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Integrated Active Aging Index (IAAI): From Individual-Level Quantification to Community-Based Active Aging Intelligence

As global populations age, conventional geriatric monitoring systems often fail to deliver real-time, holistic, and engaging mechanisms necessary for proactive care. There is a need for dynamic digital frameworks that not only ensure safety but also actively quantify and promote Active Aging through technology. This study addresses the research question: How can a multi-dimensional digital framework effectively quantify Active Aging at both individual and community levels while preserving data sovereignty for older adults with diverse physical capacities? The objective is to develop the Integrated Active Aging Index (IAAI) platform, a responsive digital ecosystem designed to assess and enhance four core dimensions of Active Aging: Security, Health Capacity, Social Participation, and Employment. The platform conceptualizes IAAI as an individual-level Active Aging Index, in which each senior generates a personalized four-dimensional AAI profile. Aggregated mean values of individual indices within a defined community subsequently form a community-level Active Aging Index, providing an area-based representation of aging capacity across the same four dimensions. Built on a React/TypeScript architecture with centralized state management (Zustand v5), the system categorizes users into three physical tiers—Seedling, Tree, and Forest. A gamification engine applies weighted multipliers to real-time step counts while penalizing fall events to generate a dynamic IAAI Total Index. Objective movement data are integrated with subjective self-assessment inputs into a unified dashboard. The platform adopts a Privacy-by-Design approach, with all data stored exclusively on-device, eliminating registration and cloud synchronization. This architecture ensures full data ownership and fosters trust among older users.

Keywords: Integrated Active Aging Index (IAAI), Gerontechnology, Privacy-by-Design, Digital Health Gamification, Multidimensional Assessment

Biography

A Thai physician and public health leader, he served as Deputy Permanent Secretary and Inspector General of Thailand's Ministry of Public Health. A pioneer in digital health, he implemented the nation's first Online Hospital Information System and helped architect the Universal Coverage Scheme. With deep expertise in aging society strategies, he directed the MoPH-JICA integrated welfare model for seniors. An alumnus of Harvard Business School (AMP 180) and a Fellow of the Royal College of Surgeons, he now integrates clinical expertise with system analysis to innovate gerontechnology via the Integrated Active Aging Index (IAAI) framework.