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Coverage Without Capability: Understanding the Disparity Between Urban and Rural Low-Income Populations in Universal Healthcare Reform

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Abstract. Despite the coverage of Universal Healthcare (UHC) reforms being globally expanded and out-of-pocket costs substantively lowered, disparities between urban and rural populations persist, particularly for those with low income. This paper examines the mechanisms through which UHC reforms have failed to close this gap. Drawing on Amartya Sen's Capability Approach and Jennifer Ruger's Health Capability Paradigm, it evaluates equity as the substantive capability to achieve health outcomes, not formal entitlement. The 3A Framework and Marmot's Social Determinants of Health specify the conversion factors that determine whether coverage becomes actual capability to access medical resources and services. Cross-country evidence shows financial protection improves access to medical resources but not treatment outcomes. The binding constraint diverges by setting: social infrastructure in cities, physical infrastructure in rural areas. A comparative study between two contrasting cases of the hyper-dense, public transit-dependent, metropolitan Shenzhen and the mountainous, formerly impoverished rural Chishui County, Guizhou confirms that instead of financial coverage, spatial accessibility is the decisive conversion factor that produces proximity without access in Shenzhen and nominal equity without substantive medical abundance in Chishui.

Keywords: Universal healthcare (UHC) Reforms, Urban-rural Disparities, Health Capability, Spatial Accessibility, substantive Equity

1. Introduction

Over the past several decades, state-led healthcare reforms across emerging and developed economies have prioritized financial protection, expanding insurance coverage and reducing out-of-pocket costs for historically marginalized populations. Yet a persistent paradox continues to challenge modern health systems: despite the nominal removal of financial barriers, profound inequality in actual treatment outcomes remains. This divergence is particularly stark when comparing low-income populations living in urban centers with those in rural areas. While low-income urban residents often need to navigate systemic fragmentation, information gaps, and transit deficits within hyper-dense medical environments, rural populations face geographic isolation, severe workforce shortages, and crumbling local primary care systems.

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This study examines this structural divergence by addressing a critical research question: To what extent, and through what mechanisms, have universal healthcare reforms reduced disparities in treatment outcomes between urban and rural low-income populations?

Reforms of Universal Health Coverage (UHC) have often failed to fulfill the mission of medical equity through the theoretical perspective of Amartya Sen's Capability Approach [1] and Jennifer Prah Ruger's Health Capability Paradigm [2]. Rather than evaluating healthcare reform solely through input metrics, this theoretical framework evaluates justice in health through individuals' substantive freedoms, including their actual, real-world capability to achieve and maintain health outcomes. Within this paradigm, healthcare resources are not purposes in themselves; they are merely institutional resource inputs that require specific social, environmental, and institutional "conversion factors" to translate into meaningful health outcomes. The aforementioned research question can thus be reframed as whether health coverage converts into actual capacity to be healthy in reality for urban and rural low-income populations, and the barriers of conversion for each group.

To operationalize conversion factors across spatial contexts, this paper incorporates the 3A Framework together with Sir Michael Marmot's Social Determinants of Health (SDOH) [3]. The 3A Framework evaluates Availability (the presence of qualified personnel and infrastructure), Accessibility (physical, geographic, temporal, and informational reach), and Affordability (financial protection against catastrophic health expenditure). By mapping these dimensions against the structural realities of urban "time-poverty" and transit barriers versus rural "medical deserts" and transport deficits, this study conceptualizes how equal financial entitlement under UHC can yield drastically unequal clinical success.

This conceptual framework is applied to review the empirical literature and conduct a comparative study between two contrasting cases of the hyper-dense, public transit-dependent, metropolitan Shenzhen and the mountainous, formerly impoverished rural Chishui County, Guizhou. The comparison shows that spatial accessibility serves as the decisive conversion factor that determines the success of treatment outcomes. In general, this study finds that UHC reforms have mitigated outcome disparities unevenly. While financial coverage lowers the initial cost of entry, reforms fail to equalize clinical outcomes because they systematically address formal financial access while neglecting the underlying physical infrastructure required in rural areas and the social infrastructure required in urban centers.

2. Theoretical framework

The theoretical framework in this paper narrows from a general approach of understanding justice down to specific mechanisms of achieving it. Sen's capability approach provides a foundational perspective for evaluating human well-being and social justice, focusing not on resources or utilities but on people's real freedoms or capabilities to live the lives they desire [1]. According to Sen, equality should be assessed in terms of individuals'opportunities to achieve health, education, and participation rather than the mere distribution of goods or services. Applied to health policy, this approach suggests that universal healthcare reforms should not be measured solely by coverage expansion or financial access but by the extent to which these reforms enhance people's actual ability to achieve good health outcomes.

Ruger formally introduces Sen's framework into the domain of public health and develops her health capability paradigm, arguing that equitable health systems must aim to improve both achieved health states and the ability to make meaningful health choices. For Ruger, justice in health is realized when individuals possess both the internal and external capabilities to attain and maintain health, a concept especially relevant for comparing treatment outcomes between rural and urban

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populations, where access to services, infrastructure, and socioeconomic conditions differ significantly [2].

While Sen's capability approach broadly establishes the moral and theoretical foundation for assessing justice and disparity, Ruger's health capability theory operationalizes these ideas specifically and focuses on how institutional arrangements, such as healthcare reforms, translate these freedoms into concrete health opportunities and outcomes. According to her, disparities in treatment outcomes should be understood as differences in realized health capabilities rather than as mere statistical inequalities of resource distribution. Building on Sen's general emphasis on what individuals can be and do, Ruger highlights how health systems can enable or constrain these capabilities. This development is critical for analyzing whether UHC reforms genuinely reduce disparities across urban and rural populations, whose capabilities may be determined by diverse social determinants, best answered by the 3A framework and Marmot's SDOH approach.

The 3A framework in healthcare refers to availability, accessibility, and affordability, three conditions that determine whether people can actually access and benefit from health services when they need them. Availability involves the presence and adequacy of health services, including clinics, hospitals, skilled personnel, medicines, and medical equipment. Despite changes in facility expansion in recent years, a gap of quality availability persists between rural and urban areas: urban cities have high-level hospitals and a concentration of medical specialists, while rural areas rely more on primary clinics and often suffer from a shortage of qualified physicians.

Accessibility is the ability to actually reach and use health services that are available, which requires reasonable geographical travel distance and waiting time, information access, and disability-friendly facilities. Long travel and wait times may discourage patients from making regular visits or from making them at all when opportunity costs are too high. Informational barriers involve comparatively lower health literacy and preventive awareness to be able to recognize symptoms early, seek care, and navigate the health system. As a result, healthcare resources are less likely to be used at the right time despite proximity. Barriers in this dimension differ by setting. Urban areas particularly struggle against spatial, temporal, and informational barriers. Sparsely located clinics and medical centers often mean long physical distances between patients and secondary or tertiary hospitals, requiring long travel times and high transport costs and lowering practical accessibility despite the technical existence of such services. In addition, patients located in rural areas have higher opportunity costs of missing work, caregiving, or other daily responsibilities to seek medical care.

Finally, affordability means the ability to pay without causing financial hardship. A core indicator is catastrophic health expenditure (CHE), out-of-pocket healthcare spending so large relative to a household's capacity to pay that it threatens basic living standards, such as food, housing, or education. Rural households possess lower savings and weaker financial resilience, as well as higher vulnerability to income shocks. Having the same reimbursement rates as urban households does not guarantee the same level of financial protection, because households with lower cash flow and fewer reserves still face a higher risk of delaying care, borrowing money, selling assets, or forgoing treatment altogether.

The 3A framework demonstrates that healthcare must also be reachable and financially manageable for patients to be truly effective. Availability, accessibility, and affordability need to be achieved together to bring more equitable healthcare, which includes earlier treatment and better outcomes across the population.

Current UHC reforms primarily target financial access; however, disparities in treatment outcomes often persist between urban and rural low-income populations, as explained by Marmot's

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framework of Social Determinants of Health (SDOH) [3]. For instance, economic stability remains a central pillar, as even with subsidized care, the "hidden costs" of recovery, such as lost wages, specialized nutrition, and medical supplies, disproportionately hinder low-income individuals. Geography acts as a physical barrier that reforms frequently fail to address, as rural medical deserts delay interventions and lower survival rates compared to areas with higher provider density. Healthcare access is also shaped by the distribution of quality, which is affected by factors such as brain drain. Urban centers attract specialists, leaving rural areas dependent on overstretched general practitioners. This is further complicated by social and community contexts, such as health literacy and unspoken provider bias. Even under a universal coverage mandate, a patient's ability to overcome cultural stigmas tethered to their socioeconomic status or navigate complex bureaucratic systems decides whether a patient in an isolated village or a crowded city achieves the same clinical success.

Put together, the difference in outcomes between urban and rural low-income populations under universal healthcare can be hypothesized through the lens of resource density versus resource accessibility. In urban centers, the challenge is rarely the lack of medical infrastructure, but rather the socioeconomic friction within the system. Low-income urban residents often face systemic fragmentation and "time-poverty". Despite living in proximity to world-class facilities, they navigate overstretched public clinics characterized by long wait times and high provider turnover. For these patients, the "extent" of reform success is limited by factors like environmental pollution, high-stress living conditions, and the lack of social safety nets, which can counteract the clinical benefits of medical treatment. The urban hurdle is a matter of navigating a dense but congested administration where implicit bias and systemic restrictions often prioritize efficiency over personalized care.

In contrast, rural disparities are primarily driven by spatial and logistical isolation. UHC is futile if physical points of care remain far away. At the same time, rural low-income populations suffer from the scarcity of specialists and advanced diagnostic equipment, which leads to late-stage diagnoses and poor management of chronic conditions. The critical barrier here is the transportation-health link. The financial and physical burden of traveling to urban hubs for specialized treatment often leads patients to put off necessary care. While an urban patient's outcome might be hindered by environmental quality, a rural patient's outcome is dictated by a lack of proximity. Therefore, healthcare reforms likely reduce the cost of entry for both groups, but fail to equalize outcomes because they fail to address the urban struggle with social infrastructure as well as the rural struggle with physical infrastructure.

3. Empirical findings in extant research

Evidence from different countries shows that expanding insurance coverage and lowering out-of-pocket costs tends to increase healthcare use, but the impact on actual health outcomes, like survival or hospitalization rates, is less clear and often inconsistent.

Findings are mixed on the impact of reforms addressing financial challenges. In India, insurance expansion increased inpatient utilization among low-income groups, suggesting improved access. Yet it raised concerns about people relying too much on hospital care because outpatient services were still limited [4]. Mexico's reforms helped reduce both catastrophic and outpatient spending, thereby supporting more consistent care and potentially improving long-term health outcomes [5], although lower financial barriers do not guarantee better health outcomes. In Kazakhstan, reforms reduced catastrophic spending in the short term but did little to lift poorer households out of poverty, confirming the limited effects on broader health conditions [6]. Similarly, in Iran, while fewer people were pushed into poverty after paying for healthcare, there was little change in catastrophic

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spending overall [7]. Across these four cases, financial protection improves medical use and spending but not reliably the actual health capability and outcomes, for which improvements in service quality and access are also necessary. This is correctly predicted by the capability framework, as these reforms only address one of the three As.

Yet evidence on urban and rural areas diverges in the specific ways the theory anticipates. In urban low-income settings, gaps in outcomes persist due to the conversion of proximity into timely use, despite the availability of services. Data from urban slums in Pakistan show that only 54% of children are fully immunized, while 14% receive no vaccines at all, highlighting major gaps in preventive care [8]. These issues are driven less by physical access and more by social factors such as low health literacy, gender inequality, and limited decision-making power. Although urban populations generally have higher health literacy than rural ones (16.92% vs. 8.09% in central China), poorer urban groups still face information gaps that affect whether they seek care on time or follow treatment properly [9]. As a result, even when healthcare becomes more affordable, outcomes remain uneven because not everyone can make full use of available services. Quality of care is another key issue. Research in low-income settings shows that healthcare providers often deliver care below the standard of what they actually know, with gaps in diagnosis and treatment [10].

In rural areas, by contrast, structural challenges often make it even harder to improve outcomes. The most important constraint is close to the "entitlement without capability" described by Ruger. In rural China, for example, use of village clinics dropped by 44% between 2011 and 2018, while more people turned to larger hospitals or self-treatment. Both trends are linked to delays in care and potentially worse outcomes [11]. This indicates that some reforms may unintentionally weaken local primary care systems, reducing early treatment and increasing hospital dependence.

Outcome gaps are also closely tied to structural barriers like workforce shortages, distance, and weak infrastructure. For example, in the United States, rural populations face higher mortality rates due to a mix of poverty, aging populations, and limited access to services [12]. Travel distance is a major factor in rural healthcare. Studies show that even a 30-minute travel time can reduce healthcare use [13]. In China, many patients travel over an hour for inpatient care, which delays treatment and worsens outcomes [9]. These delays often lead to more severe conditions and higher hospitalization rates. Workforce shortages make the problem worse. In Japan, limits on physicians' working hours are expected to deepen shortages in rural areas, especially in fields like surgery and emergency care, reducing access to timely treatment [14]. In other countries, rural hospital closures and a lack of specialists similarly limit access to critical care, affecting survival rates [15].

Beyond access, system-level issues also matter. Rural healthcare systems often struggle with staffing, resources, and infrastructure, which affects the consistency and quality of care [16]. Communication gaps and cultural barriers further reduce how effective care can be [17].

The cross-country literature on reform impact and health equity establishes that the urban-rural divergence is a reality that involves different dimensions: while the low-income population in urban areas needs more intervention on how they can overcome health literacy and information gaps to convert available medical resources into effective use, their counterparts in rural areas suffer more from persistent challenges of service availability and consequently lack accessibility. These point to important implications for UHC reforms, which currently focus on financial protection. Extant research also reveals the gap in fragmented comparisons covering different countries, health systems, and reform designs. To fill this gap, case studies are conducted on one metropolitan case and one rural case, both drawn from China's own universal coverage expansion, to test the conversion-factor hypothesis against a controlled comparison.

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4. Case studies

This study employs a comparative analysis of Shenzhen, a hyper-growth metropolitan center, and Chishui County, Guizhou Province, a formerly national-level impoverished rural jurisdiction, to examine systemic incongruities in healthcare provision across two structurally divergent spatial contexts. Drawing on the 3A-Capability framework, this study uses spatial accessibility as the core entry point, exploring how spatial accessibility serves as a critical conversion factor shaping whether nominal healthcare resources translate into substantive health-generating capabilities for vulnerable populations.

4.1. Urban health reform case: Shenzhen's spatial disparity

The urban reform paradigm often presumes that pooling structural and economic wealth automatically translates into equitable health outcomes, yet empirical evidence reveals a stark intra-city inequality. Tao et al. applied a multi-modal two-step floating catchment area (2SFCA) method to estimate actual travel times via online map APIs to critique traditional single-modal models in Shenzhen. While the average baseline supply is 1.44 physicians per 1,000 people, this aggregate masks significant internal disparities [18]. The study distinguishes car-mode and transit-mode cohorts and discovers that multi-modal accessibility scores fluctuate widely from 0.00066 to 0.00189, a significantly wider variance than traditional single-car-mode models capture. This divergence is particularly informative for the target population of this paper: the low-income, public transit-dependent subgroup is structurally disadvantaged in accessing medical services compared to car owners.

The transit-mode deficit is the core mechanism of spatial injustice across the metropolitan region. While central districts like Luohu and Futian benefit from hyper-dense hospital hubs and extensive infrastructure, peripheral sub-districts in Dapeng District and northern or western Bao'an District face rock-bottom accessibility and become localized "medical deserts", even if they belong to the same city-level healthcare system. This deficit accounts for the low conversion factor predicted by the theoretical framework: while urban healthcare investments have improved overall physical asset counts, they have failed to equalize treatment capabilities because low-income cohorts cannot convert this supply into actual care without equitable public transport connectivity.

4.2. Rural health reform case: Chishui county's structural barriers

The rural case of Chishui presents a context where geographic isolation and demographic shifts act as a persistent "tax" that discounts the practical value of universal healthcare investments. Chen et al. evaluated how the state-led Targeted Poverty Reduction Project has transformed spatial access by tracking population demand, healthcare resourcing, and transportation infrastructure [19]. The enhanced two-step floating catchment area (E2SFCA) model and chain substitution analysis across village-level units to quantify shifts in accessibility confirm that state-backed expansion of medical supply delivered universally positive gains across all villages, marked by substantial growth in clinics, hospital beds, and frontline health professionals. Despite uniform growth in formal medical resources, this supply expansion failed to generate equitable substantive healthcare capabilities for rural residents.

The reason similarly lies in the conversion factors predicted by Sen's capability framework, which mediates whether nominal resources translate into tangible health functionings, and shapes uneven, village-divergent accessibility outcomes. Rural demographic restructuring in Chishui,

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specifically population hollowing from out-migration and widespread population aging, functions as a critical individual conversion factor. These personal demographic traits erode baseline spatial healthcare capacity in remote villages, as shrinking, aged resident groups cannot fully convert newly added medical facilities into usable health and wellbeing. Limited private vehicle ownership and underdeveloped rural public transit networks operate as environmental and social conversion factors. These barriers block low-income rural residents from getting over geographic gaps between residential settlements and medical service hubs, even when formal healthcare supply has increased locally.

The study also identifies heterogeneous marginal returns to two core policy interventions due to the above conversion factors. Road network upgrades in geographically isolated villages deliver dramatic accessibility improvements by mitigating adverse environmental conversion constraints. By contrast, constructing new clinics in villages with undeveloped transport connectivity yields sharply diminishing returns, as environmental barriers neutralize expanded supply. Transportation infrastructure expansion thus induces a powerful marginal effect: building a road in an isolated area dramatically boosts accessibility, whereas adding clinics to villages with poorly established connectivity delivers diminishing returns. This underscores that without carefully optimizing the actual travel time duration between remote homesteads, transport hubs, and clinical delivery points, nominal healthcare equality remains an "empty capability" that fails to remove the structural barrier of geographic isolation.

4.3. Cross-case comparison: proximity vs. provision

If these findings are synthesized to address the core research question, it becomes clear that UHC reforms have mitigated disparities unevenly, shaped by distinct local conversion mechanisms. In urban contexts like Shenzhen, low-income communities face a reality of proximity without substantive access or recognition. While they reside physically close to advanced medical institutions, their actual capacity to utilize care is constrained by multi-modal transportation barriers and compounded by hidden institutional exclusions, such as in insurance portability and informational obstacles faced by internal migrants. In rural settings, by contrast, low-income populations experience nominal equality without substantive equality. Although state policies have successfully standardized formal healthcare provision through village-level clinic construction, deep geographic isolation, fragmented transportation infrastructure, and evolving demographic needs in rural settlements continue to be systemic barriers to meaningful access. To meaningfully bridge this capability gap, universal healthcare reforms cannot depend solely on financial investment or physical infrastructure expansion. Urban planning must intentionally integrate public transit networks to serve major peripheral industrial and residential zones, while rural healthcare strategies must prioritize the coordination of transportation hubs with the dynamic and shifting settlement patterns of village populations.

5. Conclusion

This study evaluated the extent to which universal healthcare reforms have successfully mitigated disparities in treatment outcomes for low-income populations across urban and rural divides, and what accounts for the failure among each group. Moving beyond conventional, resource-centric metrics of health policy evaluation, this research integrated Amartya Sen's Capability Approach, Jennifer Prah Ruger's Health Capability Paradigm, and the 3A Framework to demonstrate that expanding insurance mandates and subsidizing care costs are necessary but fundamentally

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insufficient conditions for health equity. Universal health coverage reduces the financial cost of entry, but it fails to equalize substantive clinical outcomes because it neglects the divergent social and physical conversion factors that dictate real-world healthcare utilization. Ultimately, universal healthcare cannot achieve justice in health through financial mechanisms alone. True health equity requires designing systems that recognize healthcare as an actionable capability, ensuring that every individual, whether in urban or rural environments, possesses the real freedom to realize their fullest health potential.

References

[1] Sen, A. (1999). *Development as freedom*. Oxford University Press.

[2] Prah Ruger, J. (2010). Health capability: Conceptualization and operationalization. *American Journal of Public Health, 100*(1), 41-49.

[3] Marmot, M. (2005). Social determinants of health inequalities. *The Lancet, 365*(9464), 1099-1104.

[4] Sriram, S., & Khan, M. M. (2020). Effect of health insurance program for the poor on out-of-pocket inpatient care cost in India: Evidence from a nationally representative cross-sectional survey. *BMC Health Services Research, 20*(1), 839.

[5] Galárraga, O., Sosa-Rubí, S. G., Salinas-Rodríguez, A., & Sesma-Vázquez, S. (2010). Health insurance for the poor: Impact on catastrophic and out-of-pocket health expenditures in Mexico. *The European Journal of Health Economics, 11*(5), 437-447.

[6] Sarsenbayeva, A., & Alpysbayeva, D. (2025). Catastrophic health expenditure during healthcare financing reform: Evidence from Kazakhstan. *Social Science & Medicine, 371*, 117824.

[7] Kheibari, M. J., Esmaeili, R., & Kazemian, M. (2019). Impacts of health reform plan in Iran on health payments distributions and catastrophic expenditure. *Iranian Journal of Public Health, 48*(10), 1861.

[8] Ahmed, K. A., Grundy, J., Hashmat, L., Ahmed, I., Farrukh, S., Bersonda, D., ... & Banskota, H. K. (2022). An analysis of the gender and social determinants of health in urban poor areas of the most populated cities of Pakistan. *International Journal for Equity in Health, 21*(1), 52.

[9] Wang, Q., Jiang, Q., Yang, Y., & Pan, J. (2022). The burden of travel for care and its influencing factors in China: An inpatient-based study of travel time. *Journal of Transport & Health, 25*, 101353.

[10] Das, J., Hammer, J., & Leonard, K. (2008). The quality of medical advice in low-income countries. *Journal of Economic Perspectives, 22*(2), 93-114.

[11] Chen, Y., Sylvia, S., Wu, P., & Yi, H. (2022). Explaining the declining utilization of village clinics in rural China over time: A decomposition approach. *Social Science & Medicine, 301*, 114978.

[12] Iglehart, J. K. (2018). The challenging quest to improve rural health care. *New England Journal of Medicine, 378*(5), 473-479.

[13] Mseke, E. P., Jessup, B., & Barnett, T. (2024). Impact of distance and/or travel time on healthcare service access in rural and remote areas: A scoping review. *Journal of Transport & Health, 37*, 101819.

[14] Numata, Y., & Matsumoto, M. (2024). Labor shortage of physicians in rural areas and surgical specialties caused by Work Style Reform Policies of the Japanese government: A quantitative simulation analysis. *Journal of Rural Medicine, 19*(3), 166-173.

[15] Schaefer, S. L., & Ibrahim, A. M. (2025). Overcoming geographic barriers: Surgical care in rural populations. *Clinics in Colon and Rectal Surgery, 38*(1), 041-048.

[16] Babawarun, O., Okolo, C. A., Arowoogun, J. O., Adeniyi, A. O., & Chidi, R. (2024). Healthcare managerial challenges in rural and underserved areas: A review. *World Journal of Biology Pharmacy and Health Sciences, 17*(2), 323-330.

[17] Coombs, N. C., Campbell, D. G., & Caringi, J. (2022). A qualitative study of rural healthcare providers' views of social, cultural, and programmatic barriers to healthcare access. *BMC Health Services Research, 22*(1), 438.

[18] Tao, Z., Yao, Z., Kong, H., Duan, F., & Li, G. (2018). Spatial accessibility to healthcare services in Shenzhen, China: Improving the multi-modal two-step floating catchment area method by estimating travel time via online map APIs. *BMC Health Services Research, 18*(1), 345.

[19] Chen, L., Chen, T., Lan, T., Chen, C., & Pan, J. (2023). The contributions of population distribution, healthcare resourcing, and transportation infrastructure to spatial accessibility of health care. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing, 60*, 00469580221146041.