Advances in Precision Medicine, 2026, Volume 11, Issue 8
https://bbwpublisher.com/journal/APM
Online ISSN: 2424-9106
Print ISSN: 2424-8592

A Study on the Current Status, Challenges, and Optimization Path of Smart Home-based Elderly Care in Urban Areas under the Background of Active Aging: A Case Study of Hainan

Fangtan Xing

Hainan Provincial People's Hospital, Haikou 570311, Hainan, China

Copyright: © 2026 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: As China's population ages, active aging has become a core strategic direction for addressing the challenges of an aging society. Smart home-based elderly care, as a new type of elderly care that combines internet technology with traditional home-based care models, has become an important innovative path to resolve the contradiction between urban elderly care supply and demand. This paper takes urban areas in Hainan as the research object, collects elderly care data of urban elderly populations in Hainan through questionnaire surveys, analyzes the current development status of smart home-based elderly care in Hainan from four dimensions: family characteristics, social environment characteristics, cognitive characteristics, and service needs, identifies the current practical difficulties faced by smart home-based elderly care in Hainan cities, and finally proposes targeted optimization paths from four dimensions: policy system improvement, professional talent training, technology adaptation and optimization, and cognitive concept guidance, providing practical reference for promoting the high-quality development of smart home-based elderly care in Hainan cities and implementing the active aging strategy.

Keywords: Active aging; Smart home-based elderly care; Urban areas of Hainan; Elderly care services

Online publication: August 26, 2026

1. Current status of smart home-based elderly care services in Hainan province under the background of active aging

1.1. Questionnaire design and selection

This survey designed a structured questionnaire focusing on smart home-based elderly care in urban areas of Hainan. The questionnaire consisted of four modules: the first module covered basic family characteristics of the elderly population; the second module covered social environment characteristics; the third module covered cognitive characteristics; and the fourth module covered needs characteristics. The survey subjects were permanent residents aged 60 and above in the three major cities of Haikou, Sanya, and Qionghai in Hainan, covering different age groups, income levels, and regions.

1.2. Data collection

This survey distributed 320 questionnaires and collected 302 valid questionnaires, resulting in a valid response rate of 94.38%. The sample age distribution was as follows: 57.28% were between 60 and 69 years old, 31.13% were between 70 and 79 years old, and 11.59% were 80 years old and above, consistent with the age structure characteristics of urban populations in Hainan. The survey combined in-person community visits with online questionnaires completed by children on behalf of the respondents. Elderly respondents received assistance from survey staff to ensure the accuracy and validity of the sample information.

1.3. Current situation analysis

Based on the valid questionnaires collected, a statistical analysis was conducted on the current status of smart home-based elderly care in Hainan cities from four dimensions. The statistical results for each dimension are as follows:

1.3.1. Family characteristics statistics

Table 1. Statistics on the characteristics of smart home-based elderly care households in Hainan cities

Index	Classification	Sample size	Percentage (%)
Living style	Living with children	128	42.38
	Living with spouse	117	38.74
	Living alone	57	18.88
Number of children	No children	12	3.97
	1	87	28.81
	2-3	162	53.64
	4 or more	41	13.58
Relationship with children	Harmonious relationship	241	79.80
	General relationship	52	17.22
	Poor relationship	9	2.98
Monthly economic income	2000 yuan and below	68	22.52
	2001-4000 yuan	147	48.68
	4001-6000 yuan	62	20.53
	6001 yuan and above	25	8.28

According to statistics on family characteristics, nearly 57.62% of the urban elderly population in Hainan do not live with their children, indicating a significant trend of empty nest syndrome; over 80% have harmonious relationships with their children; and over 70% have a monthly income of 4,000 yuan or less, limiting their purchasing power for paid smart elderly care services.

1.3.2. Statistics on social environmental characteristics

Table 2. Statistics on the characteristics of smart home-based elderly care families in Hainan cities

Index	Classification	Sample size	Percentage (%)
Insurance status	Urban employee pension insurance	194	64.24
	Urban and rural residents' old-age insurance	108	35.76
	Very satisfied	42	13.91

Current satisfaction with the status quo of elderly care	Quite satisfied	138	45.69
	generally	95	31.46
	Dissatisfied	27	8.94
Preferred retirement style	Traditional home-based elderly care	131	43.38
	Smart Home-based Elderly Care	89	29.47
	Institutional elderly care	56	18.54
	Community-based elderly care	26	8.61

In Hainan, basic old-age insurance coverage has been achieved for the urban elderly population, with more than one-third participating only in the urban and rural residents' old-age insurance program; nearly 60% are satisfied with the current state of old-age care, while more than 40% have a satisfaction level of average or below; more than 40% prefer traditional home-based old-age care, and the acceptance of smart home-based old-age care needs to be improved.

1.3.3. Cognitive feature statistics

Table 3. Statistics on Cognitive Characteristics of Smart Home-based Elderly Care in Hainan Cities

Index	Classification	Sample size	Percentage (%)
Understanding of smart home-based elderly care	**Very knowledgeable**	**18**	**5.96**
	I've heard of it, but don't know much about it.	107	35.43
	Never heard of it	177	58.61
Acceptable monthly service fee	100 yuan and below	212	70.20
	101-300 yuan	65	21.52
	301-500 yuan	18	5.96
	501 yuan and above	7	2.32
Proficiency in operating smart devices	Can operate skillfully	43	14.24
	Simple operation	102	33.77
	I basically don't know how to operate it.	124	41.06
	I have absolutely no idea how to operate it.	33	10.93

The overall awareness of smart home-based elderly care among urban elderly in Hainan is relatively low, with over 60% having never heard of it and less than 6% being very familiar with it; over 70% can only accept a monthly service fee of 100 yuan or less, indicating a weak willingness to pay; and over 50% can only operate the smart devices in a basic way or have no ability to operate them at all, with insufficient operational skills hindering promotion.

1.3.4. Statistics on the Demand for Smart Home-based Elderly Care Services and Equipment

Table 4. Statistics on the demand for smart home-based elderly care services and equipment in Hainan cities

Service/Equipment type	Percentage of those in demand (%)	Sort
Emergency call service	78.48	1
Health monitoring equipment	76.16	2
Health record management services	69.21	3
Medication reminder service	65.89	4

Remote medical consultation service	62.25	5
Positioning and anti-lost devices	51.32	6
Household service booking	46.36	7
Emotional comfort and social services	38.41	8

The demand for smart home-based elderly care in Hainan's urban areas is concentrated in the areas of health and safety. Service needs such as emergency calls, health monitoring, and health record management account for more than 60% of the demand, while the demand for mental health services is relatively low. The development of smart home-based elderly care should prioritize meeting health and safety needs.

2. The real challenges facing smart home-based elderly care services in Hainan against the backdrop of active aging

2.1. The supporting policy system is not yet sound

In recent years, in response to the national strategy of actively addressing population aging, Hainan has successively issued a number of guiding policy documents, including the "Overall Plan for the Construction of Smart Hainan (2021–2025)". However, in terms of actual implementation, most existing policies are at the macro-level, only making overall arrangements for the development direction and lacking specific implementation rules for the sub-sectors of smart home-based elderly care. In addition, the promotion of smart home-based elderly care involves multiple administrative departments, and currently, a regular cross-departmental collaborative working mechanism with clear responsibilities and smooth operation has not yet been established among different departments [1].

2.2. Shortage of professionally versatile talents

Currently, Hainan faces a significant shortage of interdisciplinary talents who possess both skills, and the talent supply cannot match the actual needs of industrial development. On the one hand, there are not many universities in Hainan that offer majors related to the intersection of elderly care services and information technology, resulting in limited local talent training capacity for the smart elderly care field and a need to improve the overall service capabilities of practitioners. On the other hand, the current overall salary level in the smart elderly care industry is not high, the daily frontline work intensity is high, the social recognition of smart elderly care practitioners is low, and the problem of talent loss within the industry is prominent.

2.3. Low compatibility with smart devices

Most smart elderly care products currently on the market are designed and developed according to the thinking and usage habits of young people, without fully considering the physiological characteristics and actual usage capabilities of the elderly. At the same time, the market price of most smart elderly care equipment is too high, exceeding the daily consumption affordability of the elderly in most cities in Hainan. Furthermore, most companies providing smart devices only focus on front-end product sales and neglect after-sales maintenance services, resulting in a long-term lack of such services. When equipment malfunctions during use, the elderly cannot receive timely professional repairs [2].

2.4. The elderly population has a low level of cognitive acceptance

Influenced by traditional concepts of elder care, most elderly people in Hainan's cities still rely on their

children for care, distrust new smart home-based elder care models, and are unwilling to try using smart devices. At the same time, due to inadequate publicity and promotion, most elderly people do not understand the functional advantages of smart home-based elder care, and even misunderstand it as institutional elder care, resulting in resistance. In addition, some elderly people are worried about privacy leaks and are unwilling to use related equipment and services, which hinders the promotion and popularization.

3. Optimization path of smart home-based elderly care services in Hainan under the background of active aging

3.1. Improve the policy support system and strengthen cross-departmental collaboration.

First, Hainan should closely leverage its own climate, location, and policy advantages for developing the elderly care industry to formulate a targeted development plan for smart home-based elderly care, clearly defining development goals for different stages, core tasks for regional coverage, and corresponding supporting measures. Second, a multi-departmental collaborative working mechanism should be established to break down long-standing data silos and information barriers between different departments. In addition, a comprehensive smart home-based elderly care service standard and full-process supervision system covering the entire service chain should be established to effectively protect the legitimate rights and interests of the elderly in using smart elderly care services [3].

3.2. Strengthen the training of professional talents and build a high-quality service team

On the one hand, support will be given to local universities and vocational colleges in Hainan to offer majors related to smart elderly care services and health management. Core courses will be designed closely to meet the actual job requirements of the industry, significantly increasing the proportion of practical teaching in the overall curriculum, and specifically cultivating local professionals to meet the needs of the Hainan market. On the other hand, vocational skills training for existing frontline workers will be strengthened. Operating standards for smart elderly care equipment and smart home-based elderly care service standards will be incorporated into routine on-the-job training and continuing education, systematically improving the professional competence of existing workers. Simultaneously, the salaries and social security levels of frontline elderly care service workers will be gradually increased to enhance the attractiveness of these positions.

3.3. Optimize smart device technology to improve product adaptability and usability

To address the current issues of insufficient age-friendliness and inadequate compatibility in the smart elderly care equipment market in Hainan, it is necessary to develop customized smart elderly care products that meet the needs of different groups, taking into account the high incidence of chronic diseases among Hainan's elderly population and the strong demand for elderly care services from migrant retirees. In terms of pricing, companies should be guided to launch cost-effective basic functional products, coupled with government purchase subsidies, to match the overall income level of Hainan's elderly population. Simultaneously, it is crucial to improve the after-sales service system, encouraging companies to establish dedicated smart elderly care equipment repair stations in various urban communities, and regularly organize staff to provide on-site equipment testing and maintenance services for elderly users.

3.4. Strengthen publicity and guidance to change the elderly's perception of elderly care

Relevant departments should further intensify publicity and promotion efforts for smart home-based elderly care, closely aligning with the information access habits of Hainan's elderly population. They should employ various offline promotional methods, such as community lectures, poster displays, and door-to-door explanations, to provide hands-on training on the use of smart devices. Simultaneously, they should improve and refine user privacy protection systems, standardize the collection, storage, and use of personal information, and strengthen investment in user information security technologies. Furthermore, they should fully leverage the guiding role of community workers and family members, encouraging children to promote smart home-based elderly care services to their parents, guiding the elderly to gradually shift from traditional elderly care concepts and proactively embrace new elderly care models.

4. Conclusion

Against the backdrop of active aging, developing smart home-based elderly care is a crucial path to addressing the challenges of population aging and improving the quality of life for seniors. Hainan, as a province with a high degree of aging, possesses favorable climate and policy advantages for developing the elderly care industry. Promoting smart home-based elderly care can not only meet the needs of the local elderly population but also attract seniors from other regions, driving the high-quality development of Hainan's elderly care industry. This research reveals that current smart home-based elderly care in Hainan's cities still faces challenges such as insufficient policy coordination, a large talent gap, poor equipment adaptability, and low awareness and acceptance. Future efforts should focus on four key areas: policy improvement, talent cultivation, technological optimization, and public awareness guidance to enhance the development level of smart home-based elderly care in Hainan and achieve the active aging goal of "providing for the elderly, ensuring their well-being, and enabling them to enjoy life."

Funding

2026 Haikou Municipal Philosophy and Social Science Planning Project: A Study on the Current Status, Challenges and Optimization Path of Smart Home-based Elderly Care in Urban Areas under the Background of Active Aging–Taking Hainan Province as an Example (Project No.: 2026-ZCKT-330)

Disclosure statement

The author declares no conflict of interest.

References

[1] Jiang X, Yao L, Li S, 2026, Research on the Identification and Evolution Mechanism of Influencing Factors on the Release of Data Value in Community-Based Smart Elderly Care. Information Theory and Practice, 49(6): 107–116.

[2] Li S, Li P, Tang J, 2023, Current Status and Optimization Strategies of Smart Elderly Care in Hainan Province. Cooperative Economy and Science & Technology, (19): 164–166.

[3] Chen B, Li F, 2024, Quantitative Analysis of Smart Elderly Care Policy in Hainan Province from the Perspective of Policy Tools (2017–2023). Tropical Agricultural Engineering, 48(6): 146–152.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.