African Journal of Industrial Engineering*, *34*(1), 85–96.

Fabusuyi, T., & Johnson, M. P. (2022). Enhancing the quality and social impacts of urban planning through community-engaged operations research. *Environment and Planning B: Urban Analytics and City Science*, *49*(4), 1167–1183.

Fernandez-Anez, V., Velazquez, G., Perez-Prada, F., & Monzón, A. (2020). Smart city projects assessment matrix: Connecting challenges and actions in the Mediterranean Region. *Journal of Urban Technology*, *27*(4), 79–103.

Ghosh, B., & Arora, S. (2022). Smart as (un)democratic? The making of a smart city imaginary in Kolkata, India. *Environment and Planning C: Politics and Space*, *40*(1), 318–339.

Graves, W., & Kalafsky, R. V. (2017). Evolving growth prospects? Assessing the state of the South in the global economy. *Southeastern Geographer*, *57*(2), 112–130.

Greenfield, A. (2013). *Against the Smart City*. Do Publications.

Guma, P. K., & Wiig, A. (2022). Smartness beyond the network: Water ATMs and disruptions from below in Mathare Valley, Nairobi. *Journal of Urban Technology*, *29*(4), 41–61.

Gupte, J., & Mitlin, D. (2021). COVID-19: What is not being addressed. *Environment & Urbanization*, *33*(1), 211–228.

Haque, A. N., Lemanski, C., & de Groot, J. (2021). Why do low-income urban dwellers reject energy technologies? Exploring the socio-cultural acceptance of solar adoption in Mumbai and Cape Town. *Energy Research & Social Science*, *74*, 101954.

Harrison, C., Eckman, B., Hamilton, R., Hartswick, P., Kalagnanam, J., Paraszczak, J., & Williams, P. (2010). Foundations for smarter cities. *IBM Journal of Research and Development*, *54*(4), 1-16.

Hoefsloot, F. I., Martínez, J., Richter, C., & Pfeffer, K. (2020). Expert-amateurs and smart citizens: How digitalization reconfigures lima's water infrastructure. *Urban Planning*, *5*(4), 312–323.

Hoelscher, K. (2016). The evolution of the smart cities agenda in India. *International Area Studies Review*, *19*(1), 28–44.

Hollands, R. G. (2008). Will the real smart city please stand up? Intelligent, progressive or entrepreneurial? *City*, *12*(3), 303–320.

Hoyng, R. (2016). From infrastructural breakdown to data vandalism: Repoliticizing the smart city?. *Television and New Media*, *17*(5), 397–415.

Hu, W., Wang, S., & Zhai, W. (2023). Human-centric vs. technology-centric approaches in a top-down smart city development regime: Evidence from 341 Chinese cities. *Cities*, *137*, 104271.

Jagganath, G. (2022). The transforming city: Exploring the potential for smart cities and urban agriculture in Africa. *The Oriental Anthropologist*, *22*(1), 24-40.

Jain, M., & Korzhenevych, A. (2022). Discerning institutional and spatial restructuring under emergent neoliberal projects in India. *Political Geography*, *97*, 102642.

Kashem, S. Bin, & Gallo, D. (2023). Smart engagement in small cities: Exploring minority participation in planning. *Urban Planning*, *8*(2), 44–56.

Kim, K. (2022). Exclusion and cooperation of the urban poor outside the institutional framework of the smart city: A case of Seoul. *Sustainability*, *14*(20), 13159.

Kim, K. (2023). Inclusion, Exclusion, and Participation in Digital Polis: Double-Edged Development of Poor Urban Communities in Alternative Smart City-Making. In K. Kim & H. Chung (Eds.), *Gated Communities and the Digital Polis* (pp. 155–178). Springer.

Kitchin, R. (2014). The real-time city? Big data and smart urbanism. *GeoJournal*, *79*, 1–14.

Kovacic, Z. (2022). Governing informality through representation: Examples from slum policies in Brazil and South Africa. *Cities*, *125*, 102122.

Kylasam Iyer, D., & Kuriakose, F. (2023). Becoming digital citizens: COVID-19 and urban citizenship regimes in India. *Citizenship Studies*, *27*(2), 230–246.

Lepore, D., Testi, N., & Pasher, E. (2023). Building inclusive smart cities through innovation intermediaries. *Sustainability*, *15*(5) 4024.

Lim, Y., Edelenbos, J., & Gianoli, A. (2019). Identifying the results of smart city development: Findings from systematic literature review. *Cities*, *95*, 102397.

Lockwood, C., Munn, Z., & Porritt, K. (2015). Qualitative research synthesis: Methodological guidance for systematic reviewers utilizing meta-aggregation. *International Journal of Evidence-Based Healthcare*, *13*(3), 179–187.

Luterek, M. (2020). Smart Cities and Citizen Orientation: The Growing Importance of "Smart People" in Developing Modern Cities. In M. Themistocleous & M. Papadaki (Eds.), Information Systems. EMCIS 2019 Lecture Notes in Business Information Processing, vol 381. Springer.

Martinez, R., & Masron, I. N. (2020). Jakarta: A city of cities. *Cities*, *106*, 102868.

McElroy, E. (2020). Digital nomads in siliconising Cluj: Material and allegorical double dispossession. *Urban Studies*, *57*(15), 3078–3094.

Mishra, B. P. (2021). Smart city and urban poor: Can they coexist?. In A. K. Mishra, V. Arunachalam & D. Patnaik (Eds.), *Critical Perspectives on Emerging Economies* (pp. 147–161). Springer.

Mishra, K. N., & Chakraborty, C. (2020). A Novel Approach Toward Enhancing the Quality of Life in Smart Cities Using Clouds and IoT-Based Technologies. In M. Farsi, A. Daneshkhah, A. Hosseinian-Far & H. Jahankhani (Eds.), *Digital Twin Technologies and Smart Cities. Internet of Things* (pp. 19–35). Springer.

Mohbey, K. K. (2017). The role of big data, cloud computing and IoT to make cities smarter. *International Journal of Society Systems Science*, *9*(1), 75.

Mohd Zain, N. A., Tambi, N., & Manap, J. (2020). Impak kemiskinan bandar terhadap faktor kewujudan golongan belia lewat kembang di Institusi Pengajian Tinggi (IPT). *Akademika 90(1(SI))*, 21–34.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Journal of Clinical Epidemiology*, *62*(10), 1006-1012.

Mossberger, K., & Tolbert, C. J. (2021). Digital citizenship and digital communities: How technology matters for individuals and communities. *International Journal of E-Planning Research(IJEPR)*, *10*(3), 19–34.

Nandi, S., Dasgupta, R., Garg, S., Sinha, D., Sahu, S., & Mahobe, R. (2016). Uncovering coverage: Utilisation of the Universal Health Insurance scheme, chhattisgarh by women in Slums of Raipur. *Indian Journal of Gender Studies*, *23*(1), 43–68.

Offenhuber, D., & Schechtner, K. (2018). Improstructure - an improvisational perspective on smart infrastructure governance. *Cities*, *72*(Part B), 329–338.

Oliveira, A., & Campolargo, M. (2015). From Smart Cities to Human Smart Cities. 2015 48th Hawaii International Conference on System Sciences (pp. 2336–2344), Kauai, USA.

Pali, B., & Schuilenburg, M. (2020). Fear and fantasy in the smart city. *Critical Criminology*, *28*, 775–788.

Poku-Boansi, M., Amoako, C., Owusu-Ansah, J. K., & Cobbinah, P. B. (2020). What the state does but fails: Exploring smart options for urban flood risk management in informal Accra, Ghana. *City and Environment Interactions, 5*, 100038.

Poster, W. R. (2022). Introduction: Digitizing borders, cities, and landscapes. *Information & Culture, 57*(2), 111–122.

Prasad, D., Alizadeh, T., & Dowling, R. (2023). Smart city planning and the challenges of informality in India. *Dialogues in Human Geography, 14*(3), 385-402.

Prashanthan, M. B. (2022). Journal usage among aesthetic studies undergraduates during the preparation of projects reports. *Global Journal of Human-Social Science, 22*(4), 1-16.

Reuter, T. K. (2019). Human rights and the city: Including marginalized communities in urban development and smart cities. *Journal of Human Rights, 18*(2), 1-21.

Riggins, F., & Dewan, S. (2005). The digital divide: Current and future research directions. *Journal of the Association for Information Systems, 6*(12), 298–337.

Robinson, P., & Lowe, J. (2015). Literature reviews vs systematic reviews. *Australian and New Zealand Journal of Public Health, 39*(2), 103.

Sanchez, W., Borruso, G., & Balletto, G. (2022). The image of the smart city: New challenges. *Urban Science, 6*(1), 5.

Schmidt, J. J. (2020). Pop-up infrastructure: Water ATMs and new delivery networks in India. *Water Alternatives, 13*(1), 119–140.

Sengupta, U., & Sengupta, U. (2022). Why government supported smart city initiatives fail: Examining community risk and benefit agreements as a missing link to accountability for equity-seeking groups. *Frontiers in Sustainable Cities, 4*, 960400.

Shamsuddin, S., & Srinivasan, S. (2021). Just smart or just and smart cities? Assessing the literature on housing and information and communication technology. *Housing Policy Debate, 31*(1), 127–150.

Shayan, S., Kim, K. P., Ma, T., & Nguyen, T. H. D. (2020). The first two decades of smart city research from a risk perspective. *Sustainability, 12*(21), 9280.

Singh, T., Solanki, A., Sharma, S. K., Nayyar, A., & Paul, A. (2022). A decade review on smart cities: Paradigms, challenges and opportunities. *IEEE Access, 10*, 2169-3536.

Smith, H., Medero, G. M., Crane De Narváez, S., & Castro Mera, W. (2023). Exploring the relevance of 'smart city' approaches to low-income communities in Medellín, Colombia. *GeoJournal, 88*, 17–38.

Sudhipongpracha, T., & Dahiya, B. (2019). City profile: Khon Kaen, Thailand. *Environment and Urbanization ASIA, 10*(2), 0975425319863931.

Szczepańska, A., Kaźmierczak, R., & Myszkowska, M. (2023). Smart city solutions from a societal perspective—A case study. *International Journal of Environmental Research and Public Health, 20*(6), 5136.

Tan, S., & Taeihagh, A. (2020). Smart city governance in developing countries: A systematic literature review. *Sustainability, 12*(3), 899.

Todd, G., Msuya, I., Levira, F., & Moshi, I. (2019). City profile: Dar es Salaam, Tanzania. *Environment and Urbanization ASIA, 10*(2), 193–215.

Uteng, T. P., & Turner, J. (2019). Addressing the linkages between gender and transport in low- and middle-income countries. *Sustainability, 11*(17), 4555.

van Gils, B. A. M., & Bailey, A. (2023). Revisiting inclusion in smart cities: infrastructural hybridization and the institutionalization of citizen participation in Bengaluru's peripheries. *International Journal of Urban Sciences, 27*(Sup 1), 29–49.

van Hoof, J., Marston, H. R., Kazak, J. K., & Buffel, T. (2021). Ten questions concerning age-friendly cities and communities and the built environment. *Building and Environment, 199,* 107922.