

Bridging the Demand–Supply Gap in Health Services for Retired University Faculty in China: A Precision-Stratified, Closed-Loop Framework

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Abstract: As China’s population ages, retired university faculty have become a large but under-studied subgroup of older adults. Their health needs are poorly matched by supply arrangements whose staffing, budgeting, and service portfolios remain calibrated to an active workforce and a student population. This paper characterizes the demand for and supply of health services for this population and proposes an integrated framework for improving delivery. The demand side is analyzed through Andersen’s behavioral model across its predisposing, enabling, and need factors, revealing high health literacy, elevated multimorbidity, and unmet needs in chronic disease management, mental health, rehabilitation, and home-based care. The supply side is examined across three tiers—university-affiliated hospitals, campus health institutions, and community-based primary care—whose limited geriatric capacity, fragmented continuity, and underdeveloped precision capabilities produce a persistent mismatch. To close this gap, the paper advances five interlocking components: precision needs assessment; stratified management; a closed-loop pathway of screening, assessment, intervention, and follow-up; supply restructuring across hospital, campus, and community tiers; and digital empowerment that safeguards the digitally excluded. The framework offers university administrators and health policymakers a theory-grounded roadmap for this and other aging professional cohorts.

Keywords: Retired university faculty; Health service demand; Supply optimization; Andersen behavioral model; Precision health management; Stratified management; Population aging

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1. Introduction

China is aging with unusual speed. By the end of 2025, the population aged 60 and above reached 323.38 million (23.0% of the total); in the Fifth National Sample Survey, 80.0% of older adults reported at least one chronic condition, 11.6% had impaired basic activities of daily living, and 26.4% reported depressive symptoms^[1–2]. Within this population, retired university faculty—roughly 1.39 million by 2024, against 2.04

million active staff in regular higher education institutions—have drawn little systematic attention, though their needs are distinctive and research has concentrated on older adults in general rather than on this cohort ^[3–4].

Retired faculty differ from other older adults in three respects. Most hold a bachelor's degree or above, which supports high health literacy and proactive care-seeking but also raises expectations about the precision and continuity of care ^[5]. Their working lives were spent in prolonged sedentary intellectual labor, and health-risk assessment identifies lifestyle-related risk factors as a principal contributor to their chronic-disease burden, with detection rates at university clinics ranging from about two-thirds of those examined to nearly all ^[6–8]. And they remain attached to an institution whose services they have long used, though staffing and budgets stay calibrated to the active workforce ^[6–8].

Policy has shifted toward integrated, life-course management. The Healthy China 2030 initiative set the direction; the 15th Five-Year Plan devotes a full chapter to population aging; and the National Health Plan directs incremental capacity toward the weakest service domains and calls for AI-enabled precision medicine ^[9–11]. With the WHO framework for healthy aging, these mark a shift from treating disease to managing health and from uniform delivery to stratification ^[12–13]. Translating such principles into service models for specific populations remains an open problem, because research has treated institution-attached cohorts as largely indistinguishable from the wider older population ^[14]. This paper characterizes their demand, diagnoses supply-side constraints, and proposes an integrated framework.

2. Demand-side analysis

The study uses Andersen's behavioral model to structure the demand profile ^[15]. The model sorts the determinants of use into predisposing, enabling, and need factors; revised in 1995 to give need primacy, it remains a reference point in health services research and has been applied widely in Chinese scholarship ^[15–17]. Built to explain utilization, it serves here as an organizing taxonomy for a needs assessment rather than as a predictive model.

Predisposing factors incline individuals toward service use. Retired faculty are mostly aged 60–85 and better educated than the older population as a whole, which produces high health literacy and proactive health-seeking—though that literacy also raises expectations about precision and continuity ^[5]. Because faculty identities are bound to professional achievement, retirement often strips away the routine and social role that anchored them, raising the risk of psychological distress ^[18].

Enabling factors are rarely financial: most retired faculty hold stable pensions and full basic medical insurance ^[3]. Access is shaped instead by geography, family structure, and technology. Many live on or near campus, but a growing number move away or live alone after spousal death; in the Fifth National Sample Survey, 14.2% of older adults lived alone, and 45.5% lived only with a spouse ^[2]. Although better educated than average, many remain uncomfortable with smartphone-based appointments and telemedicine, so technology-driven reforms risk excluding them ^[19].

Need factors are the most proximal determinants of use. Multimorbidity is the central challenge ^[20–21]; nationally, more than 40% of older adults live with it, most commonly hypertension, type 2 diabetes, coronary heart disease, and osteoarthritis ^[20]. Two domains are routinely under-recognized: mental health, where depression, anxiety, and cognitive decline are common yet under-detected because routine screening is rarely built into campus services ^[18, 22–23]; and functional need, where declines in mobility and activities of

daily living create demand for rehabilitation and fall prevention that outpatient settings cannot supply ^[24]. Chinese evidence confirms that once illness burden is high, need factors rather than predisposing ones drive demand ^[17].

3. Supply-side analysis

The supply side is stratified by institutional tier. Three matter: university-affiliated hospitals, campus health institutions, and community-based primary care; the highest tier available varies by institution, a fact any framework must accommodate.

University-affiliated hospitals concentrate the strongest clinical resources—geriatrics, cardiology, endocrinology, rehabilitation medicine—and carry most serious chronic-disease and specialist workload. Even where available, retirees enter through general patient pathways, so continuity with campus records and community follow-up stays weak. And the tier is oriented toward curative and specialist care, so capacity valuable for acute episodes does not translate into the longitudinal, functionally oriented management this population needs ^[14, 25].

Campus health institutions have long served occupational health surveillance, student health services, and basic outpatient care, but their patient mix has shifted: Chinese university clinics report chronic-disease detection rates among retirees from about two-thirds of those examined to nearly all ^[6–8]. The mismatch lies less in whom these institutions serve than in how they are resourced—the population they see has aged, while staffing, budgets, and portfolios remain calibrated to an active workforce and a student body. Geriatric capacity has not grown; portfolios lean toward acute episodic care with little chronic disease management, geriatric assessment, mental health, or rehabilitation ^[14, 24]; and clinicians rarely hold specialist geriatric training ^[25].

Community-based primary care is now the foundation of chronic disease management for older adults, and matters because most older Chinese age at home ^[14, 26]. Yet the expectations of this educated population sit uneasily with standardized, protocol-driven community care ^[5]; records, medication lists, and care plans are rarely shared across providers, producing duplication and polypharmacy risks ^[27]; and community providers face the same capacity constraints while lacking specialized mental health and rehabilitation resources ^[14, 24].

A precision gap remains. Precision medicine has advanced rapidly in oncology, but its translation to routine chronic-disease management in older adults has barely begun ^[13, 28]. Their heterogeneous multimorbidity is poorly served by the absence of stratification tools: risk-assessment and frailty-screening instruments are underused across all three tiers, and longitudinal health data accumulated over decades of employment remain unstructured ^[29]. Three gaps thus run through the analysis: a capacity gap, a continuity gap, and a capability gap.

4. Demand–supply mismatch

The core problem is a structural lag: an institutional inertia in which the supply architecture, calibrated to an active workforce and an episodic disease model, has not adapted to the demographic transition of its own constituency. Four linked manifestations follow. Structural mismatch: campus services already see many retirees, yet staffing and budgets remain sized for active employees and students, producing chronic

under-capacity where demand is highest ^[14, 24]. Episodic versus longitudinal care: demand is dominated by long-term, multi-condition needs, while supply remains geared to acute, single-condition encounters ^[25, 27]. Precision versus uniformity: an educated population demands stratified care, while supply tends toward standardized protocols ^[28–29]. Information deficits: fragmentation across tiers produces care discontinuities and raises the risk of polypharmacy ^[27].

Three causes underlie these manifestations: institutional path dependence, as staffing formulas and budget lines continue to track the active workforce ^[14]; a disease-centered paradigm that rewards single-condition treatment over continuous management ^[25, 30]; and organizational fragmentation, which blocks the information sharing that multimorbid patients need ^[27].

The consequences are layered. For the retiree, unmet need becomes preventable disease progression, avoidable hospitalizations, and accelerated functional decline. For the university, it means reputational risk and the erosion of human capital that healthy retirees might contribute. For the health system and families, it pushes costs onto informal caregivers already strained by shrinking family size and a growing number of solo households ^[31].

5. Integrated optimization framework

To close these gaps, the study proposes a five-component framework linking assessment to delivery (**Figure 1**).

Component 1: Precision needs assessment. The framework opens with measurement: predisposing characteristics (age, sex, health literacy, living arrangement), enabling conditions (access, insurance, family support, digital competence), and need factors (chronic disease burden, multimorbidity, frailty, functional status, mental health), carried over directly from Section 2. It relies on instruments already validated in geriatric practice—frailty indices, activities-of-daily-living scales, depression screening tools—so that diffuse subjective complaints become a comparable risk profile, assessed annually for the general pool and semi-annually for those flagged as high risk ^[15, 21, 24].

Component 2: Stratified management. Stratification is where precision becomes an allocation rule: a system that treats all retirees alike will over-serve the healthy and under-serve the sick. Assessment outputs become three tiers—stable, at-risk, and high-need—each with its own protocol: periodic screening and health education; enhanced monitoring and targeted prevention; coordinated multidisciplinary management with an individualized care plan. Criteria combine multimorbidity count, frailty, functional dependence, and mental health risk, so resources follow measured risk rather than headcount. No molecular profiling or genomic data are required ^[28–29].

Component 3: Closed-loop precision health management. The operational heart of the framework is a cycle, not a service. Care proceeds through four recurring stages—screening, assessment, intervention, and follow-up—and returns to the beginning: screening surfaces risk not yet expressed as a complaint; assessment characterizes it and assigns a tier; intervention delivers stratified management along lifestyle, pharmacological, rehabilitative, and psychosocial lines; follow-up measures whether it worked. What distinguishes a loop from a sequence is that no stage is terminal—a poor result re-opens the case rather than closing it, echoing the integrated chronic-disease management model promoted in national policy ^[10, 13]. The headline metric is loop closure: the share of identified risks completing all four stages within the defined

period.

Component 4: Supply restructuring and integration. Three coordinated changes are required: capacity must be built where it is thinnest, and national policy has begun to direct incremental beds and staffing toward geriatric assessment, chronic disease management, mental health, and rehabilitation [10, 14, 24, 27]. Pathways must cross institutional boundaries: formal referral routes and shared records across the hospital, campus, and community tiers are what turn three providers into one care process. And a team must carry the high-need stratum—primary care physicians, geriatricians, nurses, rehabilitation therapists, and mental health professionals, with a designated coordinator managing transitions.

Component 5: Digital empowerment. Digital tools expand reach, but only if their limits are designed for explicitly. The relevant applications are remote monitoring of blood pressure and glucose, telemedicine follow-up, shared records, and algorithmic support for stratification [19, 32]. Each carries a less obvious hazard—remote monitoring assumes a device and a connection, and algorithms inherit whatever biases their training data contain [19]. The safeguard is structural: a standing human-assisted channel and simplified interfaces alongside every digital route, so that no service becomes reachable only through a smartphone [19].

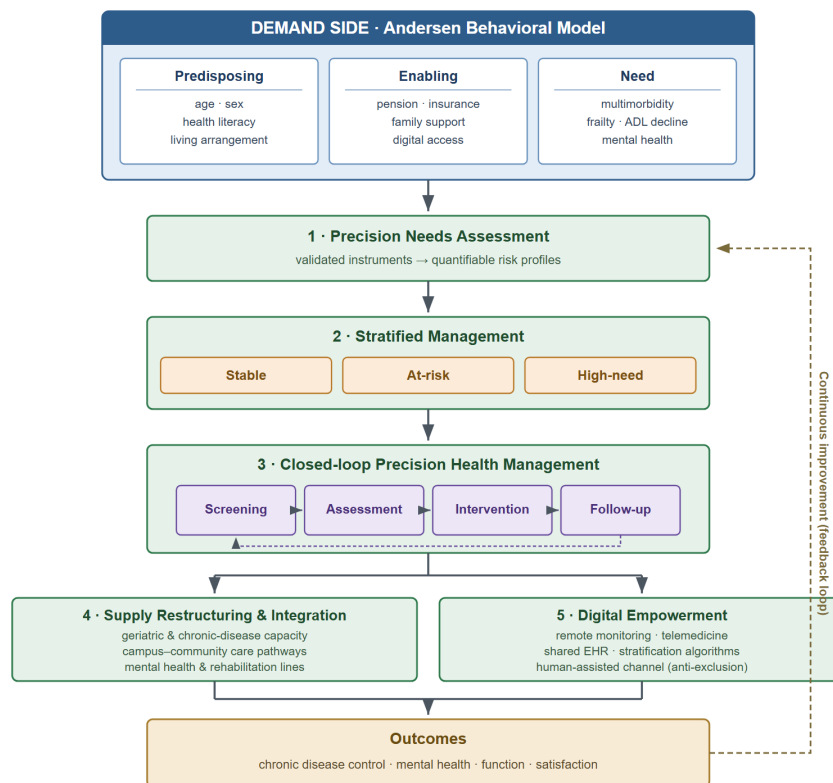


Figure 1. An integrated optimization framework linking Andersen’s demand-side model to a precision-oriented supply redesign: precision needs assessment → stratified management → closed-loop pathway (screening, assessment, intervention, follow-up) → supply restructuring and digital empowerment, with a feedback loop returning to assessment

Implementation considerations: Ownership should be assigned clearly, ideally to a dedicated retiree health management office, and the framework introduced incrementally, beginning with assessment and

stratification for a pilot cohort. Outcome indicators—chronic disease control, depression screening coverage, functional decline, service utilization—are fed back into the loop, and privacy standards must be set for the longitudinal data on which stratification depends ^[29].

6. Conclusion

Retired university faculty are an under-served and increasingly consequential population within China's aging society. Their distinctive demand profile—high health literacy alongside elevated multimorbidity, mental health burden, and growing home isolation—collides with a supply architecture still calibrated to acute, episodic, uniform care. Integrating Andersen's behavioral model with the principles of precision health management, we have proposed a five-component framework linking precision needs assessment, stratified management, closed-loop care, supply restructuring, and digital empowerment—an adaptable roadmap rather than a rigid blueprint.

Its applicability is bounded: it assumes at least a campus clinic, a working relationship with community providers, and organizational willingness to share records across boundaries—a governance question as much as a technical one—and it is calibrated to the Chinese setting, where universities carry an explicit welfare obligation toward retirees.

Three lines of work would refine it: prospective implementation in one institution, measuring tier distribution, loop closure, and selected outcomes before and after; comparative application across universities of different tiers; and an equity question—whether stratification improves outcomes for the high-need group without widening the gap for those with real but low-grade needs.

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