Development and Effectiveness of Health-Promoting Hospitals in Zhejiang Province: Policy, Structure, and Intervention Effects Postprint

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Abstract

Background Health-promoting hospitals represent an important practice of the modern medical model. China initiated pilot programs for health-promoting hospitals in 2013. Current research predominantly focuses on optimizing indicator systems, with a lack of extraction of regionally distinctive models and in-depth deconstruction of local practices. Zhejiang Province launched pilot construction of health-promoting hospitals in 2007 and issued relevant management measures and assessment standards in 2013. As one of the earliest provinces to systematically advance pilot research and practice promotion at the provincial level, it has accumulated abundant policy documents and empirical data, making it an ideal sample for regional studies.

Objective To explore the policy system and practical effectiveness of health-promoting hospitals in Zhejiang Province, distill a regionally characteristic construction model, supplement quantitative evidence, and provide references for constructing regional health-promoting hospital models and advancing high-quality development of public hospitals nationwide.

Methods This study was conducted from March 2024 to June 2025, with data derived from health-promoting hospital assessment reports and construction data of secondary-level and above hospitals across 11 cities in Zhejiang Province from 2007 to 2023. Policy text analysis combined with in-depth examination of typical hospitals was employed to summarize the policy system and practical experience of health-promoting hospital construction in Zhejiang Province. A quasi-experimental study with non-random selection of three hospitals was conducted to quantitatively analyze the health intervention effects on patients and hospital staff.

Results Zhejiang Province has developed a regionally distinctive "policy guarantee-technical support-intervention evaluation" tripartite model for health-promoting hospitals. The coverage rate of health-promoting hospital construction among secondary-level and above hospitals increased from 40.6% (157/387) in 2017 to 100.0% (388/388) in 2023. Quasi-experimental study results demonstrated: Regarding patient intervention effects, following health-promoting hospital construction, patients' daily health behavior practices at discharge were significantly better than at admission ($P<0.05$). Using postoperative abdominal distension health intervention as an example, following health-promoting hospital construction, patients' cognitive level regarding postoperative abdominal distension, compliance behavior, and acceptance rate of intervention measures were higher than before construction ($P<0.05$), while the incidence of postoperative abdominal distension was lower than before construction ($P<0.05$). Regarding hospital staff intervention effects, following health-promoting hospital construction, hospital staff' s commuting patterns, exercise behavior, fruit and vegetable consumption, and sleep quality improved compared with pre-construction levels ($P<0.05$), and the proportion of staff with BMI within the reference range was higher than before construction ($P<0.05$).

Conclusion High-quality, long-term development of health-promoting hospitals requires mutual reinforcement and coordinated development between policy guidance and intervention practice. Health intervention measures have demonstrated significant effectiveness in optimizing medical service models, promoting health among patients and healthcare workers, enhancing health promotion capacity, and improving health literacy.

Full Text

Preamble

Development and Effectiveness of Health-promoting Hospitals in Zhejiang Province: Policies, Structure, and Intervention Effects

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Abstract

Background: Health-promoting hospitals represent an important practice in

the modern medical model. China launched its health-promoting hospital pilot program in 2013. Current research has primarily focused on optimizing indicator systems, lacking refinement of regionally characteristic models and in-depth deconstruction of local practices. Zhejiang Province initiated its pilot construction of health-promoting hospitals in 2007 and issued relevant management measures and assessment standards in 2013, making it one of the earliest provinces to systematically promote pilot research and practice at the provincial level. The province has accumulated rich policy texts and empirical data, making it an ideal sample for regional research.

Objective: To examine the policy system and practical effectiveness of health-promoting hospitals in Zhejiang Province, refine the regionally characteristic construction model, and supplement quantitative evidence to provide references for building regional health-promoting hospital models and promoting high-quality development of public hospitals in China.

Methods: This study was conducted from March 2024 to June 2025, using data from health-promoting hospital evaluation reports and construction data from secondary-level and above hospitals across 11 cities in Zhejiang Province from 2007 to 2023. Policy text research combined with in-depth analysis of typical hospitals was used to summarize the policy framework and practical experience. A quasi-experimental study was conducted with three non-randomly selected hospitals to quantitatively analyze health intervention effects on patients and hospital employees.

Results: Zhejiang Province has formed a regionally distinctive "policy guarantee-technical support-intervention evaluation" three-in-one health-promoting hospital model. The coverage rate of health-promoting hospital construction in secondary-level and above hospitals increased from 40.6% (157/387) in 2017 to 100.0% (388/388) in 2023. The quasi-experimental study showed that in terms of patient intervention effects, patients' daily health behavior practices at discharge were significantly better than at admission ($P<0.05$). Taking postoperative abdominal distension intervention as an example, patients' cognitive levels, medical compliance behaviors, and acceptance rates of intervention measures were significantly higher after health-promoting hospital construction ($P<0.05$), while the incidence of postoperative abdominal distension was significantly lower ($P<0.05$). Regarding hospital employee intervention effects, employees' commuting patterns, exercise behaviors, vegetable and fruit intake, and sleep conditions improved significantly after construction ($P<0.05$), and the proportion of employees with BMI within the reference range was significantly higher than before construction ($P<0.05$).

Conclusion: The high-quality, long-term development of health-promoting hospitals requires mutual promotion and coordinated development of policy guidance and intervention practice. Health intervention measures have demonstrated significant effectiveness in optimizing medical service models, promoting health among patients and medical staff, enhancing health promotion capabilities, and improving health literacy.

[**Key words**] Health-promoting hospitals; Health promotion; Health education; Hospital administration; Health policy; Zhejiang

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Health-promoting hospitals, centered on comprehensive population health maintenance, integrate health promotion concepts and strategies into hospital development. They not only provide high-quality medical care for patients but also establish cooperative relationships with patients to promote the health of patients, employees, and surrounding communities [1-2]. In 1989, the World Health Organization (WHO) launched its first health-promoting hospital pilot project in Vienna, Austria, which was subsequently expanded to 20 hospitals across 11 European countries [3]. The emergence of health-promoting hospitals aligns with the transformation of modern medical models, shifting away from the traditional hospital philosophy of "treatment over prevention." Hospital managers integrate health promotion concepts and strategies throughout hospital management and service processes by formulating and implementing health-supportive policies, creating environments conducive to physical and mental health for both doctors and patients, strengthening community health actions, conducting health education, and optimizing health services. Currently, both domestic and international research has explored indicator systems for evaluating health-promoting hospital construction. The WHO Regional Office for Europe proposed establishing evaluation standard systems from five dimensions: management policies, patient assessment, patient information and interventions, workplace environment, and cooperative arrangements [4]. Some domestic researchers have also conducted explorations tailored to China' s national conditions [5-6].

In 2013, building upon the central government' s subsidized local health literacy promotion project, the National Health Commission launched pilot construction of health-promoting hospitals and formulated technical guidance documents such as the "Health-promoting Hospital Pilot Work Norms" and "Health-promoting Hospital Evaluation Reference Standards," which standardized construction approaches from multiple dimensions including organizational management, healthy environment, health education, and effectiveness evaluation [7]. However, domestic research has mostly concentrated on indicator system optimization, lacking refinement of regional characteristic models and in-depth deconstruction of local practices, with weak quantitative effectiveness evidence and insufficient long-term tracking data [6,8-9]. Zhejiang Province initiated pilot construction of health-promoting hospitals in 2007. In 2013, the Zhejiang Provincial Patriotic Health Campaign Committee Office and Zhejiang Provincial Health Commission jointly issued the "Zhejiang Province Health-promoting Hospital Management Measures (Trial)" and "Zhejiang Province Health-promoting Hospital Assessment Standards (Trial)" [10]. As one of the earliest provinces to systematically promote pilot research and practice at the provincial level, Zhejiang has emphasized health diagnosis and interventions targeting major health issues among patients and hospital employees, accumulating rich policy texts and empirical data that make it an ideal sample for regional research.

This study analyzes the policy system and effectiveness of health-promoting hospitals in Zhejiang Province, systematically examining policy evolution, conducting in-depth case analyses, and quantitatively analyzing intervention effects to summarize construction achievements. The findings aim to provide references for building regional health-promoting hospital models in China and promoting high-quality development of public hospitals.

1. Methods

1.1 Data Sources

This study was conducted from March 2024 to June 2025, using data from health-promoting hospital evaluation reports and related data from 2007 to 2023, covering construction process and effectiveness data from secondary-level and above hospitals across 11 cities in Zhejiang Province.

1.2 Research Methods

The study employed a combination of normative and empirical research methods. Normative research was based on WHO health-promoting hospital theories and frameworks to establish objectives and standards and analyze their degree of achievement. Empirical research collected process materials including evaluation reports, typical cases, and intervention evaluation data, combining case analysis, literature analysis, and content analysis through multi-dimensional data collection and systematic inductive analysis to construct a practical framework for health-promoting hospital construction in Zhejiang Province. Overall, the study formed a multi-dimensional argumentation system with practical cases as the carrier and policies and data as support. Specific methods included:

1. **Policy Text Research**: Examined national and Zhejiang provincial policy documents related to health-promoting hospitals or health promotion venues since 2007, using a "policy tool-objective dimension-implementation stage" three-dimensional analytical framework to interpret policy frameworks and evolutionary logic.
2. **Case Study**: Purposefully selected typical hospitals for in-depth analysis to present their construction experiences and effectiveness in hospital policies, environments, and health promotion for patients and employees.
3. **Quasi-experimental Study**: Following the principles of purposiveness, representativeness, and information richness in typical case selection, three hospitals were non-randomly selected for quantitative analysis of health intervention effects on patients and employees. Specifically: 50 inpatients from the same ward with the same diagnosis at Hospital A were selected to complete questionnaires about daily health behaviors at admission and discharge. 65 elective surgery patients from the same ward with the same diagnosis at Hospital B were selected before and after health-promoting

hospital construction to complete questionnaires about postoperative abdominal distension-related knowledge, medical compliance, intervention acceptance, and incidence. 223 employees at Hospital C were surveyed before construction, and 227 employees after construction, with questionnaires covering commuting patterns, exercise behaviors, vegetable and fruit intake, sleep conditions, and BMI. All questionnaires were distributed and collected on-site by the respective hospitals' health departments.

1.3 Statistical Methods

SPSS 22.0 statistical software was used for data analysis. Count data were expressed as relative numbers, and inter-group comparisons were performed using the ^{2} test. $P<0.05$ was considered statistically significant.

2. Practice Path of Health-promoting Hospitals in Zhejiang Province

2.1 Development History of Health-promoting Hospitals in Zhejiang Province

The development of health-promoting hospitals in Zhejiang Province can be traced back to 2007, with an evolutionary path closely integrated with policy promotion, standard iteration, and practical innovation, forming three stages: "pilot exploration-comprehensive promotion-quality enhancement." The period from 2007 to 2012 was the pilot exploration stage, during which Zhejiang Province took the lead in piloting health-promoting hospitals in two institutions, marking a transformation from traditional "disease treatment" to "health promotion" in hospital management. This stage focused on learning from WHO health-promoting hospital concepts to explore implementation paths suitable for Zhejiang' s actual conditions [7]. The period from 2013 to 2020 was the comprehensive promotion stage, during which Zhejiang Province incorporated health-promoting hospital construction into key provincial health priorities, organizing all secondary-level and above hospitals to participate comprehensively [11-12]. From 2021 to the present is the high-quality development stage, during which Zhejiang has continued advancing construction, revised and released the "Zhejiang Province Health-promoting Hospital Evaluation Standards (2021 Edition)" [13], strengthened indicator scientificity and operability, and further promoted standardized and scientific development of health-promoting hospitals across the province.

2.2 Core Structural System of Health-promoting Hospitals in Zhejiang Province

This study proposes that the basic dimensions of health-promoting hospitals in Zhejiang Province can be defined as three core levels: "policy guarantee," "technical support," and "intervention evaluation." The health-promoting hospital

evaluation indicator system is based on these three dimensions, further covering specific components such as organizational management, environmental construction, health activities, health skills, and health interventions (Figure 1 [Figure 1: see original paper]). From a practical application perspective, Zhejiang' s health-promoting hospital practice model reflects both whole-life-cycle management and medical-preventive integration concepts, promoting integrated hospital-community development through digital empowerment and multi-dimensional interventions, while also demonstrating systematic thinking and forward-looking planning for health-promoting hospital construction, providing strong support for its high-quality, long-term development.

2.2.1 Health-promoting Hospital Policy System Zhejiang Province has formed a relatively complete policy framework for health-promoting hospitals. At the top-level design, a series of policy documents including the "Healthy Zhejiang 2030 Action Outline" [14], "Implementation Opinions of Zhejiang Provincial People' s Government on Promoting Healthy Zhejiang Actions" [15], and "Three-Year Implementation Plan for Zhejiang Province Health Knowledge Popularization Action 2023-2025" [16] have incorporated health-promoting hospital construction as an important component of Healthy Zhejiang construction and included it in Healthy Zhejiang assessment indicators. The Provincial Health Commission formulated the "Zhejiang Province Health-promoting Hospital Management Measures (Trial)" and "Zhejiang Province Health-promoting Hospital Evaluation Standards (Trial),"integrating construction into hospital grade evaluation. From a specific policy perspective, the "Three-Year Implementation Plan for Zhejiang Province Health Knowledge Popularization Action 2023-2025" explicitly proposes construction goals and specific measures for health-promoting hospitals. Additionally, health promotion and education work have been incorporated into medical staff professional title evaluation and performance assessment, with health education and promotion activities by medical institutions and personnel included in hospital grade evaluation, annual target responsibility assessment, and individual performance evaluation. At the local level, various cities have formulated specific implementation plans based on actual conditions, incorporating health-promoting hospital construction into local development plans.

2.2.2 Health-promoting Hospital Technical Support System The formulation and implementation of the "Zhejiang Province Health-promoting Hospital Management Measures (Trial)" and "Zhejiang Province Health-promoting Hospital Evaluation Standards (Trial)" have improved construction and evaluation processes, providing clear norms and guidance to promote standardized and homogeneous development of health-promoting hospitals. The Zhejiang evaluation standards construct an indicator system around five dimensions: organizational construction, environmental construction, health activities, health skills, and employee health care. Regarding technical training, Zhejiang has established a three-tiered provincial, municipal, and county linkage training

mechanism, providing solid human resources support through stratified and categorized training. At the provincial level, key trainers and expert teams are cultivated through business training, continuing education, and guidance, with a provincial health-promoting hospital evaluation expert pool established covering health administration, patriotic health, and health education experts. Municipal and county levels focus on strengthening practical and operational skills of professional technical personnel. At the hospital level, full-time and part-time health promotion personnel are equipped according to construction standards, with full-time personnel receiving no less than 8 hours of professional training and health education/promotion training included in pre-job training for all staff. Full-time personnel are primarily responsible for managing hospital-wide health education and promotion work, including plan formulation, resource coordination and integration, and overall activity organization and promotion. Part-time personnel are distributed across departments, responsible for implementing health education plans and conducting targeted health promotion activities based on departmental specialties and patient needs. Health education professional institutions disseminate health-promoting hospital concepts from the five fields of health promotion, providing technical guidance for construction with practical examples. This stepped training and guidance model ensures standardized dissemination of health promotion concepts and technologies while accommodating needs at different levels, providing continuous technical support and intellectual backing for constructing a scientifically standardized health-promoting hospital system.

2.2.3 Health-promoting Hospital Intervention Evaluation System
Health-promoting hospital construction follows the WHO settings-based health promotion technical pathway, referring to the PRECEDE-PROCEED model for health education program design, implementation, and evaluation, as well as theoretical models of health-promoting hospitals [17]. In practice, based on needs assessment and problem-oriented health promotion strategies, comprehensive needs assessments are conducted using epidemiological surveys, physical examination data, and clinical data analysis. The main health problems of target populations such as patients and employees are identified to determine priority issues as entry points. Subsequently, specialized health education intervention plans are formulated around these entry points from the perspectives of hospital policies, environments, health activities, and health services. Interventions employ multidisciplinary collaborative interventions, digital health interventions, hospital-community linkage interventions, integrated traditional Chinese and Western medicine interventions, personalized health management, behavioral lifestyle interventions, and mental health support. Targeted comprehensive interventions are implemented using evidence-based medicine methods, with continuous improvement through "Plan-Do-Check-Act" (PDCA) cycles and regular evaluation of intervention effectiveness. Meanwhile, the "Zhejiang Province Health-promoting Hospital Evaluation Standards" incorporate hospital health knowledge base construction as an important indi-

cator. Hospitals develop health knowledge bases by specialty and key disease during construction, integrating them into Hospital Information Systems (HIS) and clinical pathways to lay the foundation for standardized health education, implementation of "dual prescription systems," and digital health interventions.

3. Effectiveness of Health-promoting Hospitals in Zhejiang Province

3.1 Coverage Rate of Health-promoting Hospitals

By 2023, all 388 secondary-level and above hospitals in Zhejiang Province had completed health-promoting hospital construction, achieving a coverage rate of 100.00% (Table 1).

3.2 Intervention Effects

3.2.1 Patient Intervention Effects Survey results from Hospital A showed that the proportions of patients practicing correct spitting, correct sneezing, proper water drinking habits, proper seatbelt use when riding in vehicles, and regular window ventilation habits at discharge were significantly higher than at admission ($P<0.05$). However, there was no significant difference in the proportion of patients separating raw and cooked foods in refrigerators compared with admission ($P>0.05$) (Table 2).

Survey results from Hospital B showed that after health-promoting hospital construction, patients' cognitive levels regarding postoperative abdominal distension, medical compliance behaviors, and acceptance rates of intervention measures were significantly higher than before construction ($P<0.05$), while the incidence of postoperative abdominal distension was significantly lower than before construction ($P<0.05$) (Table 3).

3.2.2 Hospital Employee Intervention Effects Survey results from Hospital C showed that after health-promoting hospital construction, employees' commuting patterns, exercise behaviors, vegetable and fruit intake, and sleep conditions improved significantly compared with before construction ($P<0.05$). The proportion of employees with BMI within the reference range [18] was significantly higher than before construction ($P<0.05$) (Table 4).

4. Recommendations and Prospects for Promoting Health-promoting Hospital Construction

4.1 Health-promoting Hospital Construction Should Be Guided by Health Promotion Theory

Through systematic analysis of Zhejiang Province' s health-promoting hospital policies and health intervention measures, this study proposes a basic framework of "policy guarantee-technical support-intervention evaluation."The results

demonstrate that a sound health-promoting hospital policy system provides institutional guarantees for high-quality, long-term development. From a regional practice perspective, the construction effectiveness is evident. Compared with health-promoting hospital construction in other regions of China [19-20], Zhejiang' s construction process follows the technical pathway of "needs assessment-comprehensive intervention-effectiveness evaluation,"focusing on targeted health interventions for major health issues among patients and employees, which better aligns with practice models supported by health promotion theory.

4.2 Health-promoting Hospital Construction Should Widely Advocate Health Promotion Concepts

Health-promoting hospitals represent an important practice of modern medical philosophy, with their core mission extending from 单纯的 "disease treatment" to "health-centered care" and integrating health promotion into all policies and clinical pathways. As an important implementation vehicle for the "Healthy China" strategy in the medical field, health-promoting hospitals need to summarize and learn from regional practical experiences, adopt a problem-oriented approach, focus on replicable practical methods, and form a promotion pathway of "practice-optimization-innovation." Health-promoting hospital construction requires a mindset shift toward "creating long-term health value," transforming hospitals from places that merely provide clinical services into platforms that promote the overall health of individuals, families, and communities. The policies and intervention measures of health-promoting hospitals form synergistic effects through goal alignment, resource complementarity, innovative interaction, and evaluation feedback, jointly driving the development of health-promoting hospitals.

4.3 Health-promoting Hospital Construction Should Focus on Policy Improvement and Capacity Building

Accelerating the promotion of health-promoting hospitals requires deepening the transformation of health promotion concepts and reshaping hospital organizational culture. Health promotion should be integrated into hospital high-quality development strategies, with innovative incentive mechanisms, resource integration mechanisms, capacity building and training mechanisms, and evaluation feedback mechanisms for medical staff to conduct health promotion, effectively promoting the development of health-promoting hospitals. Training should strengthen health promotion concepts, promoting understanding and awareness of health education and promotion theories and practices among all hospital staff. Following health promotion theories to guide construction, relying on diversified health intervention pathways and effectiveness evaluation methods based on needs assessment, and through multiple approaches including service model transformation, capacity building, resource integration, and brand building, health intervention measures can play roles in improving health literacy, promoting health behavior formation, optimizing medical service mod-

els, and enhancing health promotion capabilities.

4.4 Health-promoting Hospital Construction Should Focus on Whole-Life-Cycle Health Management for Patients, Employees, and Community Residents

Patient education is an important component of health-promoting hospitals. Systematic health services centered on patients should be strengthened to achieve a transformation from "consultation room treatment"to "whole-life-cycle health management." Admission assessment and personalized interventions should be conducted, integrating health education and interventions into clinical pathways and providing personalized lifestyle guidance on diet, exercise, medication compliance, and psychological adjustment according to patients' conditions. Integration of prevention, treatment, rehabilitation, medical-nursing care (elderly care), and hospice services should be achieved through data sharing and business collaboration to realize whole-life-cycle health management for residents. Simultaneously, health-promoting hospitals should pay greater attention to employee health by strengthening precise employee health assessments, implementing comprehensive employee health programs, and providing services such as mental health support, stress management, regular physical examinations, and fitness facilities to promote employee health and prevent occupational exposure and burnout.

4.5 Health-promoting Hospital Construction Should Strengthen Intervention Technology Innovation

Digital means should be utilized to innovate health intervention strategies, with diversified measures for patient and employee health interventions forming innovative models such as multidisciplinary collaboration, digital empowerment, and community linkage. A unified health information platform should be established to implement personalized health management and develop artificial intelligence-based health prescription systems [21-22] and virtual health assistants to reduce repetitive manual work and enhance patient participation in health promotion. Digital health should be deeply integrated with personalized health management, using artificial intelligence, big data, and Internet of Things technologies for health risk assessment, personalized intervention plan generation, and effectiveness prediction.

From a long-term development perspective, health-promoting hospital promotion and practice still face issues such as insufficient integration of health promotion concepts, incomplete policy systems and technical standards, limited resource investment, and lack of targeted long-term interventions. Further optimization is urgently needed in evaluation indicator design, evaluation dimensions, evaluation methods, and the establishment of long-term monitoring mechanisms. This study lacks typical data and effectiveness analysis on the health intervention impact of health-promoting hospital construction on surrounding community populations, which should be addressed in future research.

The conclusions of this study indicate that health-promoting hospitals result from the mutual promotion and coordinated development of policy guidance and intervention practice, forming a development model with Zhejiang characteristics. The high-quality, long-term development of health-promoting hospitals is a systematic project requiring joint efforts in policy guidance, intervention practice, and social participation. Future efforts should accelerate health-promoting hospital construction to contribute to the "Healthy China" initiative.

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Note: Figure translations are in progress. See original paper for figures.