

Mobile Health Clinics and Telehealth Outreach in Thailand: A Focus on Elderly Care and NCDs

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Background: Thailand faces a rapidly aging population alongside a high burden of non-communicable diseases (NCDs). Ensuring equitable healthcare access for older adults with NCDs is a pressing challenge. Mobile health clinics and telehealth services have emerged as key strategies to reach underserved elderly populations and maintain continuity of NCD care in remote or resource-limited settings.

Objective: To examine current mobile clinic initiatives and telehealth outreach in Thailand focused on elderly care and NCD management, and to evaluate their impact on healthcare access and outcomes for older adults.

Methods: We conducted a narrative review of published literature, policy reports, and program descriptions on mobile health clinics and telehealth interventions in Thailand, with emphasis on applications for older adults and chronic disease care (eg, diabetes, hypertension). A comprehensive search (2010–2025) of PubMed, Google Scholar, and Thai government/organization websites identified relevant sources. Data on intervention models, settings, target populations, and reported outcomes were extracted. In total, 15 key publications and reports were reviewed, from which 8 major mobile clinic or telehealth initiatives were identified.

Results: Mobile health clinics have expanded primary care access for vulnerable elderly in both urban and rural areas. The Thai Red Cross Society's mobile clinic serves remote mountainous communities and provides primary care, NCD screenings, vaccinations, and medications to about 5,000 underserved people annually. Past mobile outreach programs have uncovered many untreated cases—in one survey, 58% of hypertensive and 75% of diabetic elderly were first diagnosed via a mobile unit. Telehealth services have likewise grown substantially. During the COVID-19 pandemic, telemedicine was rapidly adopted for routine consultations and chronic disease follow-ups. The National Health Security Office (NHSO) introduced a nationwide telemedicine service under the Universal Coverage Scheme, enabling remote consultations and medication deliveries for stable chronic NCD patients, ensuring continuity of care during lockdowns. Numerous telehealth applications emerged (public and private); for example, smartphone apps like MorDee (“Good Doctor”) gained wide usage in Thailand. In an urban pilot “Dusit Telemedicine” model, integrating community clinics with a tertiary hospital, over 300 elderly patients received teleconsultations, reducing overcrowding. An acceptance study in this Bangkok pilot found older generations significantly less likely to adopt telemedicine than younger people – perceived ease of use was a strong predictor of acceptance (adjusted OR 3.95 for usability). Community-based telehealth pilots in rural areas, such as a Chiang Mai program using Community Health Leaders, demonstrated high satisfaction (≥90%) and successful NCD risk screenings, but also highlighted the need for training and support for both health workers and patients.

Conclusion: Mobile clinics and telehealth are complementary strategies for enhancing healthcare delivery to elderly Thais with NCDs. Mobile clinics physically bring essential services to those unable to travel, while telehealth connects patients to providers for continuous care and monitoring. The Thai experience illustrates that integrating these innovations into primary healthcare systems can enhance equity of care for aging populations. Continued support, digital literacy training for seniors, and policy integration of telehealth into the health system are recommended to ensure healthy aging under universal health coverage.

Keywords: Thailand, elderly care, mobile health clinics, telehealth, COVID-19 pandemic, non-communicable diseases, rural health outreach

Introduction

Thailand is undergoing a profound demographic and epidemiologic transition. By 2023, about 12 million Thais (18% of the population) were aged 60 or above, qualifying Thailand as an “aged society,” with projections of the elderly share reaching 28% by the next decade.¹ In parallel, non-communicable diseases (NCDs) such as cardiovascular disease, diabetes, cancer, and chronic lung disease have become the leading causes of death and disability. NCDs account for an estimated 74–76% of all deaths in Thailand.² The Ministry of Public Health (MoPH) has identified NCD prevention and control as a top priority, given the immense health and economic burden (approximately 1.6 trillion THB, or 9.7% of GDP annually).² Notably, about three-quarters of Thai senior citizens suffer from at least one chronic NCD, often requiring ongoing medical care.³

Despite Thailand’s strong primary healthcare network and near-universal coverage, elderly individuals in rural or underserved areas face barriers to timely chronic care. Mobility limitations, long travel distances, and shortages of healthcare professionals in remote regions contribute to unmet needs among the elderly.⁴ The COVID-19 pandemic further exposed these vulnerabilities, as many older patients deferred routine clinic visits due to infection risk, underscoring the need for alternative care delivery models. In response to these challenges, Thailand has increasingly turned to mobile health clinics and telehealth (telemedicine) outreach as innovative solutions – delivering care to the doorstep and digitally bridging patients with providers when in-person services are difficult.

Given these developments, this article aims to review the landscape of mobile health clinics and telehealth outreach in Thailand with a focus on how they are being used to improve elderly care and NCD management.

Methods

Design

We performed a descriptive, review of programs and studies, given the broad scope of service models and the limited homogeneity of outcomes. Our review focused on two categories of interventions in Thailand: (1) mobile health clinics or mobile outreach services, and (2) telehealth/telemedicine initiatives, specifically in the context of elderly populations and NCD care. We also included relevant policy documents and reports to contextualize national strategies.

Literature Search

A comprehensive search was conducted using electronic databases (PubMed, Scopus, Google Scholar) and manual searches of references from identified sources. Search terms included combinations of “Thailand”, “mobile clinic”, “mobile health unit”, “telehealth”, “telemedicine”, “elderly care”, “aging”, and “NCD” (and specific NCDs such as “diabetes care”, “hypertension”). We limited the search to sources from 2010–2025 to capture contemporary initiatives, with particular attention to the last 5 years (during which telehealth use grew markedly amidst COVID-19). Both English and Thai-language sources were considered; key Thai government sources were translated as needed.

Inclusion Criteria

We included peer-reviewed journal articles (eg, pilot studies, program evaluations, qualitative studies), conference proceedings, and official reports or news from reputable organizations (Ministry of Public Health, WHO, etc.) describing mobile clinic or telehealth programs in Thailand. Interventions specifically targeting or including older adults (age ≥60) and/or addressing major NCDs were of primary interest. General digital health policies and broader studies were included to the extent they provided background or data on usage patterns among older age groups.

Data Extraction

From each source, we extracted information on the intervention type (mobile clinic vs telehealth, and specific format), setting (urban vs rural, level of care), target population (including any emphasis on elderly or NCD patients), and reported outcomes or impact (eg, number of patients served, health outcomes, user acceptance, or cost-effectiveness). When available, we also noted challenges or barriers described.

Synthesis

We narratively synthesized the findings, grouping results by the two major modalities (mobile clinics and telehealth). Within those categories, we highlight specific use cases or programs. A summary table (Table 1) was constructed to

Table 1 Summary of Mobile Health and Telehealth Interventions in Thailand Focused on Elderly Care and NCDs

Intervention	Setting (Location/Level)	Target Population	Outcomes/Impact
Thai Red Cross Mobile Clinic – fully equipped primary care truck for remote northern provinces (est. 2018)	Remote mountainous areas (8 provinces in Northern Thailand), coordinated by Chiang Mai Red Cross Chapter	Remote rural villagers, emphasis on elderly and other vulnerable groups in hard-to-reach areas	5,000 beneficiaries served per year; provides NCD screening (diabetes/HTN), basic treatments, vaccinations, and home visits. Impact: Detected numerous previously uncontrolled HTN/DM cases, improving access to care in isolated communities and providing health education and referrals.
Mobile Geriatric Screening Survey (Mae Sot) – one-time mobile screening program (1990s)	Rural villages in Mae Sot District, Tak Province (community outreach by hospital team)	Older adults (age ≥60) across 54 villages in remote areas	Screened 3,302 seniors. Impact: Identified many undiagnosed NCDs – 58% of hypertensives and 75% of diabetics were first-time diagnoses via the mobile unit. Also uncovered treatable conditions (eg, cataracts) and linked seniors to follow-up care, demonstrating mobile screening efficacy.
Mobile Eye Clinic (Thai Red Cross & DKSH) – mobile ophthalmology surgery unit	Various underserved areas nationwide (scheduled outreach camps)	Elderly with cataracts or other reversible blindness conditions	Performed free eye exams and surgeries (eg, cataract removals) for hundreds of elderly patients in rural communities. Impact: Improved vision and quality of life for patients, reduced cataract surgery backlog; an example of a public-private partnership (Red Cross with DKSH) delivering specialty care.
“Vajira@Home” Telemedicine (Dusit Model) – integrated telehealth for continuum of care	Urban Bangkok (Dusit District): community health centers linked with Vajira Hospital (tertiary care)	Elderly and chronic NCD patients in an urban district (addresses hospital overcrowding)	>300 patients enrolled in teleconsultations connecting primary to tertiary care. Impact: Reduced hospital visits for stable NCD patients, improved convenience and patient satisfaction. An acceptance study showed older generations had lower telemedicine acceptance, prompting focus on usability and support for seniors (eg, ease-of-use training; perceived ease of use had OR 3.95 for increasing acceptance).
NHSO National Telemedicine Service (COVID-era) – government-sponsored remote consultation program	Nationwide (all provinces), via phone and video under the Universal Coverage Scheme (UCS)	Patients with stable chronic diseases (hypertension, diabetes, asthma, mental health, etc.), including many elderly, especially during COVID-19 surges	Tens of thousands of teleconsultations delivered (exact numbers varied by COVID wave). Impact: Ensured continuity of care during pandemic lockdowns; medications delivered to patients' homes via mail or local centers. Reduced infection exposure risk and eased hospital burden. Now being extended into a permanent telehealth service for routine follow-ups under UCS.
“HealthD” Community Telehealth Pilot – CHL-led digital screening and telemedicine program	Rural subdistricts in Chiang Mai (remote Northern Thailand) – community health leaders (CHLs) using a telehealth app in villages	120 adults (aged 30–70, many older at-risk individuals) with no prior NCD diagnosis, in remote communities	Impact: Demonstrated feasibility and high acceptance of community telehealth. 97% participant satisfaction; significant detection of high NCD risk (eg, 73% had elevated diabetes risk). CHLs' tech competency improved post-training (+11% in skills score). The model empowered local health workers to conduct NCD screening and coordinate care effectively, advocating for scale-up of such community telehealth approaches.

(Continued)

Table 1 (Continued).

Intervention	Setting (Location/Level)	Target Population	Outcomes/Impact
Village Health Volunteer (VHV) Digital Support Initiative – “Smart VHV” program and VHV Online app	National (community level) – integrating 1,040,000 VHVs with digital health tools	Communities across Thailand, especially rural elderly who rely on VHVs for care support	Impact: During COVID-19, 72% of health facilities used VHVs to deliver medicines and 77% to follow up with NCD patients at home, maintaining care continuity. Building on this, the government is training VHVs in smartphone/app use and launching a dedicated VHV app to enhance telehealth outreach and real-time reporting at the village level (“VHV 4.0”). Expected to improve data sharing and patient monitoring for homebound elders.
Home-based Diabetes Telecare (Bangkok) – remote monitoring and coaching for isolated patients	Bangkok metropolitan area (multi-center volunteer initiative during COVID-19) – phone/app-based diabetes management	50 older adults with type 2 diabetes who were in home isolation due to COVID-19 (unable to attend clinic)	Impact: Achieved improved glycemic control remotely; most patients avoided acute complications or ER visits. Demonstrated telemedicine’s potential for managing complex chronic conditions in elderly patients when in-person visits are not possible. This success spurred consideration of scaling similar telecare models for homebound chronically ill seniors beyond the pandemic period.

Abbreviations: HTN, hypertension; DM, diabetes mellitus; NCD, non-communicable disease; CHL, community health leader; VHV, village health volunteer; OR, odds ratio; NHSO, National Health Security Office; UCS/UHC, Universal Coverage Scheme (universal health coverage); DKSH, Diethelm Keller Siber Hegner (healthcare company).

comparatively present key interventions identified, detailing the intervention characteristics, setting, target population, and outcomes/impact. Given the heterogeneity of data, no quantitative meta-analysis was feasible. Instead, we present an integrated qualitative summary of evidence to draw overall conclusions.

Mobile Health Clinics for Elderly NCD Care in Thailand

Mobile health clinics have become a vital extension of Thailand’s healthcare delivery for reaching the elderly in underserved areas. These mobile units range from government-operated outreach teams to non-governmental organization (NGO)-run clinic vans, and they primarily deliver primary care services such as basic medical exams, chronic disease screenings, and medication refills or dispensing.

One notable example is the Thai Red Cross Society’s Mobile Medical Clinic, launched in 2018 to serve remote mountainous communities in eight provinces of Northern Thailand. Stationed out of Chiang Mai, this program uses a fully equipped clinic truck to visit villages on a rotating schedule. Services include routine health screening for NCD risk factors (especially diabetes and hypertension), blood pressure and glucose checks, nursing services (wound care, etc.), vaccinations, family planning, and health education. Importantly, the mobile clinic also conducts home visits for frail elders who cannot travel to the village meeting point. In its first year, the Red Cross mobile clinic was expected to reach approximately 5,000 beneficiaries who otherwise had limited access to healthcare.⁵ Early reports indicate that many older adults welcomed the service, and common conditions addressed included uncontrolled hypertension, visual impairment, and mobility issues (with referrals arranged for further care as needed).

Historically, Thailand’s mobile units have succeeded in identifying undiagnosed NCDs among rural seniors. A seminal geriatric screening survey in the 1990s used a mobile unit to screen 3,302 older individuals (age ≥ 60) across 54 villages in Tak Province. This effort uncovered that 58% of those found to have hypertension and 75% of those with diabetes were previously undiagnosed before the mobile team’s visit.⁶ The screenings also detected treatable conditions like cataracts and high cholesterol in many seniors, who were then referred for appropriate treatment. The study concluded that geriatric screening via mobile units can effectively uncover hidden, treatable conditions among rural elderly.⁶ These findings underscore how bringing services directly to communities can bridge gaps in NCD case-finding and early intervention.

Mobile clinics are not limited to rural hinterlands; they also play a role in hard-to-reach urban populations. In Bangkok, for instance, city health authorities and some hospitals operate mobile vans that visit slum areas or community centers to provide blood pressure checks, diabetes screenings, and medication refills for low-income older residents who may not regularly visit hospitals. One Bangkok hospital's mobile unit travels to local neighborhoods (including urban senior centers) to conduct check-ups and health education, illustrating an urban outreach model beyond hospital walls. Although detailed outcomes from such city mobile services are not widely published, anecdotal reports suggest improved medication adherence (by delivering refills) and greater convenience for seniors with limited mobility.

Another specialized mobile initiative addresses vision health in the elderly. Recognizing the high prevalence of cataracts and preventable blindness in older Thais, the Thai Red Cross, in partnership with DKSH (Diethelm Keller Siber Hegner) – a healthcare services company – introduced a Mobile Eye Clinic project. This fully equipped ophthalmology unit conducts campaign-style visits to underserved areas nationwide. It offers free eye examinations and on-site surgeries (such as cataract removals) for underprivileged elderly patients. Hundreds of cataract surgeries have been performed through this mobile eye service, significantly improving vision and quality of life for affected seniors and reducing the backlog of cataract cases awaiting treatment.² This program exemplifies a successful public–private partnership in mobile specialty care, with DKSH contributing resources via corporate social responsibility efforts.^{2,7}

While mobile clinics clearly improve access for many, they typically provide episodic care by nature – visiting a community infrequently (eg monthly or quarterly). To maximize impact, these programs are often integrated with permanent healthcare facilities. For example, the Red Cross mobile team coordinates with local subdistrict health centers and hospitals so that any patient with a newly identified condition (like high blood sugar or vision loss) can be referred and followed up. By linking mobile screenings to the existing healthcare system (such as enrolling new diabetic patients into the local chronic care clinic), continuity of care is better ensured.

Telehealth Outreach for Elderly NCD Care in Thailand

Telehealth – the remote provision of healthcare via telecommunications – has rapidly expanded in Thailand, accelerated both by proactive policy support and by necessity during the COVID-19 pandemic. Telemedicine modalities deployed in Thailand include telephone consultations, video calls, mobile health apps, and remote patient monitoring. The Ministry of Public Health's Digital Health Strategy (2017–2026) explicitly prioritizes telemedicine to improve healthcare efficiency and expand access, especially for those in rural areas or homebound due to age or disability.^{8,9} By reducing the need for travel, telehealth has the potential to alleviate hospital overcrowding and bring services to patients who cannot easily travel. During the pandemic, Thai hospitals widely adopted telehealth for routine check-ups — for example, many non-urgent outpatient visits for well-controlled NCD patients were shifted to teleconsultations with medications delivered to patients' homes. The National Health Security Office (NHSO) approved reimbursement for telemedicine services under the Universal Coverage Scheme, marking a major policy endorsement that institutionalized telehealth as part of mainstream public healthcare. Under this program (initially launched in 2020), patients across all provinces could consult doctors via phone/video and receive medications by mail or pickup at local health centers. The service was provided free of charge for eligible Universal Health Coverage beneficiaries (approximately 75% of the Thai population), ensuring equitable access. This nationwide telemedicine initiative delivered tens of thousands of remote consultations during COVID surges, maintaining continuity of care for chronic disease patients when in-person visits were risky. It has since been expanded as a permanent offering for routine follow-ups of stable NCD cases.

In parallel, numerous telehealth mobile applications have emerged in Thailand, some developed in partnership with the government and others by the private sector, offering on-demand platforms where patients can chat with physicians or schedule virtual visits. For example, apps like MorDee (“Good Doctor”) and others gained substantial popularity during the pandemic era, connecting patients to online doctors for consultations and medication delivery.^{10,11} Public-sector solutions also arose: the Ministry of Public Health launched a national telehealth hotline (“Telehealth 1668”) to provide medical advice and COVID-19 triage remotely. These efforts indicate a rapid digital transformation of healthcare access. By mid-2022, over 5,300 patients had registered for the major telemedicine apps within the first month of their rollout,¹⁰ reflecting the high demand and acceptance of such services.

Telehealth initiatives specifically targeting elderly patients with NCDs have also been piloted. A notable urban example is the “Vajira@Home” telemedicine program under the “Dusit model” in Bangkok’s Dusit District. This prototype project, led by Vajira Hospital (a large public teaching hospital) in coordination with community health centers, integrates telemedicine across primary, secondary, and tertiary care levels. The aim is to reduce the extreme outpatient load at Vajira Hospital (which handles over 2,300 OPD visits daily) by managing stable chronic patients at home through remote care. In this model, older patients with conditions like diabetes, hypertension, or COPD can have scheduled video consultations with hospital physicians, while community nurses assist with monitoring vitals and follow-up. Early results indicate the program helped reduce hospital visits and waiting times, with improved patient convenience and satisfaction (formal outcome evaluations are ongoing). Importantly, an acceptance study of telemedicine in this pilot area found that older generations were less likely to readily accept telemedicine compared to younger users. Baby Boomer patients had significantly lower odds of telemedicine acceptance than Gen Z patients, after adjusting for other factors.⁷ Key facilitators of acceptance included perceived ease of use of the technology and the presence of adequate support or “facilitating conditions” (such as help from staff or family in using the app).¹¹ These findings highlight the need for user-friendly design and digital literacy support for seniors in telehealth programs. In response, the project emphasized training for elderly users and made workflow adjustments (for instance, providing a help-line to guide patients through connecting to video calls). The insights from this model have informed broader telehealth adoption strategies in urban Thailand, underscoring that technology must be tailored to older adults’ needs to achieve equitable uptake.

In northern Thailand, a noteworthy telehealth pilot is the HealthD Community Telehealth program in rural Chiang Mai. This project deployed a telehealth platform (“HealthD”) enabling trained lay health workers known as Community Health Leaders (CHLs) to conduct NCD risk screening in remote villages and facilitate telemedicine consultations. Over a 6-month pilot (June–November 2023), CHLs screened 120 adults (ages 30–70, many of them older and at-risk) for diabetes, cardiovascular disease, and COPD risk using a tablet-based assessment tool. Individuals were stratified by risk level, and those at moderate/high risk were provided teleconsultations at 2 and 4 months with remote doctors via the platform. The results were striking: at baseline, 73% of participants had an elevated diabetes risk (with 21% at high risk) – many were previously unaware of their risk status. Through follow-up, CHLs were able to continuously monitor these individuals; for example, while risk scores fluctuated, over 60% still had high diabetes risk by program end, indicating a significant burden of undetected pre-diabetes/diabetes. The competency of CHLs in using telehealth tools improved significantly after training (mean skills test scores increased from 8.4 to 9.3 out of 10). Crucially, both the health workers and community members reported very high satisfaction with the model – 92% of the CHLs and 97% of participant patients were satisfied with the telehealth system. This indicates strong feasibility and acceptability of telehealth delivered in a community-based setting. The pilot concluded that the HealthD telehealth platform is feasible and well-accepted for community NCD screening and monitoring, and it advocated for integrating such telehealth approaches into Thailand’s health system to enhance early disease detection in remote communities.^{12,13} In essence, this model links digital technology with human outreach: the local CHLs act as the bridge between villagers and remote doctors, leveraging telehealth to extend the reach of NCD prevention and care.

Thailand’s extensive network of Village Health Volunteers (VHVs) also plays a key role in telehealth outreach. There are over 1 million VHVs nationwide, and they serve as the “eyes and ears” of the health system in each community. Recognizing that many VHVs are older adults themselves (and may lack digital skills), the MoPH in 2024 initiated a “Smart VHV” program to train these volunteers in digital literacy and equip them with a custom mobile health application. This app (an upgraded version of the existing “AorSorMor Online” VHV app) allows VHVs to record health data for people under their care, access basic health information for each household, and communicate more efficiently with nurses and doctors. By strengthening VHV digital capacity, Thailand aims to connect the last mile of healthcare (the patient’s home in a remote village) with the central health information system. For example, a VHV could input an elderly person’s blood pressure readings into the app, which are then visible to clinic staff, or help set up a video call between a housebound patient and a physician. During the COVID-19 pandemic, VHVs already performed quasi-telehealth tasks: according to a national survey, 72% of health facilities leveraged VHVs to deliver medicines to NCD patients at home, and 77% had VHVs follow up with NCD patients by checking on them and relaying information to clinicians. Over 70% of facilities even organized community blood draws for lab tests (eg, glucose, lipid profiles) via VHV teams to maintain routine care during lockdowns. These efforts

ensured continuity of care when many elderly patients avoided traveling to clinics. Essentially, the volunteers acted as the “hands and feet” of the telehealth system on the ground, while doctors provided guidance from a distance. The ongoing Smart VHV initiative will further formalize this role, with digital tools enabling volunteers to be effective telehealth extenders for the healthcare team.

Telehealth has also been used in targeted ways to improve specific NCD outcomes in older patients. For example, in Bangkok during the pandemic, a group of endocrinologists and diabetes educators created a remote diabetes management program for patients in home isolation. Participants were given a Bluetooth glucometer to check blood sugars, and they reported their readings via phone calls or a mobile app. Educators provided dietary advice and medication adjustments remotely. Over a few months, patients’ glucose levels improved, and most avoided needing any acute care visits. This demonstrated that even a complex chronic condition like diabetes can be managed (at least short-term) via telemedicine when patients receive the right support and tools. Another example involved tele-rehabilitation for stroke and orthopedic patients: some hospitals piloted physical therapy sessions via video calls to continue rehabilitation for elderly patients who could not attend in person. Patients were guided through exercises remotely. While not all aspects of rehab can be done virtually, these trials showed promise in keeping patients active and on track with therapy when faced with mobility or pandemic-related barriers.

Integration into the Health System

A critical factor in the success of these initiatives is integration with the broader health system. Mobile clinics in Thailand are typically not standalone efforts; they act as outreach extensions of existing public health infrastructure. For instance, the Red Cross mobile clinic coordinates closely with district hospitals and provincial health offices. Any serious cases identified (eg, a new diagnosis of severe hypertension or a suspicious breast lump) are referred into the fixed facilities for further management. This ensures that the mobile clinic’s patients have a continuum of care beyond the day of the visit. Likewise, telehealth services are being embedded into routine practice rather than run as isolated pilot projects. The inclusion of telemedicine in NHSO reimbursement policies means it is treated as a legitimate modality of care under universal health coverage, not just a temporary emergency measure. Many public hospitals now have formal telemedicine clinics or hotlines integrated into their outpatient services. Typically, a teleconsultation is documented in the patient’s electronic medical record just like an in-person visit, and any prescriptions are filled via the hospital pharmacy network (with medications sent to local health centers or by mail to the patient). This integration allows telehealth to complement in-person services smoothly—patients can transition between virtual and physical visits as needed, with their records unified.

Another important integration aspect is task-sharing and workforce integration. One example is using digital tools to enable non-physician providers to take on expanded roles under tele-supervision. The SMARThealth Diabetes program (an initiative in rural Thailand) plans to utilize mobile decision-support tools so that nurses or community health workers can manage certain aspects of diabetes care, with remote physician input when necessary.⁴ By building such workflows into primary care, telehealth can help address physician shortages and bring specialist guidance to peripheral areas. Similarly, leveraging VHVs as described is essentially integrating volunteers into the telehealth model, acting as intermediaries between patients and the digital system.

Health system integration is also evident in data management. Thailand’s use of unique citizen IDs and national health databases means that patient encounters via mobile clinic or teleconsultation can be logged and tracked across the system. For example, if a patient from a remote village is seen by a mobile clinic and given a referral, the referral can be traced and the patient’s eventual hospital visit outcome can loop back to the local providers. This kind of data connectivity is a goal of the digital health strategy and will be crucial for scaling these programs effectively.

Sustainability

Ensuring the sustainability of mobile and telehealth interventions requires attention to funding, human resources, and technology maintenance. Mobile clinics entail recurring costs: vehicles (and their fuel and upkeep), medical equipment, and staffing (doctors, nurses, drivers, etc). Many mobile units in Thailand are funded by government health budgets or by grants/donations (in the case of NGO-run units). The continuing operation of the Thai Red Cross mobile clinic, for instance, is supported by charitable funding and demonstrates recognized value by stakeholders. However, scaling up

mobile clinics to cover every remote community regularly would require substantial investment. A strategic approach is to use data to target mobile clinic services where they are most needed – for example, focusing on districts with high concentrations of immobile elderly or those farthest from health facilities – while improving permanent clinic services in more accessible areas. This targeted deployment can maximize impact within limited budgets.

For telehealth, sustainability is closely tied to technology infrastructure and user acceptance. Thailand has rapidly improving internet and mobile phone coverage, even in rural regions, under initiatives like the national broadband expansion. This provides a foundation, but maintaining and upgrading the infrastructure (bandwidth, digital platforms, cybersecurity) is an ongoing need. Funding for telehealth also includes covering the costs of teleconsultations (provider time) and possibly subsidizing devices or data for low-income patients. The decision by NHSO to reimburse telemedicine visits was a pivotal step, essentially creating a funding stream for remote care. Looking ahead, officials are considering models like including telehealth services in capitation budgets for primary care, or providing incentives for providers to conduct a certain proportion of follow-up visits via telemedicine when appropriate (on the premise that it can save costs long-term by reducing travel reimbursements and catching complications early).

Workforce training and support is another element of sustainability. Not all healthcare providers initially feel comfortable managing elderly patients remotely – some are concerned about missing physical exam findings or feel that the personal touch is lost. To address this, professional training programs now incorporate telemedicine best practices, such as how to decide which patients can be safely managed via telehealth and when to insist on an in-person visit. Clear protocols are being developed (eg, a checklist for virtual geriatric assessments, guidelines for remote management of diabetes, etc.) to aid providers. Additionally, medico-legal clarity (such as guidelines on prescribing via telemedicine and liability coverage) is evolving in Thailand, which helps give providers confidence to use these tools. The COVID-19 period acted as a crash course for many clinicians, but formalizing those lessons into standard practice is necessary for long-term adoption.

On the patient side, building digital health literacy among the elderly is vital for sustainability. As mentioned, efforts like the Smart VHV program indirectly support seniors, but direct initiatives (such as community workshops for older adults on how to use telemedicine apps, or printed “how-to” guides in clinics) are also being rolled out. Family members often assist elder patients with technology, so some hospitals have started involving caregivers in telehealth orientation sessions as well.

Challenges

Despite the successes, significant challenges persist for both mobile clinics and telehealth. For mobile clinics, logistical hurdles can impede operations – for example, bad weather or rough terrain can delay or limit visits to remote villages. Human resource constraints are also a challenge: it can be difficult to continuously staff mobile teams with doctors and nurses, especially in provinces that are already short-staffed in their regular hospitals. Burnout and turnover of mobile clinic staff must be monitored. Another issue is ensuring proper follow-up: a mobile clinic might diagnose an elderly patient with a new condition or start a treatment, but if there is no system to ensure that patient gets follow-up (either at the next mobile visit or at a stationary clinic), the benefits might be short-lived. Some critics argue that while mobile clinics are a great stop-gap measure, the ultimate goal should be strengthening permanent healthcare facilities in every area. The ideal scenario is to integrate mobile clinics as part of a broader health system plan – for example, use them to provide services in an area until a permanent clinic is built, or to supplement a clinic that can only be staffed a few days a week, etc., rather than having parallel systems.

For telehealth, the foremost challenge is the digital divide. Many older people, especially those over 80 or those with low socioeconomic status, may not have access to smartphones or the internet, or may not feel comfortable using them. A recent survey in Thailand found that digital health literacy levels among seniors are significantly lower than in younger adults.¹³ Common barriers reported by older patients include difficulty navigating apps due to poor eyesight or unfamiliarity, lack of trust in technology, and a strong preference for face-to-face doctor visits (owing to habit and the reassurance of in-person interaction). There is also the risk that telehealth could inadvertently worsen health disparities if these issues are not addressed – for instance, tech-savvy urban seniors might benefit greatly, while rural elders who are not online get left behind. Thailand’s strategy of involving human intermediaries (like VHV’s or family) to assist less

tech-savvy seniors is one way to bridge this gap. Another concern is clinical quality and scope: Some conditions are challenging to evaluate remotely, especially in multi-morbid elderly patients. For example, managing heart failure via telemedicine can be tricky if the patient does not have home monitoring devices; subtle signs like leg edema or lung crackles cannot be assessed over a phone call. To mitigate this, healthcare providers are exploring the use of home-use medical devices (blood pressure cuffs, pulse oximeters, even digital stethoscopes or ECG patches) to gather objective data remotely. Pilot programs have distributed “telehealth kits” to certain high-risk patients (eg, those with heart failure or COPD) which include such devices that transmit readings to clinicians. Ensuring privacy and data security is another challenge, as older adults may be wary of discussing health issues on the phone or might fall prey to misinformation online. Telehealth platforms must be secure and user-friendly, and patients need education on how their data is protected. Additionally, some healthcare providers have noted that the lack of physical examination means they have to rely more on patient history and perhaps schedule more frequent follow-ups to compensate, which can affect workflow.

Many of these challenges are not unique to Thailand – they mirror global telemedicine growing pains.¹⁴ Studies from other countries have reported similar issues of technology acceptance in older patients, concerns about diagnostic limitations, and the need for provider and patient training.^{15,16} However, acknowledging these challenges is the first step to addressing them. Thai health authorities are actively working on solutions: for example, designing simpler telehealth app interfaces for seniors, creating call-in centers to assist with technical issues, and incrementally building trust in telemedicine through community outreach. Evidence from geriatric telemedicine experiences in other settings also provides guidance – for instance, in specialized clinics for older patients, a hybrid approach (combining telehealth with periodic in-person visits) has been suggested to balance convenience and thoroughness.¹⁷

Opportunities

Looking ahead, there are significant opportunities to further leverage mobile clinics and telehealth in synergy. One opportunity is to blend the mobile and telehealth models for continuity of care. For example, after a mobile clinic team visits a village and identifies patients with uncontrolled NCDs, they could set those patients up with telehealth follow-ups. The village community hall or local health post could serve as a “telehealth station” – perhaps monthly a nurse or VHV helps the patients connect via video to a doctor at the hospital for check-ins, rather than waiting for the next mobile clinic visit. This hybrid approach could greatly improve ongoing management of conditions identified by mobile units. Conversely, telehealth can support mobile clinic staff in real time – if a mobile clinic has only a nurse practitioner on board due to doctor shortages, that nurse could teleconference with a physician for complicated cases (a model of tele-supervision or tele-expertise sharing). This was tried in some areas during COVID-19 when specialists in city hospitals supported general doctors in field hospitals via teleconsultation.

Another opportunity lies in remote patient monitoring and health promotion using basic technology. Even without full telemedicine visits, simple interventions like SMS medication reminders or health education messages via LINE (a popular messaging app in Thailand, widely used by older adults) can improve chronic disease management. For instance, an automated system could send a daily text to an elderly hypertensive patient: “Have you taken your morning blood pressure pill?” which studies have shown can improve adherence. Similarly, apps that track blood glucose and send alerts to clinicians if readings are out of range could prevent complications. Given that mobile phone penetration in Thailand is high even in rural areas, these low-cost telehealth adjuncts could be scaled up to complement formal telemedicine.

From a policy perspective, Thailand’s experience offers lessons for other middle-income countries facing aging populations and NCD burdens. Government commitment and clear policy frameworks (such as including telehealth in the national health coverage scheme and digital strategy) were key to moving these innovations beyond pilot stage to broader implementation. The COVID-19 pandemic served as a catalyst, but sustained support has turned emergency measures into routine practice. Community engagement and trust, through mechanisms like the VHV network, greatly amplify the effectiveness of both mobile clinics and telehealth by ensuring local buy-in and assistance. Training and education for all stakeholders – from patients to providers to community volunteers – must be continuous, so that technology is used effectively and confidently. Finally, ongoing evaluation and research are important: while many programs appear promising, more data is needed on long-term outcomes, cost-effectiveness, and scalability. Thailand has

begun to generate this evidence (as seen in pilot studies and surveys), and sharing these findings will be important for continuous improvement.

It is notable that these developments in Thailand align with global trends in telehealth. During the COVID-19 era, countries worldwide saw telehealth usage surge dramatically, and it has since become a fundamental part of healthcare delivery.^{18–22} Thailand's proactive approach and the blending of mobile outreach with digital health solutions position it as a model that other nations can learn from in striving to achieve health equity for their aging populations.

Limitations

This review is narrative in nature and, while comprehensive, may not capture every local initiative (especially unpublished programs). The available outcome data for many telehealth programs are still emerging, so assessments of impact are often based on early indicators like user satisfaction or process measures. We also note that our search was limited to sources in certain languages and to a broad timeframe, which could introduce selection bias. Nonetheless, by synthesizing data from diverse sources, we aimed to provide a useful overview of Thailand's current efforts and lessons learned in mobile and telehealth care for the elderly.

Conclusion

Mobile health clinics and telehealth outreach programs are complementary innovations enhancing healthcare delivery for older adults in Thailand's era of NCDs. Mobile clinics bring essential services directly to those elderly individuals who cannot easily travel – effectively meeting patients where they are. Telehealth extends the reach of healthcare providers digitally, enabling continuous care and monitoring for patients at home. Together, these approaches help ensure that elderly patients receive timely screenings, treatment, and follow-up, regardless of geographic or mobility barriers.

Our review found that these interventions have improved access to care, enabled early detection of diseases, and maintained continuity of chronic disease management for many seniors. At the same time, challenges such as digital literacy gaps and resource limitations must be addressed to fully realize their benefits. With strong policy support, community involvement, and iterative improvements, integrating mobile clinics and telehealth into the primary healthcare system can significantly enhance the equity of care for aging populations. Thailand's experience illustrates that even in resource-limited settings, leveraging both wheels and wires – by driving care to the people and connecting people to care virtually – is a viable strategy to support healthy aging under universal health coverage.

Disclosure

The authors report no conflicts of interest in this work.

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