

Mutual Medical Aid for Retired Workers in China: An Empirical Evaluation from the Perspective of Social Solidarity Theory

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Research Article

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Abstract

Background

Under the dual pressures of population ageing and rising medical burdens, how to effectively supplement basic medical insurance and prevent poverty caused by illness in old age has become a key issue in building China's multi-tiered medical security system. Drawing on social solidarity theory, this study constructed a four-dimensional analytical framework of 'structure–process–outcome–experience' and conducted an empirical evaluation of the effectiveness of the Shanghai Municipal Inpatient Mutual Medical Aid Programme for Retired Workers, known as the 'second medical insurance'.

Methods

A mixed-methods design was adopted, integrating macro-level programme data from Shanghai, anonymised enrolment and claims records for all retired staff of Donghua University during 2021–2024, and a questionnaire survey of 72 retired workers who had received claims. Descriptive statistics, comparative analysis, theory-guided interpretation and qualitative thematic analysis were applied.

Results

Relying on an employer-based group enrolment model, the programme built a mutual aid community with a coverage rate of 98.97%. The risk-sharing mechanism operated effectively, with an overall claim rate of 133.02% and funds flowing significantly towards the oldest age groups. Under the 'automatic payment without application' service model, satisfaction reached 100%, and 83.33% of beneficiaries felt a strong sense of organisational belonging, elevating the programme into a 'socio-psychological institution'. Nevertheless, 33.33% of beneficiaries had a 'knowledge gap' concerning the nature and source of payments, and 75% called for expanding the scope of coverage.

Conclusions

The programme combines the efficiency of institution-based organisational mobilisation with the warmth of emotional care, achieving significant effects in risk sharing, targeted protection and psychological identification. Institutional design should be improved in three directions: dynamic adjustment of benefit packages, transparent payment notifications and bridging the 'employer divide'.

Background

Data from the National Bureau of Statistics show that China has entered a moderately ageing society: by the end of 2025, the population aged 60 years and over had reached 323 million, accounting for 23% of the total population [1]. Medical care needs grow in tandem with age, placing sustained pressure on the

stable operation of basic medical insurance. China has built the world's largest social security system, with basic medical insurance covering 1.33 billion people, and reimbursement ratios for inpatient expenses within the policy scope reaching approximately 80% for employee insurance and 70% for resident insurance [2]. Building a multi-tiered medical security system coordinated by government, market and society has become a national strategy, and the 14th Five-Year Plan for National Medical Security explicitly encourages the development of supplementary medical insurance of a mutual aid nature. However, moving from 'full coverage' to 'high-quality development' – in particular, filling institutional gaps through supplementary protection tiers and preventing poverty caused by illness – remains a key challenge in the construction of the multi-tiered medical security system [3]. Shanghai, as a mega-city with the deepest degree of ageing in China and the fastest-growing old-age dependency ratio among provincial-level regions, faces a particularly pressing need for innovative supplementary protection arrangements that combine fiscal efficiency with social inclusivity.

Retired workers face a distinctive 'protection gap' in the multi-tiered medical security system. On the one hand, basic medical insurance, as the first tier, follows unified actuarial and benefit standards: it provides fundamental protection but cannot readily reflect differentiated care across employers and groups – in particular, it cannot carry the additional emotional attachment and sense of responsibility that employers feel towards their retired members. Retired workers have significantly higher rates of hospitalisation and serious illness than active employees, while their income sources (mainly pensions) are relatively limited, resulting in heavier out-of-pocket medical burdens for which basic medical insurance offers no targeted relief mechanism. On the other hand, commercial health insurance, as the third tier, generally imposes high enrolment age thresholds, strict exclusion clauses and expensive premiums on older people because of their higher risk profile and pronounced adverse selection; moreover, older people's limited recognition of commercial insurance and their as-yet-unformed risk awareness and purchasing habits result in extremely low actual uptake, making commercial insurance an ineffective supplementary option for retired workers.

In China's multi-tiered medical security architecture, the first tier (basic medical insurance) emphasises universality and equity, and the third tier (commercial health insurance) emphasises individual choice and actuarial pricing, whereas supplementary protection organised on the principle of mutual aid occupies the intermediate space between state compulsion and market voluntarism. Welfare pluralism holds that the state, the market, the family and the community each possess comparative advantages in welfare provision [4]. For retired workers, whose risks are high and purchasing power limited, community-based mutual aid has a natural advantage: contributions are priced on a community rather than an individual risk basis, cross-subsidies that commercial actuarial logic would reject are tolerated, and the arrangement can carry the emotional and symbolic content that statutory schemes deliberately exclude. In the Chinese context, the employer (danwei) retains a residual welfare function even after the decline of the traditional work-unit system, making it a ready-made platform for mobilising collective action among retirees.

In this context, a social-solidarity-based supplementary protection situated between state compulsion and market voluntarism has shown unique institutional potential. Led by the Shanghai Federation of Trade Unions and operated by the Shanghai Municipal Workers' Mutual Aid Association, the Retired Workers' Inpatient Mutual Medical Aid Programme (hereinafter the 'Retired Inpatient Mutual Aid Programme') has operated since 2001. Relying on the trade union network and employer organisations, it provides supplementary reimbursement for the out-of-pocket expenses of retired workers, such as hospitalisation and outpatient serious illness, with cumulative payments exceeding 10 billion yuan. It is affectionately known by workers as the 'second medical insurance'. From the author's years of work in university retiree administration, the programme has three salient characteristics for retired members: universality (employer-based group enrolment covering all eligible persons), practicality (second-round reimbursement of out-of-pocket expenses) and a 'fuel in the snow' floor function, particularly in situations of advanced age, serious illness and end-of-life care. Existing research, however, has mostly focused on policy review and macro-level effectiveness assessment, with insufficient attention to micro-level operating mechanisms and beneficiaries' subjective experiences. This study addresses three questions: how does the programme build and sustain a mutual aid community through employer organisations; does the capital flow of the risk-sharing mechanism genuinely benefit those most in need; and, beyond economic compensation, does the programme generate extra-economic values such as psychological security and organisational belonging?

Mutual insurance originates from the tradition of mutual aid in human society, and modern mutual organisations took shape during the Industrial Revolution [5]. Unlike commercial insurance, the policyholders of a mutual insurer are its owners, and surpluses serve member welfare rather than shareholder profits [6]. Risk screening relies on community ties, which helps to curb adverse selection and reduce transaction costs [7]. Relative to compulsory social insurance, mutual insurance embodies voluntariness, complementarity and sociality, constituting an institutional form within welfare pluralism that connects the state and the market [4]; its function has evolved from purely economic risk pooling into an important vehicle for sustaining community identity and accumulating social capital [8].

In terms of international experience, Japan's 'kyosai' (mutual aid) organisations provide medical and care assistance for older people [9], and Germany's sickness funds achieve intergenerational redistribution through risk structure equalisation [10]. In Chinese practice, the cooperative medical scheme of the planned-economy era already had mutual aid characteristics [11], and worker medical mutual aid promoted by trade unions has developed rapidly since the beginning of this century, with Shanghai's 'second medical insurance' being a typical case [12]. Three gaps exist in the current literature: the operating mechanisms of such programmes have rarely been systematically deconstructed from the perspective of social solidarity theory; analyses integrating objective data with subjective experience are lacking; and no systematic analytical framework integrating institutional structure, operating process, objective outcomes and subjective experience has yet been formed.

Social solidarity theory holds that individuals who form communities with common interests can cope with uncertain risks more effectively [8]. Mutual trust within a community is the 'lubricant' for mutual aid

[13], and risk sharing achieves financial transfers from low-risk to high-risk members through a risk pool [14]. This study further proposes that a successful mutual insurance scheme can realise not only economic value but also psychological value (security), social value (belonging) and normative value (identification with mutual aid).

On the basis of these core concepts, this study constructs a four-dimensional analytical framework of 'structure–process–outcome–experience' (Fig. 1). The structural dimension examines the foundation of the mutual aid community, focusing on enrolment mechanism design and organisational mobilisation; the process dimension traces the dynamic mechanism of risk sharing, focusing on capital flows and cross-subsidies; the outcome dimension evaluates objective performance, focusing on enrolment rates, claim rates, beneficiary coverage and protection against major risks; and the experience dimension captures beneficiaries' subjective perceptions, focusing on service evaluation, economic perception and emotional identification. The four dimensions form a dynamic interactive loop of 'structure → process → outcome → experience → structure'.

Methods

This study adopted a mixed-methods design, treating the operation of the programme at the Shanghai municipal level as the macro analytical unit and Donghua University as a deeply embedded micro analytical unit. Donghua University was selected for three reasons: representativeness (a ministry-affiliated university with a stable population and standardised management); data completeness (complete coverage data for four consecutive years, 2021–2024); and the coexistence of homogeneity and heterogeneity in population characteristics, which facilitates observation of the relationships among core variables. Except for a few special cases, Donghua University enrolled all retired faculty and staff members in the programme in accordance with the principle of 'insurance for all eligible persons' (yingbao jinbao), as a welfare benefit provided by the university.

Conceptually, the design follows the logic of a nested case study: the municipal programme provides the institutional environment (rules, pricing and benefit package), while the university case provides complete, high-resolution observations of how these rules translate into individual-level outcomes. Because the university enrolls virtually all retired staff, the case data approximate a complete census rather than a sample, eliminating sampling bias in the description of fund flows; the survey data, in turn, capture the subjective side that administrative records cannot register.

The data sources formed a three-source data matrix: (1) macro policy data, drawn from the public statistics of the Shanghai Municipal Workers' Mutual Aid Association; (2) micro claims data, comprising the anonymised enrolment and claims records of all retired staff of Donghua University during 2021–2024, including age, gender, claim type and claim amount; and (3) questionnaire survey data, collected in January 2026 from 72 retired faculty and staff members who had received claims. The sample characteristics indicate good representativeness: the majority of claims occurred after 2024 (79.17%), the dominant claim type was inpatient treatment (83.33%), and the dominant age group was 60–79

years (70.84%). The combination of administrative records with survey data permits a rare form of methodological triangulation: where administrative data reveal what happened, survey data illuminate how beneficiaries experienced it and why they valued it.

The questionnaire covered four modules corresponding to the four-dimensional framework: basic information (age, claim timing and claim type); service experience (satisfaction, arrival speed of payments and prior knowledge of the nature and source of the payment); economic and psychological perception (perceived relief of burden, sense of security, sense of organisational belonging and identification with the mutual aid ideal); and overall evaluation and optimisation demands (multiple-choice items plus one open-ended question). The survey was distributed and retrieved through the retirees' affairs administration network, and all 72 respondents had personally experienced the claims process.

Qualitative responses to the open-ended question were read independently by two researchers, coded line by line and grouped into thematic categories. Themes were cross-checked and reconciled through discussion until consensus was reached, a procedure intended to enhance the trustworthiness of the findings. The quantitative data were organised in spreadsheets and checked for consistency, while the qualitative extracts were retained in their original Chinese and translated into English only at the reporting stage, in order to preserve semantic nuance.

Analytical methods comprehensively applied descriptive statistics (frequencies, proportions and year-on-year comparisons), comparative analysis, theory-guided interpretation and qualitative thematic analysis of the open-ended responses, corresponding to the different levels of the four-dimensional framework, so as to achieve cross-validation between objective data and subjective experiences. All micro data were anonymised, informed consent was obtained from all questionnaire respondents, and reported cases were de-identified.

Results

Structural dimension: efficient construction of the employer community

The Retired Inpatient Mutual Aid Programme is led by the Shanghai Federation of Trade Unions and operated by the Shanghai Municipal Workers' Mutual Aid Association, covering 4.1625 million people by 2024. Enrolment is divided into two types: 'employer-based group enrolment' and 'community-based individual enrolment'. Employer-based group enrolment requires an enrolment rate of no less than 75%, which effectively avoids adverse selection. Between 2021 and 2025, the employer enrolment premium was adjusted from 350 yuan to 450 yuan, and total benefit payments increased from 1.3 billion yuan in 2022 to 2.07 billion yuan in 2024. The programme focuses on the out-of-pocket portion after basic medical insurance settlement, covering inpatient treatment, outpatient serious illness and family sickbed

services, with an annual maximum payment of 100,000 yuan per person, delivered through the ‘automatic payment without application’ service model.

In accordance with the principle of ‘insurance for all eligible persons’, the Retirees’ Affairs Committee of Donghua University pays the full premium on behalf of all retired faculty and staff. From 2021 to 2024, the average enrolment rate reached 98.97%, with the number of insured people stable at approximately 2,580, and cumulative premiums of 3.8804 million yuan over the four years. The employer’s full payment is itself a signal of organisational care – it is not deducted from pensions but constitutes an additional expenditure by the university, so the act of ‘enrolment’ carried emotional value from the outset. From a theoretical perspective, the employer acts as a ‘trust intermediary’, significantly reducing the cost of building the community. Putnam’s social capital theory points out that dense social networks and mutual trust are the key to successful collective action [8]. In the Chinese context, with its deep tradition of the work-unit (danwei) system, the occupational community has become an efficient organisational vehicle, and the committee’s unified organisation and full funding are essentially an injection of ‘organised social capital’. Employer-based group enrolment thus converts the start-up problem of collective action into an organisational routine: premiums are paid collectively, claims are processed automatically, and individual members bear virtually no transaction costs.

Process dimension: capital flows of the risk-sharing mechanism

From 2021 to 2024, retired staff of Donghua University received cumulative claims of 5.1616 million yuan against premiums of 3.8804 million yuan, an overall claim rate of 133.02%. Except for 2021 (a system transition year, 91.71%, when benefit rules and settlement interfaces were being aligned with the municipal platform), claims substantially exceeded premiums in the other three years (Table 1). This claim rate is not a signal of financial crisis but direct evidence of successful risk sharing: the funds were not only fully returned to members who incurred losses but also received additional support from a broader risk pool.

Table 1
Comparison of premiums paid and claims received at Donghua University, 2021–2024

Year	Premiums (yuan)	Claims (yuan)	Claim rate	Difference
2021	905,100	830,093	91.71%	–8.29%
2022	901,250	1,350,668	149.87%	49.87%
2023	1,032,000	1,413,804	137.00%	37.00%
2024	1,042,000	1,567,063	150.39%	50.39%
Total	3,880,350	5,161,628	133.02%	33.02%

By claim type, inpatient treatment accounted for 92.27%, outpatient serious illness for 6.59% and family sickbeds for 1.14%, with resources precisely focused on the areas of heaviest burden for retired workers. By age, funds flowed systematically from younger to older groups (Table 2). The 80–89 age group received 35.48% of total claims while accounting for only 18.37% of enrollees; the 90–99 age group received 21.22% of claims while accounting for 8.54% of enrollees; and the 60–69 age group received only 20.49% of claims despite accounting for 35.90% of enrollees. By gender, male enrollees received 56.82% of total claims while accounting for 47.41% of enrollees, forming a ‘hidden cross-subsidy’ based on natural risk.

Table 2
Claims by age group of retired workers at Donghua University, 2021–2024

Age group (years)	Total claims 2021–2024 (yuan)	Share of total claims	Share of total enrollees
50–59	60,627	1.17%	2.93%
60–69	1,057,481	20.49%	35.90%
70–79	1,090,998	21.14%	34.22%
80–89	1,831,358	35.48%	18.37%
90–99	1,095,328	21.22%	8.54%
100–103	25,836	0.50%	0.04%

In terms of sustainability, the programme responds to adverse selection through gradual premium adjustments and community-based tiered pricing (up to 1,350 yuan per year) and, more importantly, is embedded in a comprehensive protection system that covers active employees, forming an intergenerational redistribution through which ‘active workers subsidise retirees’. This confirms Hansmann’s assertion that mutual organisations, owing to their non-profit attribute of ‘owners as members’, can tolerate short-term partial losses in exchange for long-term overall welfare maximisation [6].

These findings are highly consistent with the core concepts of ‘risk sharing’ and ‘cross-subsidy’ in social solidarity theory. Barr notes that the core function of mutual insurance is to achieve financial transfers from low-risk to high-risk members through a risk pool [14]. In this programme, the systematic flow of funds from younger and female groups to older and male groups is a concrete manifestation of this function. The cross-subsidies exhibit multi-level characteristics: at the age level, an intergenerational subsidy in which the young subsidise the old; at the gender level, a gender subsidy in which women subsidise men; and at the municipal level, an inter-group subsidy in which active workers subsidise retirees. The superimposition of these three subsidies constitutes a complex, multi-directional risk redistribution network whose coverage and regulatory depth far exceed what any single commercial insurance product can achieve. Overall, the process dimension demonstrates that the programme successfully pools risks across a large and heterogeneous population, converting individual vulnerability

into collective solvency. The multi-layered cross-subsidies operate not as an explicit political choice but as an emergent property of the enrolment and pricing rules, illustrating how well-designed mutual aid institutions can produce socially desirable redistribution without direct state fiscal transfers.

Outcome dimension: objective performance and multi-dimensional value

From 2021 to 2024, the average annual claim rate among retired staff of Donghua University reached 21.29% (Table 3), meaning that more than one-fifth of enrollees received payments each year. This high beneficiary coverage makes ‘mutual aid and shared risk’ a visible fact verified each year by a large number of members, forming the institution’s ‘credible commitment’: members believe that the institution will indeed honour its protection promises when needed.

Table 3
Enrollees and claimants at Donghua University, 2021–2024

Year	Enrollees	Claimants	Claim rate
2021	2,586	443	17.13%
2022	2,575	575	22.33%
2023	2,580	607	23.53%
2024	2,605	578	22.19%
Total/Average	10,346	2,203	21.29%

The programme’s role in protecting against major risks is significant. In 2024, a 95-year-old retired staff member received 90,000 yuan for end-of-life hospitalisation, the highest single payment in the four years. For patients with chronic diseases and disabilities requiring long-term treatment, repeated claims within and across years constitute a ‘financial crutch’ that effectively prevents poverty caused by illness. The programme is not a ‘frosting on the cake’ universal subsidy but a ‘fuel in the snow’ risk floor – precisely the core distinction between social mutual aid and commercial insurance. Benefit incidence analysis reinforces this point: the per-enrollee claim of the 80–89 age group was roughly 3.4 times that of the 60–69 group, indicating that the programme functions as a targeted transfer mechanism rather than a uniform subsidy. The stable enrolment rate of 98.97% indirectly confirms members’ deep identification with the institution: given that voluntary withdrawal is unrestricted, the persistently stable enrolment rate indicates that identification stems not from coercion but from rational judgement and emotional approval.

Experience dimension: beneficiaries’ subjective perceptions

Service satisfaction reached 100%. Of the respondents, 81.94% reported being 'very satisfied', and 97.22% considered that the mutual aid payments arrived quickly; the 'automatic payment without application' technical model greatly improved benefit accessibility. Among those informed in advance, the main channels of awareness were notifications from the retirees' affairs administration and bank transfer records, indicating that the employer's administrative network remains the key intermediary of meaning transmission. However, a 'knowledge gap' of 33.33% emerged: only 66.67% learned of the nature of the payment in advance through clear notifications, and 15.28% were completely unaware, reducing the mutual aid payment to a 'silent remittance' – an unexplained bank credit whose source the recipient could not identify. For these groups, the mutual aid act completed the economic function of 'resource transfer' but failed to realise the social function of 'meaning transmission'. More worrying, the 'completely unaware' may be precisely the most vulnerable groups – the oldest people, those living alone and those with weak social support.

In terms of economic effects, 92.27% affirmed that the claims reduced their economic burden, but fewer than 10% considered the effect 'enormous', forming a 'perception gap' with the high claim rate of 133.02%: retired workers' total out-of-pocket medical expenses are already high, and although the absolute amount of mutual aid payments is considerable, its share of an individual's total expenditure may be limited. In terms of extra-economic value, 83.33% felt a 'sense of belonging and warmth', 50% felt a 'sense of security', and 33.33% strengthened their identification with the mutual aid ideal. Belonging far exceeded security, indicating that the programme's core value lies in 'making people feel remembered and cared for' – the recurrent expression 'the organisation still remembers me', which dominated the open-ended responses, succinctly captures the institution's emotional value.

These affective responses indicate that the programme functions as a 'rite of recognition' – a periodic affirmation by the workplace community that the retired individual continues to matter. This has implications for how mutual aid is theorised: the relevant metric of success is not only the adequacy of the financial transfer but also the density and directionality of the social ties that the transfer activates. When 84.72% of beneficiaries identify the programme primarily as 'embodying the employer's responsibility and care', the institution has effectively transformed an insurance contract into a medium of social integration.

After experiencing claims, 79.17% of the respondents significantly increased their approval of the programme. Of the respondents, 84.72% chose 'embodying the employer's responsibility and care' as their overall evaluation, indicating that the programme's value orientation is first an 'emotional carrier' and second a 'protection tool'. As in Beneficiaries' optimisation demands (Table 4), Optimisation demands centred on 'expanding the scope of coverage' (75%) and 'raising the reimbursement ratio/limit' (65.28%), directly responding to the aforementioned 'perception gap'. A notable subset of demands also focused on information transparency: 40.28% wanted improved payment notifications, and 34.72% hoped for more convenient inquiry channels, suggesting that beneficiaries value both the substance and the communication of protection.

Table 4
Beneficiaries' optimisation demands (multiple choice)

Optimisation direction	Proportion
Expand the scope of coverage	75.00%
Raise reimbursement ratio/limit	65.28%
Improve payment notifications	40.28%
Establish convenient inquiry channels	34.72%
Maintain stable premiums	25.00%

These demands point to a core paradox: the institution operates objectively efficiently (a 133% claim rate and 100% service satisfaction), yet beneficiaries still feel that 'it is not enough'. This paradox is not a sign of institutional failure but a 'by-product' of institutional success – when an institution makes members genuinely feel the power of mutual aid, they naturally hope that this power can be greater and cover more. From a theoretical perspective, the mutual aid programme has been elevated into a 'socio-psychological institution'. Traditional mutual insurance theory focuses on risk pooling and financial compensation [14], but this study finds that a sense of belonging of 83.33%, a sense of security of 50% and a cognitive improvement of 79.17% indicate that the programme has transcended purely economic mutual aid to become an institutional arrangement that strengthens emotional ties, provides psychological security and promotes identification with mutual aid. We summarise this phenomenon as an evolution from an 'economic community' to an 'emotional community' and then to a 'psychological community'. At the same time, the 'knowledge gap' reveals the tension between technological empowerment and meaning transmission: technological convenience does not equal meaning transparency, and the efficiency of algorithms needs to be complemented by 'warm notifications' in order to transform cold fund transfers into warm organisational care.

Discussion

Logical relationships among the four dimensions

The four-dimensional analysis reveals a clear causal chain: the structural dimension (employer-based group enrolment, 98.97% coverage, injection of organisational care) → the process dimension (133.02% claim rate, funds flowing towards the oldest groups) → the outcome dimension (21.29% beneficiary coverage, 90,000 yuan risk floor) → the experience dimension (83.33% belonging, 100% satisfaction), constituting a virtuous cycle of 'structural trust → effective process → visible outcomes → positive experience → consolidated structure'. This causal chain is simultaneously self-reinforcing: high enrolment rates support high claim rates, capital flows translate into visible beneficiary coverage, high beneficiary coverage strengthens the institution's positive image, and a sense of belonging makes members more willing to continue enrolling.

Each link in this chain has an identifiable mechanism. Employer-based enrolment solves the start-up problem of collective action by removing individual decisions; the injection of organisational trust lowers the perceived risk of participation; automatic payment converts institutional reliability into a repeated, verifiable experience; and each verified claim becomes a micro-event of recognition that feeds back into members' willingness to remain enrolled. The framework thus suggests that sustainability should be assessed not only in financial terms but also in terms of the reproduction of trust — a stock that accumulates slowly and depletes quickly.

Institutional advantages and underlying tensions

The institutional advantages are reflected in three aspects. First, organised mobilisation and the reconstruction of the emotional community: by relying on the employer, a high-trust organisation, the programme activates existing social networks; 84.72% of beneficiaries perceived 'employer responsibility and care', proving that the programme successfully converted premium payments into emotional bonds. Second, targeted protection and the floor effect: funds flow precisely to the oldest groups, with maximum payments of 90,000 yuan for serious illness, embodying the 'fuel in the snow' function. Third, technology-empowered user experience: the 100% satisfaction with 'automatic payment without application' proves that technology greatly improves benefit accessibility.

At the same time, the four-dimensional analysis reveals three underlying tensions. First, the 'triangular tension' of financial sustainability: the 133.02% claim rate depends on cross-pool redistribution with active employees, and deepening ageing will compress the space for intergenerational transfers; achieving a dynamic balance among inclusivity, benefit levels and financial balance is the core challenge. Second, the 'employer divide' in coverage: community-based tiered pricing reaches up to 1,350 yuan per year (versus only 450 yuan per year for employer-based enrolment); the weaker the employer backing, the higher the enrolment cost for disadvantaged groups, creating structural inequity. Third, the 'digital divide' and the rupture of meaning transmission: the 15.28% who were 'completely unaware' may be precisely the most vulnerable groups; convenient services 'cover' them, yet poor access to information leaves them 'missed' by the institution's meaning.

International perspectives

Viewed internationally, the Shanghai programme shares functional similarities with, yet differs institutionally from, mutual aid arrangements in other ageing societies. Japan's *kyosai* organisations provide medical and long-term care mutual aid largely on an individual or occupational-association basis [9], and Germany's sickness funds realise intergenerational redistribution within a statutory framework [10]. The Shanghai model is distinctive in its mobilisation of the employer (*danwei*) as the organisational nucleus: enrolment, premium payment, information transmission and emotional care are all channelled through the workplace community even after retirement. For countries confronting rapid ageing, the case suggests that dormant workplace-based social capital can be reactivated as low-cost infrastructure for supplementary health protection — an insight particularly relevant where commercial insurers are

reluctant to serve older customers. At the same time, the 'employer divide' warns that reliance on employers may exclude those outside stable employment relationships, a problem that universalistic statutory schemes handle more evenly.

Implications for health systems research

For health systems researchers, the Shanghai case offers three analytical take-aways. First, the distinction between 'coverage' (being enrolled) and 'meaning' (understanding the protection) is analytically productive: a person can be fully covered yet remain meaningfully excluded if the institution fails to communicate its care. The 33.33% knowledge gap observed here is not a defect of coverage but a defect of communication, suggesting that future programme evaluations should routinely measure not only enrolment rates but also informational adequacy. Second, the employer-based model demonstrates that intermediate organisations need not be limited to formal insurance entities; workplace communities can function as low-cost, high-trust platforms for supplementary health protection, provided that attention is paid to mitigating the structural inequity faced by workers outside stable employment. Third, the programme's dual character — economic instrument and emotional carrier — calls for an expanded conception of 'health system performance' that includes psychosocial outcomes such as belonging and security alongside the conventional metrics of financial protection and access.

Theoretical implications

This programme shows evolutionary characteristics from 'spontaneous mutual aid' to 'guided corporatist mutual aid' — trade-union-led, combining top-down guidance with bottom-up response. The state (through the trade unions) has been transformed into a platform builder and rule setter, proving that organised guidance can equally activate mutual aid vitality. The mutual aid programme has transcended purely economic mutual aid to become a 'socio-psychological institution': it does not directly produce material wealth, but it produces trust, belonging and meaning. This finding extends social solidarity theory from the 'economic function' to the 'psycho-social function' level, providing a new theoretical footnote for the institutional logic of mutual aid protection in the Chinese context. At the same time, the 33.33% knowledge gap warns that technology must achieve not only efficiency but also the simultaneous transmission of meaning; algorithmic efficiency needs to be complemented by 'warm notifications'.

The theoretical contribution of this study is further reflected in two aspects. First, it reveals the key role of 'organised trust' in mutual aid institutions. Fukuyama points out that trust can originate from shared norms and identity [13]. In the Chinese context, the employer (danwei) is not merely a workplace but a vehicle of emotional belonging. Being remembered and cared for by the employer years after retirement — this 'organised trust' is a key variable in reducing the cost of building the mutual aid community and injecting initial emotional value, and it is also an important institutional feature that distinguishes Chinese mutual aid protection from spontaneous Western mutual aid. Second, it reveals the necessity of addressing the 'perception gap' through expectation management. The gap between the 133.02% claim rate and a perception of an 'enormous' effect held by fewer than 10% of respondents is not institutional

failure but a manifestation of differing expectations. As the institution continues to operate, beneficiaries' expectations shift from 'whether it exists' to 'whether it is enough'. The implication for policymakers is that institutional communication requires not only objective data but also expectation management, in order to avoid the paradox of 'the more is done, the higher the expectations, the harder to satisfy'.

Practically, these findings suggest that programme managers should treat communication as an integral operational function rather than an afterthought. The 33.33% knowledge gap is not a marketing problem but an institutional design problem: if the payment system is designed to be invisible, its meaning will also be invisible. Embedding "warm notifications" into the operational workflow – for example, by requiring that each automatic payment be accompanied by a personalised message identifying the source – would close this gap at minimal marginal cost while preserving the convenience that beneficiaries value.

Limitations

This study has the following limitations. First, as a ministry-affiliated university, the population characteristics of Donghua University may be better than the social average, and the generalisability of the conclusions needs to be verified in more types of employers. Second, the four-year data period is still insufficient for assessing long-term financial sustainability. Third, the questionnaire survey covered only claimants and excluded the 'silent contributors' who never claimed. A notable strength, by contrast, is the rare combination of complete population-level claims data over four consecutive years with beneficiary survey data, which enables triangulation between objective fund flows and subjective perceptions within a single organisational unit. Future research could extend to comparative studies across employer types and regions, conduct actuarial analyses combined with population projection models, and track the transfer of the 'Shanghai model' to pilot cities, so as to provide empirical evidence for policy diffusion.

Conclusions

Drawing on social solidarity theory, this study constructed a four-dimensional framework of 'structure–process–outcome–experience' and empirically examined Shanghai's 'second medical insurance'. The main conclusions are as follows. Relying on the employer-based group enrolment model, the programme achieved a high coverage rate of 98.97%, with the university's full payment of premiums injecting organisational care. The four-year claim rate was 133.02%, with funds flowing significantly towards the oldest groups, indicating that the risk-sharing mechanism operates effectively. An average annual beneficiary coverage of 21.29% transformed mutual aid and shared risk from an abstract ideal into verifiable experience. The 'automatic payment without application' model achieved 100% satisfaction, and 83.33% of beneficiaries felt a sense of belonging, elevating the programme into a 'socio-psychological institution'. The programme combines the efficiency of institution-based organisational mobilisation with the warmth of emotional care, achieving significant results in both economic security and social integration.

The policy implications point to three priority directions. First, the gap between protection content and beneficiary expectations calls for a dynamic adjustment mechanism for the benefit package, giving priority to the inclusion of clinically necessary and high-cost medicines in special protection, and exploring tiered reimbursement ratios for people aged 80 and above. Second, the disconnect between technological convenience and meaning transmission calls for optimised payment notifications: each payment should clearly indicate the nature and source of the funds, age-friendly inquiry platforms should be developed, and face-to-face notification channels should be preserved in counter services. In particular, the transition from ‘silent remittance’ to ‘warm notification’ requires embedding informational design into the operational workflow rather than treating it as an optional add-on. Third, the structural inequity in enrolment opportunities calls for targeted subsidies for low-income people and those without employer backing, the use of medical insurance personal account balances to pay premiums, and the gradual bridging of the ‘employer divide’, so that the institution evolves from ‘a premium welfare of advantaged employers’ into more universal social infrastructure. In the longer run, the integration of mutual medical aid into local medical security planning – with clarified responsibilities among trade unions, employers and health authorities – would provide the institutional basis for such universalisation.

From a broader perspective, the findings of this study are of reference value for understanding the evolutionary logic of China’s multi-tiered medical security system. After basic medical insurance achieved ‘full coverage’, institutional innovation in the supplementary protection tier has become the key path to improving the quality of medical security. The practice of Shanghai’s ‘second medical insurance’ shows that social-solidarity-based supplementary protection can effectively fill the ‘institutional gap’ between basic medical insurance and commercial insurance, layering emotional care and organisational identity on top of risk sharing and forming a distinctive Chinese model of an ‘employer–trade union–mutual aid’ trinity. The value of this model lies not only in economic compensation but also in its reactivation of the ‘employer community’ mutual aid tradition during China’s social transition, providing transferable experience for medical security institution-building in an ageing society. For health systems internationally, the Shanghai case underscores that the most scalable supplementary health protection may not come from either the market or the state alone, but from the intelligent reactivation of existing social capital embedded in workplace communities – provided that equity, transparency and meaning are kept at the centre of institutional design.

Declarations

Ethics approval and consent to participate: This study was conducted in accordance with the ethical standards of the institutional research committee and was approved by the Retirees’ Affairs Committee of Donghua University (approval No. 2025060401, approval date:2025-06-04). The study was carried out in compliance with the ethical principles of the World Medical Association Declaration of Helsinki. The questionnaire survey was carried out on a voluntary and anonymous basis with written informed consent obtained from all participants. The administrative claims data used in this study were anonymised

records routinely collected by the Retirees' Affairs Committee of Donghua University for programme administration, and no personally identifiable information is reported..

Consent for publication: Not applicable.

Availability of data and materials: The data that support the findings of this study are available from the corresponding author on reasonable request, subject to anonymisation requirements and institutional data governance policies.

Competing interests: The author declares no competing interests.

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Authors' contributions: Xiaojun Wu conceived and designed the study, collected and analysed the data, and drafted and revised the manuscript. The author read and approved the final manuscript.

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Figures

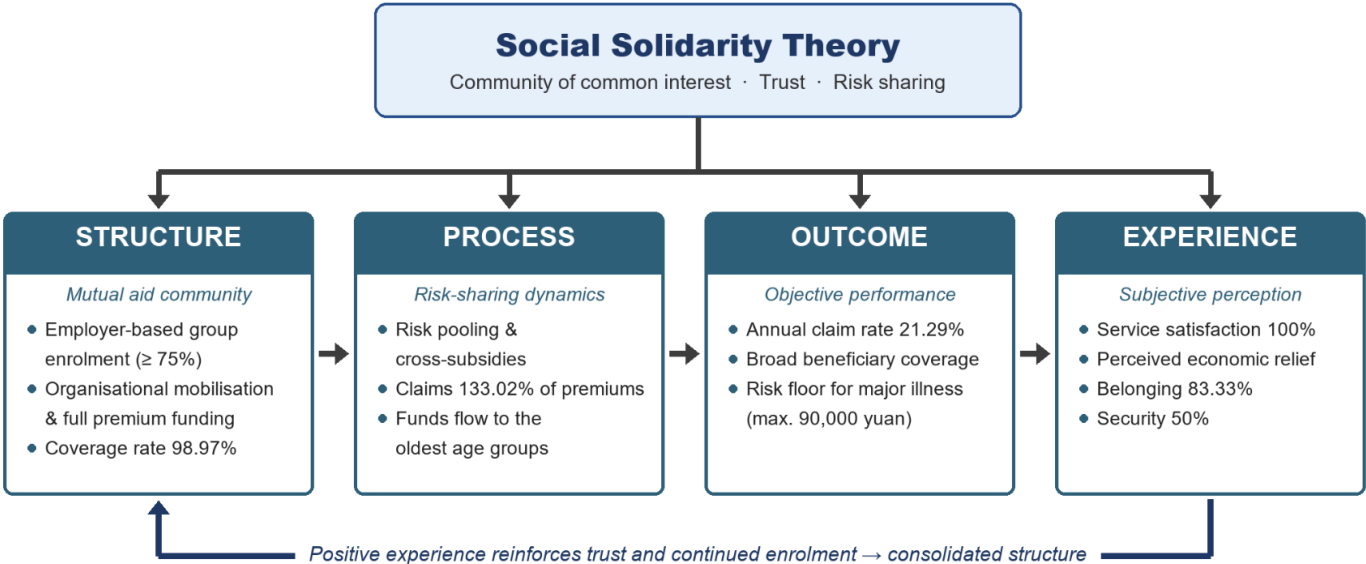


Figure 1

Four-dimensional analytical framework of mutual medical aid for retired workers from the perspective of social solidarity theory

Supplementary Files

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