

Moving long-term care insurance upstream: A geriatric-syndrome-oriented framework for healthy aging in China

Xiqi Hu¹, Xiaoli Wu², Ya-nan Ma¹, Ying Xia^{1,2,*}

¹Department of Neurosurgery, Integrated Neuroscience Center, Geriatric Hospital of Hainan, Haikou, China;

²Department of Neurosurgery, Haikou Affiliated Hospital of Central South University Xiangya School of Medicine, Haikou, China.

SUMMARY: Long-term care insurance (LTCI) is commonly understood as a social insurance mechanism that compensates care-related costs after disability has occurred. This compensation function remains essential, but it is insufficient in the context of rapid population aging, multimorbidity, cognitive impairment, and long-term family caregiving burden. In older adults, disability often emerges from the cumulative interaction of geriatric syndromes, including frailty, recurrent falls, cognitive decline, malnutrition, depressive symptoms, pressure injuries, together with multimorbidity, environmental vulnerability, and caregiver burden. This article argues that the next stage of LTCI reform should not simply expand coverage or reimbursement, but should incorporate earlier identification of functional risk, comprehensive geriatric assessment, continuous care, caregiver support, and functional outcome evaluation. Existing quasi-experimental studies from China suggest that current LTCI pilots are associated with partial benefits in cognitive and psychological outcomes, changes in healthcare utilization including reduced hospitalization in some studies, modest improvements in health-related quality of life, and favorable frailty-related outcomes. However, these studies do not establish the effectiveness or added value of a geriatric-syndrome-oriented LTCI model. We therefore distinguish between the current evidence base and a proposed reform model, outline potential pathways linking LTCI to healthy aging, and propose operational priorities for future evaluation.

Keywords: intrinsic capacity, caregiver burden, frailty, cognitive impairment, dementia care, CHARLS

1. Why long-term care insurance (LTCI) should target geriatric syndromes

The primary rationale for LTCI is economic protection. Long-term disability generates persistent, unpredictable, and often catastrophic costs for families. Recent work based on the China Health and Retirement Longitudinal Study (CHARLS) has shown that conventional measures of catastrophic health expenditure may underestimate the real burden borne by older adults with cognitive or physical functional limitations when formal long-term care costs and informal caregiving costs are not included (1). This finding supports LTCI as a necessary social protection instrument.

However, a purely compensatory interpretation of LTCI is clinically incomplete. Disability in later life is rarely a sudden or static state. The World Health Organization has emphasized that complex health states in older age often arise from multiple interacting factors, including frailty, falls, delirium, urinary incontinence, and pressure injuries (2). If LTCI intervenes only after severe disability has occurred, it remains largely an

ex post payment system. If it can identify declining functional capacity earlier and support care continuity, it may become part of the infrastructure for healthy aging. In this context, healthy aging should not be reduced to fewer hospitalizations or delayed disability alone. It also includes maintaining functional ability, autonomy, social participation, and the possibility of aging in place despite chronic disease and declining intrinsic capacity.

This question is timely in China, where LTCI is moving from local pilots toward broader institutionalization (3). The key policy issue is not whether LTCI should retain its compensation function; it must. The question is whether the system can add a second function: identifying modifiable geriatric risks before disability becomes irreversible. LTCI is not expected to replace medical care, rehabilitation, or public health services. Its distinctive role lies in its longitudinal relationship with functional dependency, daily care needs, and family caregiving. While medical services are often episodic and disease-oriented, LTCI is positioned around sustained functional support across home, community, and institutional settings. This makes LTCI a potentially suitable financing

and coordination platform for linking geriatric risk identification with long-term functional maintenance. International experience supports this broader view. Japan's community-based integrated care system links medical care, long-term care, preventive care, and daily living support within local community settings, illustrating that LTCI can be embedded in service organization rather than limited to reimbursement (4).

A useful clinical distinction is between disease-driven disability and syndrome-driven disability. Disease-driven disability refers to persistent functional limitation after a specific disease or injury, such as residual motor impairment after stroke, advanced Parkinsonian disability, or functional decline after hip fracture. These conditions require disease-specific treatment, rehabilitation, and secondary prevention. Syndrome-driven disability, in contrast, results from multifactorial states not attributable to a single disease. Frailty, recurrent falls, malnutrition, depressive symptoms, cognitive impairment, dysphagia, pain, and caregiver exhaustion may interact with multimorbidity, polypharmacy, unsafe environments, and weak social support to reduce functional reserve. In this article, a geriatric-syndrome-oriented LTCI model refers to an LTCI design that uses geriatric syndromes and intrinsic capacity decline as early indicators of functional vulnerability, and links risk assessment, care planning, service packages, caregiver support, and outcome evaluation around the goal of maintaining functional ability.

In real-world geriatrics, these two pathways overlap. A specific disease may trigger functional decline, but frailty, nutrition, cognition, and caregiver capacity often determine whether recovery is sustained. This is the clinical basis for moving LTCI upstream. Frailty assessment research in Japan highlights the importance of early identification for preventing disability and long-term care dependence (5). Japan's dementia strategy similarly emphasizes early screening, memory clinics, community-based integrated care, and coordination among medical care, long-term care, and family support (6). Intervention trials also suggest that multicomponent programs incorporating physical activity and nutritional counseling can reduce mobility disability among older adults with physical frailty and sarcopenia (7). These findings do not prove that LTCI-funded geriatric interventions are effective, but they support the plausibility of targeting a pre-disability intervention window.

2. What current evidence shows and what it does not show

Evidence from China is important but should be interpreted carefully. Existing studies mainly evaluate current LTCI pilots, which remain largely eligibility- and compensation-oriented. They therefore provide evidence on the effects of existing models, not direct evidence that

a geriatric-syndrome-oriented model is superior.

Several quasi-experimental studies using CHARLS data suggest partial health-related benefits. Lin *et al.* found that LTCI implementation was associated with lower frailty levels among older adult beneficiaries and with spillover effects among spouses (8). Ye *et al.* reported improvements in self-rated health and cognitive function, especially among older adults with functional or cognitive impairment (9). Chen and Zhao found reductions in depressive symptoms and improvements in subjective well-being, as well as spillover effects on caregivers' physical health and social participation (10). The reported reduction in depressive symptoms should nevertheless be interpreted as modest in clinical terms, even when statistically significant.

Findings on healthcare utilization are directionally suggestive but not uniform. Yang *et al.* reported statistically significant but modest reductions in hospitalization frequency and inpatient expenditure, with no significant effect on outpatient utilization (11). Jiang *et al.* found reductions in outpatient visits and hospitalization, but also noted that disability status and rural residence weakened policy effects (12). These results may reflect competing mechanisms: formal care may reduce avoidable hospitalization, while reduced financial barriers may also release previously unmet medical needs.

Evidence on quality of life and equity further underscores the need for cautious interpretation. Lin *et al.* reported modest improvements in health-related quality of life after LTCI reform (13). Tian *et al.* found that LTCI improved average self-rated health, but its measured contribution to income-related health inequality was small and positive (14). This does not justify a strong claim that LTCI substantially widens inequity, but it does suggest that system expansion without equity safeguards may incrementally reinforce existing disparities.

The limitations of this evidence are substantial. CHARLS does not adequately capture LTCI service processes, service intensity, care quality, or whether an individual actually received specific services. Clinical geriatric outcomes such as gait speed, grip strength, fall events, pressure injuries, delirium, clinically diagnosed dementia, or caregiver burden are limited or absent. Pilot cities were not randomly selected, and local policy designs vary. Thus, current evidence supports a two-level argument: existing LTCI pilots may generate partial health-related benefits; a geriatric-syndrome-oriented model may plausibly amplify these benefits, but this remains a theoretical and policy inference requiring direct empirical testing.

3. A proposed conceptual framework

Figure 1 summarizes a proposed conceptual framework rather than an established causal mechanism. The framework distinguishes five potential pathways with different levels of evidentiary support.

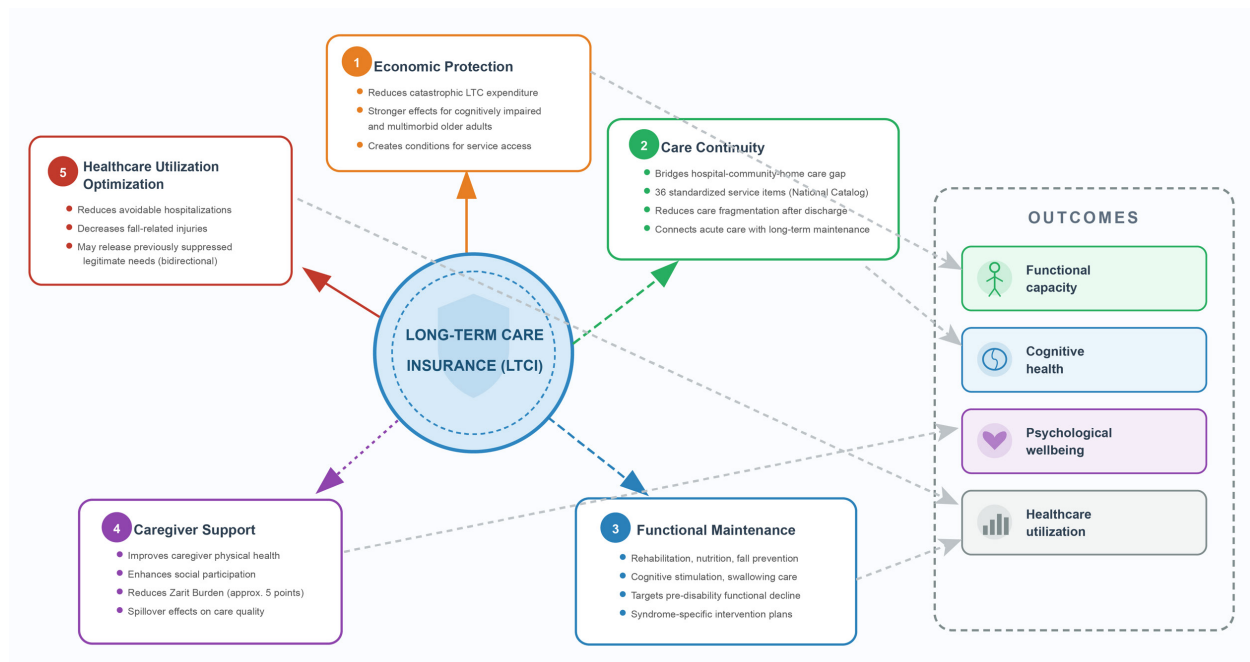


Figure 1. Proposed conceptual framework linking long-term care insurance to geriatric-syndrome-oriented reform and healthy aging outcomes. LTCI may influence healthy aging through five potential pathways: economic protection, care continuity, functional maintenance, caregiver support, and appropriate healthcare utilization. These pathways differ in evidentiary strength, ranging from quasi-experimental evidence to policy-based or theoretically plausible inference. Dashed arrows indicate hypothesized or variably supported relationships rather than established causal mechanisms.

First, economic protection is supported by quasi-experimental evidence. By reducing catastrophic health and care expenditure, LTCI may create conditions for obtaining formal care, maintaining rehabilitation, improving nutrition, and purchasing assistive devices (1). The downstream link from financial protection to functional recovery, however, remains inferential.

Second, care continuity is policy-based and theoretically plausible. China's national LTCI service item catalog has standardized 36 service items, providing a common service vocabulary for home, community, and institutional long-term care. Whether this catalog can support effective transitional care after hospital discharge remains to be empirically evaluated (15). Yet direct evidence that LTCI-funded services achieve continuous care is limited.

Third, functional maintenance would distinguish a geriatric-syndrome-oriented LTCI model from a conventional compensation model. The WHO integrated care framework emphasizes identifying declines in intrinsic capacity and developing individualized care pathways (16). LTCI could potentially support packages for post-stroke swallowing and mobility care, dementia-related behavioral management and cognitive stimulation, fall-risk assessment, and home modification. This pathway is supported indirectly by geriatric intervention trials, but LTCI-specific evidence remains insufficient.

Fourth, caregiver support is partially supported by spillover evidence and caregiver-intervention research.

Family caregivers are central to long-term care in China. LTCI may reduce caregiver burden by expanding formal services, but training and respite support are also needed. A meta-analysis of caregiver interventions suggests that professional support can reduce caregiver burden (17), but the LTCI-specific caregiver-mediated pathway remains unconfirmed.

Fifth, appropriate healthcare utilization is a downstream outcome, not the primary goal. Reduced hospitalization may represent fewer avoidable complications, but lower utilization should not be equated with better policy performance if necessary care is also reduced. Evaluation should therefore distinguish low-value utilization from appropriate unmet need.

4. Operational priorities for reform

The first priority is a two-level assessment model. Current LTCI eligibility assessment is primarily designed to determine severity of long-term functional dependency, with core domains including basic activities of daily living, cognition, and sensory-communication capacity. This eligibility-oriented assessment should remain the basis for determining severe-disability coverage. However, because it is not designed to capture modifiable geriatric risks before severe dependency develops, it should be complemented by rapid screening for high-priority geriatric risks. The first level could be performed by trained assessors in community or primary care settings and include ADL/IADL, brief cognitive

screening, fall history, nutritional risk, gait speed or timed up-and-go performance, depressive symptoms, swallowing risk, and caregiver burden. The goal is risk stratification, not full diagnosis. The second level should be professional comprehensive geriatric assessment for complex cases, involving geriatrics, rehabilitation, nursing, mental health, nutrition, and social work. Evidence from comprehensive geriatric assessment research suggests potential value, but implementation must be simplified and targeted to remain feasible outside hospital settings (18).

The second priority is service reorganization by population risk. The national service catalog provides a standardized foundation (15), but itemized services should be assembled into care packages. For post-stroke disability, this may include swallowing management, mobility training, pressure injury prevention, and caregiver guidance. For cognitive impairment, it may include safety assessment, cognitive stimulation, behavioral management, and caregiver training. For recurrent falls, it may include gait training, medication review, home modification, and osteoporosis management. These packages should not expand LTCI into an unlimited payer for all medical and rehabilitation services; rather, they should coordinate existing reimbursable services around functional risk.

The third priority is a minimum core outcome set. Administrative indicators such as fund expenditure, number of beneficiaries, and service counts are necessary but insufficient. LTCI evaluation should include ADL change, fall incidence, pressure injury incidence, unplanned hospitalization, caregiver burden, time living at home, and patient-reported outcomes. Provincial-level pooling, such as the emerging Hainan model, may provide an opportunity to build linked data systems connecting assessment, claims, service processes, and functional outcomes (19). However, currently available Hainan information remains administrative and process-oriented, and should be interpreted as an opportunity for future evaluation rather than evidence of health impact. Digital governance may improve assessment, service coordination, and policy feedback, but it also requires safeguards for data quality, privacy, algorithmic bias, and equity (20).

5. Conclusion

China's LTCI reform should not be viewed only as expansion of a reimbursement scheme for severe disability. Its broader policy potential lies in whether it can become a functional ability-oriented platform that links geriatric risk identification, coordinated care packages, caregiver support, and outcome-based evaluation. A geriatric-syndrome-oriented LTCI model offers a testable pathway for shifting long-term care from late-stage disability compensation toward functional maintenance and healthy aging. This transition, however,

should be evaluated through linked assessment, claims, service delivery, clinical geriatric, caregiver-reported, and patient-reported outcome data before strong claims of effectiveness are made.

Funding: This work was supported by Hainan Provincial Natural Science Foundation of China (326MS0422), National Natural Science Foundation of China (82460268), Hainan Province Postdoctoral Research Project and Joint Program on Health Science & Technology Innovation of Hainan Province (WSJK2026ZD293).

Conflict of Interest: The authors have no conflicts of interest to disclose.

References

1. Long C, Yang W, Glaser K. Can long-term care insurance reduce catastrophic health and long-term care expenditures among older adults? A quasi-experimental study in China. *Eur J Ageing*. 2025; 22:25.
2. World Health Organization. Ageing and health. <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health> (accessed April 13, 2026).
3. National Healthcare Security Administration, Ministry of Civil Affairs, Ministry of Finance, *et al*. Notice on issuing the Implementation Plan for Accelerating the Establishment of the Long-Term Care Insurance System. 2026. https://www.nhsa.gov.cn/art/2026/3/26/art_104_20039.html (accessed April 13, 2026). (in Chinese)
4. Song P, Tang W. The community-based integrated care system in Japan: Health care and nursing care challenges posed by super-aged society. *Biosci Trends*. 2019; 13:279-281.
5. Deng Y, Karako K, Yamauchi K, Song P. Implementation and current status of frailty assessment in Japanese hospitals: Processes, epidemiology, and future directions. *Biosci Trends*. 2026; 20:139-148.
6. Deng Y, Ma YN, Yamauchi K, Karako K, Song P. Dementia strategies in an aging society: Policies, care, and global insights from the Japanese experience. *Biosci Trends*. 2025; 19:607-618.
7. Bernabei R, Landi F, Calvani R, *et al*. Multicomponent intervention to prevent mobility disability in frail older adults: Randomised controlled trial (SPRINTT project). *BMJ*. 2022; 377:e068788.
8. Lin L, He M, Nie P. Direct and spillover effects of long-term care insurance on Chinese elderly frailty. *J Econ Ageing*. 2025; 31:100571.
9. Ye X, Hu M, Lin H. Effects of the long-term care insurance on health among older adults: A panel data from China. *Int J Health Policy Manag*. 2023; 12:7664.
10. Chen Y, Zhao H. Long-term care insurance, mental health of the elderly and its spillovers. *Front Public Health*. 2023; 11:982656.
11. Yang S, Guo D, Bi S, Chen Y. The effect of long-term care insurance on healthcare utilization of middle-aged and older adults: Evidence from a China Health and Retirement Longitudinal Study. *Int J Equity Health*. 2023; 22:228.
12. Jiang W, Yang H. The effect of long-term care insurance on health outcomes and medical services utilization: Based

- on an analysis of moderating effect of disability. *J Health Popul Nutr.* 2025; 44:344.
13. Lin L, He M, Zai X. Evaluating the impact of long-term care insurance reform on health-related quality of life and inequality among older adults in China: A quasi-experimental analysis. *Econ Hum Biol.* 2025; 58:101495.
 14. Tian Y, Fan L, Zhou M, Du W. Impact of long-term care insurance on health inequality in older adults in China based on the concentration index approach. *Int Health.* 2024; 16:83-90.
 15. National Healthcare Security Administration. Notice on issuing the National Long-Term Care Insurance Service Item Catalog (Trial). 2025. https://www.nhsa.gov.cn/art/2025/9/25/art_104_18020.html (accessed April 13, 2026). (in Chinese)
 16. World Health Organization. Integrated care for older people (ICOPE): Guidance for person-centred assessment and pathways in primary care. 2nd ed. Geneva: World Health Organization, 2025.
 17. Caicedo-Fajardo DJ, Perdomo-Romero AY, Cantillo-Medina CP, de Souza ML, Ramírez-Perdomo CA. Impact of health interventions on informal caregivers: A systematic review and meta-analysis. *Collegian.* 2024; 31:437-445.
 18. Safitri ED, Ranakusuma RW, Siagian NKP, *et al.* The effectiveness of comprehensive geriatric assessment intervention for older people in an outpatient setting: A systematic review/meta-analysis. *BMC Geriatr.* 2025; 25:418.
 19. General Office of the People's Government of Hainan Province. Implementation Plan for Establishing the Long-Term Care Insurance System in Hainan Province. 2025. https://www.nhsa.gov.cn/art/2026/4/6/art_14_20128.html (accessed April 13, 2026). (in Chinese)
 20. Cheng Y, Han Y, Wang L, Ma J, Karako K, Shi Y, Song P. Pathways to embed digital health technologies and their governance mechanisms in Long-Term Care Insurance Systems: A comparative review of Japan, South Korea, and China. *Biosci Trends.* 2026. doi:10.5582/bst.2026.01098.
- Received May 11, 2026; Revised June 2, 2026; Accepted June 9, 2026.
- *Address correspondence to:*
Ying Xia, Department of Neurosurgery, Integrated Neuroscience Center, Geriatric Hospital of Hainan, Haikou, China.
E-mail: xiaying008@163.com
- Released online in J-STAGE as advance publication June 12, 2026.