Beyond land tenure and titling: legal recognition as a pivotal determinant of health in urban informal settlements

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Over 1 billion people across low-income and middle-income countries live in urban informal settlements, where these residents face severe health disparities. In this Viewpoint, we argue that the absence of legal recognition in informal settlements is a foundational cause of the causes of ill health, as the absence of recognition contributes to unsafe housing and inadequate access to water, sanitation, and other life-sustaining basic services. Despite the importance of legal recognition, few public health researchers have explored how legal barriers influence health outcomes in these communities. Based on the evidence identified through a systematic search, we argue that previous research focused on how tenure or titling can improve living conditions but overlooked other legal interventions that might better enhance health equity by expanding basic service access. We propose an innovative research agenda aimed at characterising the global landscape and underlying mechanisms of a wider spectrum of legal interventions—beyond tenure or titling alone—that could improve health in informal settlements.

Introduction

Globally, over 1 billion people live in urban informal settlements (also called slums), which are widespread across low-income and middle-income countries (LMICs).[1] Health outcomes in informal settlements are not only worse than those in formally housed city neighbourhoods but can also be worse than those in lower-income rural communities.[2] Studies from several countries report higher neonatal and infant mortality in urban informal settlements than in rural areas,[3] potentially because of higher rates of respiratory infections, diarrhoeal illness, and undernutrition.[2]

The law can influence underlying social and environmental determinants to improve health and health equity or, conversely, contribute to unequal health outcomes across populations.[4] However, few studies have explored the far-reaching implications of legal recognition in informal settlements. According to the UN definition, slum households face a lack of durable housing, inadequate water and sanitation, overcrowding, or insecure residential status.[5] All these deprivations represent key health determinants. However, insecure residential status (ie, legal exclusion or absence of legal recognition) often serves as the upstream health barrier by undermining access to water, sanitation, and safe housing.

Contemporary legal exclusion has roots in elitist urban planning policies, often reflecting colonial legacies that militated against incorporating informal settlements into the city's built environment and political fabric.[6] Legal exclusion can entrench health disparities between formal and informal areas and create stark inequities among informal settlements within the same city.[7,8] For instance, providing services in informal settlements that do not have formal property rights is illegal for Brazil's utility agencies.[9] Similar policies exist across LMICs.[8,10]

This Viewpoint makes multiple contributions to understanding and promoting the social determinants of health in informal settlements. Although previous research has explored how governance decisions and public policies shape urban health (in)equalities,[11] attention to the role of legal recognition has been scanty. Despite highlighting inadequate access to water, sanitation, and other services as a key cause of ill health in the public health literature,[5] such scholarship often overlooks legal exclusion's role as the underlying "cause of the causes"[12] for curtailed service access. Meanwhile, in the sparse health research examining legal interventions in informal settlements, most scholars have used a narrow economic lens of tenure or titling to analyse these interventions.[13–15] We argue that legal recognition—a broader concept than tenure or titling alone—should be the central focus of inquiry. Our approach expands the toolkit of legal interventions available for promoting health. In this Viewpoint, we propose a novel typology of legal recognition; synthesise empirical findings regarding recognition's influence on health; and outline an interdisciplinary research agenda to foster health and wellbeing in informal settlements.

Spectrum of legal recognition

We define legal recognition as a governmental (legislative, judicial, or administrative) intervention that acknowledges any of a wide array of rights for residents of informal settlements. Recognition can be legislatively prescribed, accrued through administrative actions, or emerge through the accumulation of rights over time. Recognition provides legally defensible mechanisms for delivering services that might otherwise invite legal contestation. By recognising informal settlements and enabling service delivery, governments acknowledge informal settlements' legitimacy, potentially countering histories of marginalisation.

Our typology includes tenure-led and titling-led recognition. Policy makers and academics widely consider tenure and titling to be forms of recognition, because these interventions entail the government's official acknowledgment of rights to occupy land by residents who previously did not have legal status (table 1).

Additionally, we propose the concept of service-led recognition as part our typology to encompass diverse legal

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	Service-led recognition	Tenure-led recognition	Titling-led recognition
Definition	Any legislative, judicial, or administrative intervention† that enhances legal access to life-sustaining basic services (eg, water, sanitation, and electricity) without formal provision of tenure security or titles	Any legislative, judicial, or administrative acknowledgment of the right to own, hold, or use land by residents of informal settlements	Any legislative, judicial, or administrative intervention providing land or home ownership titles to residents of informal settlements
Scale of intervention	Community level	Community or household level	Household level
Examples of mechanisms used to enable recognition	Declarations of special planning areas, issuing of no objection certificates, or judicial actions compelling municipalities to provide services, thereby helping utility providers to bypass the legal or administrative barriers that prevented service provision	Issuing of occupancy certificates, notification of settlements, or creation of community land trusts	Issuing of title deeds that confer ownership to households or individual household members
Implications for protection against government-enforced displacement	Does not provide formal protection against displacement but might enhance perceived tenure security,[16] as the state might be less inclined to support evictions given its investment in improving services	Extends safeguards against forced evictions (at an individual or collective level) or might include a government duty to provide restitution in case of displacement	Provides higher levels of protection against government eviction at the individual household level than other forms of recognition
Potential for market-led gentrification and commodification	Might be less likely to result in gentrification, as integration into the land market is absent or partial, especially when recognition is implemented at a collective level (eg, recognition of entire settlements rather than households)		Greater risk of market-led displacement than other forms of recognition,[17] especially in prime urban locations because of greater incentives or pressures to sell the land owing to rising prices[18,19]

*The typology discussed here presents general differences in forms of recognition but does not assume a hierarchy (ie, one form of recognition is superior) because the health and social impacts might vary based on local contexts and specific implementation approaches. The goal of this typology is to encourage a broader conceptualisation of recognition, which expands the toolkit of interventions that can advance rights or secure entitlements, such as basic services. †Generally, legislative interventions refer to laws passed by the national, state, or municipal governments; judicial interventions refer to court orders or other actions; and administrative interventions refer to policies, regulations, notices, declarations, or statutorily-derived efforts to provide legal exemptions (eg, issuing no objection certificates).

Table 1: **Definitions and features of three types of legal recognition of urban informal settlements***

mechanisms that can secure entitlements, including the provision of basic services. Service-led recognition is distinct from unregulated, non-state service delivery, which is typically of poor quality, unreliable, and prone to removals.[7,10] This form of recognition also does not refer to one-off or ad hoc public investment in urban services, as such practices can produce unequal benefits (given the obstacles to extending services to informal settlements). Rather, service-led recognition specifically entails the development of government interventions to overcome legal or administrative barriers that formerly curtailed service provision.[20,21] By transforming relations among residents, utility agencies, and officials, service-led recognition can address the structural exclusion of specific populations while enhancing the quality of governance.

Legal recognition may be enabled by various sociopolitical factors, often related to governance or grassroots mobilisation (appendix p 3). For example, in the Indian state of Odisha, grassroots mobilisation combined with the state government's political will, eventually culminated in legislation to provide land titles and services in informal settlements. Furthermore, service-led recognition itself might enable other forms of recognition. For example, before extending sanitation services to informal settlements in Rio de Janeiro, Brazil, the Favela Bairro programme conceded residents' right to use the land, which indirectly improved tenure security.[16]

See Online for appendix

We included service-led recognition in our toolkit of interventions because of benefits related to feasibility and health equity. First, although titling-led or tenure-led recognition might protect residents from eviction, these initiatives do not always enhance service access.[17] In Karachi, Pakistan, regularised informal settlements gain tenure security; however, because service provision is not mandated, water access poorly correlates with tenure status.[22] Second, service-led recognition might sometimes have greater feasibility than titling-led or tenure-led recognition, as governments might be more willing to expand services through administrative actions without providing tenure, thereby retaining land rights for future sale or development.[16,17]

Furthermore, previous research on titling typically reflects a bias towards individualistic, market-based strategies that aim to incentivise residents' housing investments.[23] This bias has obscured the greater health benefits of community-level interventions. Housing investments can lead to health improvements, including reduced gastrointestinal infections as a result of upgraded flooring.[24] However, such household-level gains are likely eclipsed by benefits from community-level investments in water and sanitation, which may improve outcomes through powerful neighbourhood effects.[5]

Table 2 presents illustrative interventions used to extend recognition in informal settlements, beginning with service-led approaches. For example, in Kenya, grassroots mobilisation led to the declaration of Nairobi's Mukuru settlement as a special planning area. This declaration sidestepped tenure-related barriers (from informal occupation of private lands) to allow the official provision of water and sanitation.[20] In Maharashtra, India, more than half of the informal settlements were non-notified (ie, unrecognised) and denied water and sanitation. Following public interest litigation proceedings in 2014, Maharashtra's high court ordered municipalities to extend water to non-notified settlements while explicitly not conferring tenure.[21] Civil society groups have leveraged the ruling to expand water access. By disentangling service access from tenure, service-led recognition can create

	Intervention type	Location	Legislative, judicial, or administrative tool used	Intervention goals or characteristics
Service-led recognition	Administrative order	Ahmedabad, India	No objection certificate issued by the Ahmedabad Municipal Corporation in the 1990s for informal settlements involved in a slum networking project	Permits legal extension of water, sanitation, drainage, solid waste management, electricity, and roads, without providing long-term tenure security[25,26]
	Judicial order	Maharashtra state, India	Bombay High Court ruling in Pani Haq Samiti and Others versus Brihan Mumbai Municipal Corporation and Others (2014)	Permits legal extension of water to non-notified informal settlements (ie, areas unrecognised by the government), without providing tenure security[21]
	Legislation and administrative order	Zambia	Housing (Statutory and Improvement Areas) Act (1975) and the Urban and Regional Planning Act (2015)	Permits legal extension of water and sanitation, drainage, roads, and pathways; occupancy licences protecting against eviction might be issued, although such a license is not compulsory.
	Legislation and administrative order	Malawi	Designation of Improvement Areas using The Town and Country Planning Act (1988)	Permits extension of legal water and sanitation, drainage, roads, and pathways, without explicitly addressing tenure
	Legislation and administrative order	Nairobi, Kenya (Mukuru informal settlement)	Special Planning Area designation leveraging the Physical and Land Use Planning Act (2019)	Permits extension of legal water and sanitation in the context of a public health emergency, overriding barriers related to the absence of tenure security among residents[20]
Tenure-led recognition	Legislation	Maharashtra state, India	Maharashtra Slum Areas Act (1971)	Mandates the government to rehouse residents in situations of displacement and entitles residents to apply for legal water and electricity connections[7]
	Legislation and administrative order	Johannesburg, South Africa	Transitional Residential Settlement Area designation, leveraging the City of Johannesburg, Amendment Scheme 9999	Mandates government provision of occupancy certificates for residential units, which promotes tenure security while providing legal pathways for basic service provision
	Legislation	Namibia	The Flexible Land Tenure Act (2012)	Permits provision of simpler, cheaper alternatives to individual land titles with the option of upgrading to freehold titles while providing legal pathways for basic service access
	Legislation	Karachi, Pakistan	The Sind Goth-Abad (Housing Scheme) Act (1987) and The Sindh Katchi Abadis Act (1987)	Permits regularisation of settlements, allowing the government to issue land leases to eligible households but does not mandate the provision of utilities (eg, water)[22]
	Legislation	Bandung, Indonesia	Housing and Settlement Areas Law (No. 1/2011)	Permits regularisation of unauthorised developments without evicting residents while also enabling provision of services
Titling-led recognition	Constitutional article and judicial order	Rio de Janeiro, Brazil (Chácara do Catumbi settlement)	Article 183 of Brazil's Federal Constitution allowing for residents' adverse possession claims in the court system	Permits residents occupying land for at least 5 years to acquire collective land titles and register a special shared condominium; a court judgment in the Chácara do Catumbi settlement upheld this position
	Legislation	Peru	Law on the Formalisation of Informal Ownership of Lands Occupied by Informal Possessions, Informal Urban Centres, and Popular Urbanisations (Reglamento del Título I de la Ley N° 28687)	Permits the formalisation of informally held urban land, allowing for issuance of individual titles

Table 2: **Illustrative examples of interventions extending forms of legal recognition to urban informal settlements**

pathways for extending services to historically excluded populations.

Legal recognition as a foundational health determinant

Recognition might improve health and social outcomes via enhanced services or housing quality, alongside complementary pathways such as enhanced governance (figure). Although numerous studies affirm the individual links shown in our model, few have measured health outcomes and thereby mapped recognition's effects across this entire pathway. We identified such studies using a systematic search (appendix pp 4–8). We found evidence from 16 interventions (with findings reported across 23 articles), including seven service-led, six tenure-led, and three titling-led forms of recognition (appendix pp 9–16).

The literature identified through this systematic search, however, has several limitations. Most studies are from Latin America and India, with a few from Africa and southeast Asia. The included studies have evaluated links among forms of recognition and health conditions including gastrointestinal infections, child undernutrition, and child mortality. However, attention to conditions such as chronic diseases, mental health, or adult mortality, among other health and social outcomes, has been scanty. Methodological approaches used in the studies identified through this systematic search were of varied quality and included quasi-experimental and cross-sectional comparisons of settlements that have recognition versus settlements that do not have recognition.

Nevertheless, these studies suggest that legal recognition is a foundational health determinant. We next synthesise key findings of these 23 studies (appendix pp 9–16), following our recognition typology.

Service-led recognition

Cities have used service-led recognition to expand service access while bypassing laborious tenure regularisation processes, generating far-reaching gains such as reductions in waterborne illness, violence, and gender inequality.

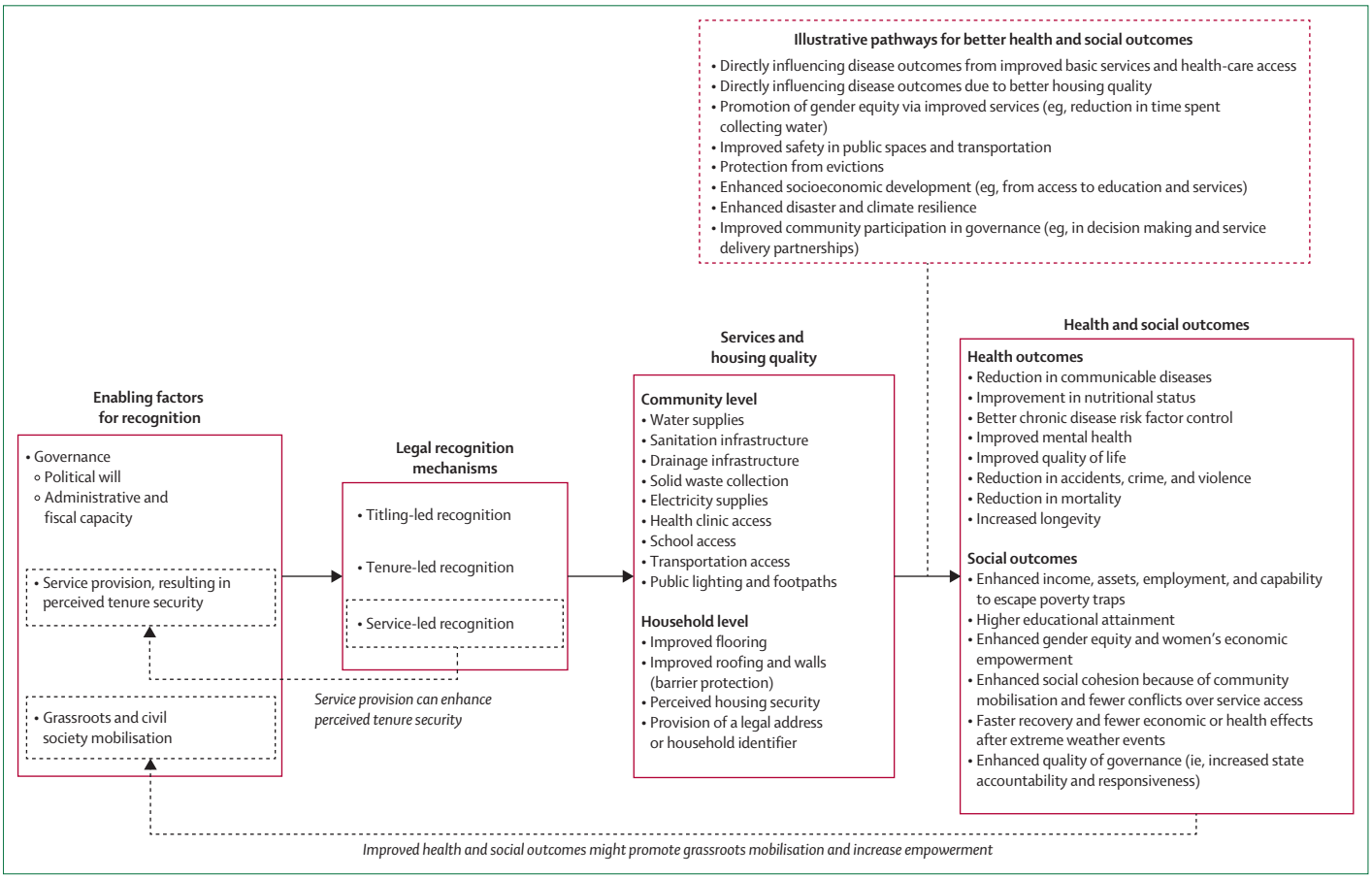

Figure: **Conceptual model depicting the relationship among forms of legal recognition and health outcomes in urban informal settlements**
A simplified model of probable relationships, informed by our literature review and previous conceptual models is presented.[13,15] Details regarding the illustrative pathways to better health and social outcomes are presented in appendix p 17. Given the variable quality of previous studies, further research is needed to affirm these causal links in diverse global settings, as articulated in our research agenda.

In Salvador, Brazil, the Bahia Azul project laid more than 2000 km of sewer pipes during 1996–2004 and connected nearly 300 000 informal households despite the absence of secure tenure. This initiative resulted in 42% to 62% reductions in the prevalence of different parasitic infections and a 43% reduction in diarrhoeal illness incidence.[27,28] In Ahmedabad, India, the Slum Networking Programme used no objection certificates to enable expansion of water, sanitation, and electricity, regardless of the households' legal status. Consequently, beneficiaries' waterborne illness insurance claims declined significantly.[25] The initiative in Ahmedabad also promoted gender equality by issuing utility bills in the names of female household heads and improving women's educational attainment.[26]

In Medellín, Colombia, in the early 2000s, the government developed a gondola-based transit system between the central city and settlements that were previously denied official services. This initiative was designed to overcome administrative hurdles in providing services in informal settlements. Between 2003 and 2008, neighbourhoods serviced by the transit system showed a 66% greater reduction in homicides than unserviced areas, because of enhanced public lighting and footpaths.[29]

Tenure-led recognition

Evidence from India and South Africa suggests that tenure-led recognition influences health outcomes by improving service access and housing quality. In India, notification is a form of recognition that differs across states but usually includes weak tenure security (eg, limited to compensation after displacement). According to national-level data, notification was associated with improved access to water, sanitation, and health clinics.[8] Between 1993 and 2012, notified Indian settlements showed substantial improvements in access to services, whereas non-notified settlements showed no improvement (on average).[8]

Although constrained by cross-sectional designs, studies suggest that notified Indian settlements' improved service access resulted in better health outcomes and health-care access. The enhanced outcomes included improvements in infant mortality, nutrition, immunisation, family planning, antenatal care use, institutional delivery, and breastfeeding practices.[7,30–32] Notification might also influence mental health. In Mumbai's non-notified Kaula Bandar settlement, the prevalence of common mental disorders (eg, depression) was among the highest reported in India.[33] This prevalence was explained by deprivations in service

access and the internalised stigma of living in a non-notified settlement.[33,34]

In South Africa's informal settlements, tenure provision has been linked to enhanced infrastructure, thereby improving quality of life and reducing violence. In Cape Town, the Violence Prevention through Urban Upgrading project issued occupancy certificates allowing households to remain on their plots without land deeds. This project was then able to improve walkways, parks, and other public spaces in Khayelitsha, a settlement where many households do not have tenure security. Households near the project's infrastructure subsequently reported less interpersonal violence.[35] In Johannesburg's Soweto informal settlement, residents with tenure security had significantly higher neighbourhood satisfaction and personal and environmental quality of life scores than residents without tenure security.[36]

Titling-led recognition

We found mixed evidence regarding titling's effects on health, possibly because titling primarily influences health through individual-level pathways (eg, housing investment). In Buenos Aires, Argentina, families living on titled parcels had better housing quality, higher educational attainment, and lower teenage pregnancy rates than families living on untitled land parcels.[37,38] Children younger than 12 years living on titled parcels had higher weight-for-height scores than those living on untitled parcels; however, the two groups did not have a significant difference in height-for-age, which is a better long-term nutrition measure than weight-for-height.[37,38] Nonetheless, the average weight-for-height score in this sample exceeded the international median, indicating that titling might have increased the probability of children becoming overweight or obese. Similarly, a study in Lima, Peru, found that children younger than 6 years in households with longer durations of titling did not have better height-for-age scores but were more likely to be overweight or obese.[39]

In Montevideo, Uruguay, adults in titling-eligible households had lower self-reported hypertension, diabetes, and asthma than adults in titling-ineligible households.[40,41] Children in titling-eligible households also had a lower probability of illness in the previous 30 days than children in titling-ineligible households. Of concern, infant mortality rates were higher in titling-eligible households. The study's author postulated that the higher infant mortality might be attributed to increased housing investments leading to reduced health-care and educational investments.[40,41]

Comparing health implications across different forms of recognition

Evidence indicates that legal recognition improves health and social outcomes; however, the effects might vary by recognition type. Service-led and tenure-led forms of recognition might improve health by promoting community-level services. In contrast, titling-led recognition might have variable health effects because of inadequate community-level interventions and trade offs (eg, health spending might decline in favour of housing investments).[23] Given the limitations in past literature—such as the restricted geographic scope, methodological shortcomings, and narrow set of health outcomes examined—higher-quality research is needed to gain a deeper understanding of recognition's role in promoting health.

An innovative interdisciplinary research agenda

To inform future interventions, we propose a research agenda that maps the connections among legal mechanisms, basic service and housing access, and several health and social outcomes (appendix p 18). We share previous researchers' motivations to articulate pathways between health and tenure security,[13] but we expand this agenda to our broader concept of legal recognition. We highlight service-led recognition because of the insufficient literature examining its legal mechanisms, its greater feasibility, and its potential for expanding community-level services.

Characterising the global landscape of legal mechanisms could inform advocacy around recognition. Future research should compare mechanisms for extending recognition, especially in understudied regions such as Africa and southeast Asia. For service-led recognition, studies have rarely described the precise tools that governments use to bypass tenure-related barriers.[25,27,29,35] Sociolegal research can characterise legal mechanisms and elucidate policy makers' motivations for extending (or not extending) recognition.

Future research should also analyse the potential adverse consequences of legal recognition. These consequences might include gentrification[18] and land commodification[19] (especially from titling); exploitation stemming from political clientelism (eg, demanding political support in exchange for recognition); and generation of disparities from non-inclusion of communities[7] or households.[42] Recognition might be counterproductive for settlements on hazardous sites, where relocation might be the optimal intervention.

Legal recognition is often necessary but insufficient for securing entitlements. For example, even in Mumbai's notified settlements, residents need to navigate bureaucratic hurdles to obtain water connections.[43] Research should examine how civil society organisations use grassroots mobilisation and negotiation tactics to translate legal recognition into improved living conditions.

Research on legal recognition should be paired with data collection on service access, housing quality, and health and social outcomes. Innovations in measuring access to basic services in informal settlements could uncover the effects of different types of recognition while providing residents with data to promote government accountability. There is a need to incorporate less-studied health and social outcomes, such as chronic diseases (including mental health), gender equality, and climate resilience.

Future work should also include qualitative and mixed-methods research to understand mechanisms,

prospective studies to capture longitudinal impacts, and more robust approaches to establishing causal relationships (eg, propensity scores). Research should consider feedback loops: legal exclusion might undermine residents' social cohesion and self-efficacy,[34] thereby reducing their political voice. Conversely, by improving living conditions, legal recognition might enhance gender equality, social cohesion, and participation in governance. Across all initiatives, coproduced research involving residents and civil society organisations can help to ensure that communities are central to knowledge production.

Conclusion

The sociologist Henri Lefebvre argued that all urban residents should have a right to the city, by which he meant the right to access city resources and public spaces.[44] This right to the city—closely resonating with our understanding of legal recognition—is not just fundamental for social and political participation. For residents of informal settlements, legal recognition is also essential to promote health and social outcomes. From the perspective of social determinants of health, legal recognition is one of the most pivotal "causes of the causes" shaping access to services that are foundational health determinants.[12]

We therefore encourage the public health community, interdisciplinary scholars, and global stakeholders to adopt an expansive understanding of legal recognition, moving beyond a narrow focus on tenure and titling. Our agenda seeks to catalyse research on legal interventions (especially service-led recognition) to illuminate their role in promoting health, while examining factors that promote recognition and identifying adverse consequences of recognition. Implementing these legal mechanisms widely—along with grassroots advocacy to claim the benefits of legal recognition—could provide new pathways towards guaranteeing rights and entitlements for all city residents.

Contributors

RS, AS, SO, and SD conceptualised the Viewpoint, building on ideas and concepts refined during discussions with AP-D, MK, and ZL. AS, RS, SD, and SO conducted the systematic search, literature review, and data curation and wrote the original draft of the manuscript. AP-D, MK, and ZL reviewed the original draft and revised it critically. RS and SD created the figures with input from AS and SO. SD, RS, AS, and SO facilitated acquisition of funding to support meetings that led to the development of this manuscript. RS and AS accessed and verified the data. All authors had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Declaration of interests

We declare no competing interests.

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