Table 1. Comparative Analysis of Smart City, Healthy City, SHAFE, and Smart Healthy City Concepts

Feature	Smart City	Healthy City	Smart Healthy Age-Friendly Environments (SHAFE)	Smart Healthy City (SHC)
Primary Focus	Technological infrastructure and digital solutions	Health promotion and environmental determinants of health	Age-friendly design with smart technology integration	Integration of smart technologies with health-promoting strategies
Key Objectives	Enhance urban efficiency, sustainability through technology	Improve population health outcomes and reduce health inequities	Support aging in place through technology and inclusive design	Achieve health equity, smart connectivity, and system-level resilience
Target Population	General urban residents with emphasis on tech-savvy citizens	All urban residents with focus on vulnerable populations	Primarily older adults and people with disabilities	All urban residents across the lifespan
Theoretical Foundation	Information and communication technology theories	Social determinants of health, public health principles	Combination of gerontology and smart environment theories	Six integrated perspectives including socio-ecological theory, capabilities approach, and systems thinking
Implementation Approach	Top-down technological deployment	Community-based participatory approach	User-centered design with multi-stakeholder collaboration	Multi-dimensional approach balancing technology, health, and social sustainability
Potential Limitations	Risk of digital divide and technocentric bias	Limited integration of technological innovation	Narrow demographic focus may limit broader application	Tension between technological advancement and social sustainability priorities
Primary Dimensions	Digital infrastructure, data analytics, IoT	Built environment, social cohesion, health services	Accessible environments, supportive technologies, social participation	Healthy Environment Cities, Smart Networking Cities, Socially Sustainable Cities, Health Empowering Cities
Key Organizations	Technology companies, municipal IT departments	World Health Organization, local health authorities	European Commission, AGE Platform Europe	Interdisciplinary collaboration across sectors

Table 2. Summary of Key Findings Based on Research Questions

Research Question		Analysis Method	Key Findings	Implications
1	What constitutes the concept of a Smart Healthy City?	Concept Mapping Analysis	Four dimensions identified through multidimensional scaling and hierarchical cluster analysis: - Healthy Environment Cities - Smart Networking Cities - Socially Sustainable Cities - Health Empowering Cities	Provides a comprehensive framework for conceptualizing and implementing SHCs that balances technological infrastructure with social determinants of health
2	What are the priority concepts within a Smart Healthy City?	Pattern Matching Analysis	Differential contributions of SHC dimensions to core objectives: - Healthy Environment Cities: Balanced contribution across all objectives (health equity, smart connectivity, system-level resilience) - Smart Networking Cities: Strong correlation with smart connectivity objectives - Socially Sustainable Cities: Primary association with health equity objectives - Health Empowering Cities: Key contribution to system-level resilience	Guides strategic development and resource allocation in SHC initiatives by highlighting how different dimensions contribute to key urban health objectives
3	What are the key concepts integral to achieving the core objectives of a Smart Healthy City?	Go-Zone Analysis	Highest-priority concepts across multiple objectives: - Easy access to healthcare services (Healthy Environment Cities) - Efficient health promotion (Healthy Environment Cities) - Integration of smart technologies (Smart Networking Cities) - Disease prevention focus (Health Empowering Cities) - No statements from Socially Sustainable Cities cluster appeared in the highest-priority zone	Identifies actionable focal points for SHC development while revealing a potential disconnect between the theoretical importance of social sustainability and its practical implementation priority

5 **Table 3. SHC Dimensions Summary and Comparison**

SHC Dimension	Definition	Thematic Focus	No. of Stmts	Mean (s.d.)	Key Statements by Importance (mean score)	Core SHC Objectives* (Mean (s.d.))	Theoretical Connections
Healthy Environment City	• Focuses on creating health-promoting physical environments with accessible infrastructure and services. • Emphasizes urban design elements that facilitate physical activity, provide easy access to healthcare services, and promote overall wellbeing through efficient health systems integration.	Physical Urban Infrastructure for Health	7	4.05 (0.21)	Health-promoting urban environment elements (4.29) Easy access to healthcare services (4.21) Highly efficient in improving health (4.15) Encompassing smart city and healthy city concepts (4.14)	HE: 3.77(0.96) SR: 3.77(1.02) SC: 3.71(1.05)	**Foudational Theory:** • Socio-ecological Theory: Physical environmental level of health influenc **Integrative Theories:** • Systems Thinking: Interconnected urban environment systems • Smart City Theory: Integration of health-promoting technologies in urban spaces
Smart Networking City	• Leverages digital connectivity and information sharing to enhance healthcare delivery, facilitate inter-agency collaboration, and engage citizens. • Focuses on breaking down technological barriers and using digital innovations to transform traditional healthcare approaches.	Digital Connectivity for Health System Transformation	13	3.95 (0.24)	Going beyond traditional healthcare through smart technologies (4.50) Using digital technology to reorient healthcare (4.21) No barriers to utilizing smart technologies (4.14) Application of bio and industrial technologies felt by citizens (4.07)	HE: 3.50(1.13) SR: 4.30(0.63) SC: 3.85(0.89)	**Foundational Theory:** • Smart City Theory: Technological solutions for urban health challenges **Integrative Theories:** • Participatory Urban Planning: Digital citizen engagement • Systems Thinking: Connectivity between stakeholders and agencies
Socially Sustainable City	• Promoting social inclusivity, addressing community health needs, and ensuring quality of life for vulnerable populations. • Emphasizes collective wellbeing, intergenerational harmony, and solutions to social challenges including aging and inequality.	Inclusive Community Wellbeing	17	3.85 (0.31)	Targeting the health of the entire community (4.50) Enhancing quality of life for people with disabilities (4.07) Improving quality of life for the elderly (4.07) Offering solutions to aging population challenges (4.00)	HE: 4.16(0.79) SR: 3.18(1.14) SC: 3.67(0.99)	**Foundational Theory:** • Health Equity & Social Determinants: Focus on vulnerable populations **Integrative Theories:** • Participatory Urban Planning: Inclusive policies and community-centered approaches • Capabilities Approach: Enhancing dignity regardless of circumstances
Health Empowering City	• Focused on building resilience and enhancing capabilities at both individual and system levels, • Emphasizing preventive approaches, adaptive capacity development, and empowerment of citizens to take control of their	Individual and System-Level Resilience and Capability Building	20	3.73 (0.34)	Model for disease prevention (4.29) Public health city safe from infectious diseases (4.29) Social model that scales healthy living behaviors (4.14)	HE: 3.62(0.98) SR: 3.38(1.12) SC: 3.68(1.05)	**Foundational Theory:** • Capabilities Approach: Development of individual and collective capabilities to achieve health and wellbeing **Integrative Theories:** • Systems Thinking: Systemic resilience and adaptive capacity across multiple

Tables

SHC Dimension	Definition	Thematic Focus	No. of Stmts	Mean (s.d.)	Key Statements by Importance (mean score)	Core SHC Objectives* (Mean (s.d.))	Theoretical Connections
	health trajectories through personalized services and community-based preventive measures.				Providing personalized and customized services (4.07) Maintaining personal quality of life (4.07)		urban scales • Participatory Urban Planning: Co-production of preventive health strategies and empowerment mechanisms

* HE: Health Equity; SR:System-level Resilience; SC:Smart Connectivity

Table 4. Detailed Statements in Zone 8 and Importance Ratings

Statements(no.)	Importance								Cluster
	Aim 1: Health Equity		Aim 2: Smart Connectivity		Aim 3: System-level Resilience		Average		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
A smart healthy city is a city with easy access to health and welfare services (10)	4.56	0.73	3.88	0.96	4.00	1.03	4.15	0.37	Healthy Environment City
A smart healthy city is a city that is highly efficient in improving the health of individuals and the city as a whole. (23)	3.81	1.05	4.19	0.91	3.94	0.85	3.98	0.19	
A smart healthy city is a city that is well equipped with basic infrastructure. (5)	3.87	0.74	3.63	1.41	3.88	1.09	3.78	0.14	
A smart healthy city is a city where there are no barriers to utilizing smart technologies. (31)	3.81	1.22	4.50	0.63	3.80	0.86	4.04	0.40	Smart Networking City
A smart healthy city is an essential model for disease prevention (19)	4.15	0.56	3.69	1.08	4.00	0.89	3.95	0.24	Health Empowering City