

## Article

# A Three-Stage Model for Innovation Adoption in Health Systems: Insights from the Health Promotion and System Strengthening Project in Tanzania

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**Abstract:** We explored the outcomes and challenges encountered during a 12-year collaborative development endeavor in Tanzania, focused on enhancing the healthcare system. The Health Promotion and System Strengthening (HPSS) project, supported by the Swiss Government and implemented by the Swiss Tropical and Public Health Institute (Swiss TPH) from 2011 to 2023, aimed to strengthen various aspects of Tanzania's healthcare landscape. This included reforms in health insurance through the improved Community Health Fund (iCHF), the establishment of a public-private partnership to optimize the health commodity supply chain via a Prime Vendor System (Jazia PVS), the implementation of health technology management innovations, and the facilitation of participatory community and school health promotion initiatives. Operating in a multisectoral, interdisciplinary, and systemic manner, the HPSS project employed a variety of interconnected strategies, focusing on key entry points within the Tanzanian health system, starting from district level to national policies. These efforts followed a three-stages approach to reach a sustainable adoption of the innovations, going through the process of service and product innovation, integration into service delivery systems, and finally their adoption in the respective institutional policies. Each stage presented distinct frameworks and challenges, detailed in this article. The development of innovative concepts was complemented by capacity building through on-the-job training, establishment of new accredited training programs for pre-service trainings, and the development of new IT systems integrated into the governmental IT environment, as well as efforts to improve transparency, accountability, and governance. Activities in these fields were guided by operational research, following the translational approach of Swiss TPH to go from innovation and validation to application. The example of the HPSS project highlights the cycle of developing and testing innovations at the community and district level, followed by endeavoring national-level integration and policy adjustments, consequently resulting in improved service delivery at the district and community level.

**Keywords:** health system strengthening; health system thinking; innovation adoption; health insurance; Community Health Fund; supply chain management; prime vendor system; health technology; health promotion; Tanzania



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## 1. Health System Strengthening, Health System Thinking, and Stages of Adopting Innovations

Understanding a health system is a prerequisite to formulate and design interventions, given that every intervention will have repercussions on other structures of the health system. WHO has described a health system as a framework of six building blocks or components, namely (i) financing; (ii) health workforce; (iii) information systems; (iv) medical products and technologies; (v) leadership/governance; and (vi) service delivery [1]. This framework is widely used to describe and appraise health systems and to design project

interventions. However, WHO points to the increasing gap between having increasingly sophisticated interventions available but still not having health systems deliver them to those in greatest need comprehensively and at an adequate scale [1].

At the same time, the health system framework is limited as a construct in that it tends to neglect interactions, connections, relative weight, and external context [2]. Health system descriptions necessarily lead to system thinking which makes it possible to uncover the underlying characteristics and relationships of the components. These elements and connections are dynamic, fluid, and intimately linked to the shifting and modulations of other components [3]. As the WHO building block framework does not adequately address such critical elements and dynamic interplay, recent analysis calls for broadening the concept through inclusion of context and critical determinants of health [4]. Health systems have also been identified as complex adaptive systems (CASs), having multiple interconnected components which are dynamic and constantly changing, requiring adaptations [5]. They include various agents (e.g., patients, providers, and decision-makers), structures (e.g., policies, norms, and regulation), and processes (e.g., communication and information flow) [6]. Health system thinking has been defined as a holistic view of independent components and their role and behavior in the context of a whole system [7].

In order to implement health system thinking in everyday practice, concerted efforts by all stakeholders and a paradigm shift for supporting such efforts are called for [8]. A practical framework and guidelines to plan, implement, and assess health systems thinking in interventions and projects has only recently been conceived and published [9].

The discussion of health system strengthening approaches has to be seen as part of a larger discourse in development policies on the trade-off between providing optimized individual interventions and technologies and investing into a system to enable it to deliver results. The Integrated Rural Development Projects (IRDPs) of the 1970s and 1980s already provide examples for such integrated development approaches. They gained popularity after 1972 when Bangladesh replicated the successful “Comilla Model” of rural development of the 1960s for the whole country [10]. IRDPs were subsequently implemented all over the world with examples in Pakistan, India, Bangladesh, Mexico, Ethiopia, Brazil, the Philippines, Nepal [11], Sri Lanka [12], Barbados [13], the Commonwealth of Dominica [14], Azerbaijan [15], and Viet Nam [16], to name a few. These projects already attempted to address bottlenecks in the rural economy and in social service delivery through an approach of multi-sectoral interventions, aiming at the integration and coordinated management of resources for rural development [11]. They often added goals addressing quality of life, rural transformation, self-sufficiency, and capacity building [17]. Evaluations of IRDPs, however, soon criticized that managing the complexity of such projects posed a genuine challenge, even more so when multicomponent projects spread across multiple sectors [18].

While individual interventions can be optimized and their management facilitated by concentrating resources and capacities for one specific goal, system approaches have to take into account interacting sub-systems and the way they communicate with each other and with the system environment [19]. As per their definition, these changing system components and interactions are difficult to grasp and to clearly define, and thus benefit from more concrete guiding principles. The approach of simultaneously addressing all system components needs to be combined with an attempt to understand the pre-conditions and dynamics of the adaptation process for innovations in a systems context. An evaluation of 17 IRDPs over 30 years, for instance, concludes that outside-initiated transformation requires creating a true sense of ownership for the communities to sustain and manage new infrastructure as well as operational and maintenance systems. Furthermore, limiting this ownership to their national or regional governments or even to their village representation is not sufficient [20].

Emphasizing the importance of true ownership for the communities in developmental processes, the authors reason: “Realizing that necessary community mobilization requires intensive work, that donor resources are limited, and that often the real causes of underdevelopment are systemic, e.g., based on governmental policies, more development experts

focus on programs that target systemic reforms that put into place the proper institutions and incentives for development rather than work in IRD.” [20]. Here, the systems approach goes further than the traditional goals of integrated rural development, aiming at a deeper transformation of institutions and adoption of policies. However, this goal is even more complex to manage and requires a balance between good design and flexibility to adjust to changing developments [20]. This focus on ownership and transformation of institutions concurs with the Primary Health Care concept of Alma Ata [21], its central tenet—health being a right for all—reaffirmed and endorsed by the Astana Declaration [22], as well as with the central message of the Ottawa Charter of 1986, emphasizing the empowerment process of health promotion and the importance of creating ownership [23].

In this article, we appraise a longstanding health system-strengthening project in Tanzania. We will first show the system approach pursued in the framework of the WHO building block model. We postulate that, for innovations to reach sustainable system integration, a sequence of three stages is required: from developing individual innovations, to their integration into service delivery systems to, finally, their adoption in the respective institutional policy. Each stage presents its own challenges and requires planning and allocation of human and financial resources to address them.

This perspective takes into account that innovations and interventions in international development cooperation often do not reach full integration into their service delivery environment and are discarded before being adopted at the policy level. As one study pointedly formulates: “The development sector is a graveyard of pilot projects” [24]. Donor-funded health projects develop a multitude of innovations hoping to benefit the population beyond the lifetime of the project. However, unfortunately, in many cases the developed innovations end with the project. Hence, strategies to better scale innovations to the national level are required [5,25–27].

Below, we describe the path and corresponding results of the HPSS project along the three stages of an innovation adoption process. We recount the journey along the complexity of a health system and sketch the approach pursued at the respective levels. By reporting the resulting achievements and bottlenecks, we hope to contribute to the discussion on complex projects addressing health systems development.

## 2. The Integrated Health System Strengthening Approach of the HPSS Project

The Health Promotion and System Strengthening (HPSS) project “<https://www.hpss.or.tz/> (accessed on 5 August 2024)”, funded by the Swiss Government, was implemented between 2011 and 2023 by the Swiss Tropical and Public Health Institute (Swiss TPH) in collaboration with the Ministry of Health (MOH) and the Prime Minister’s Office, Regional Administration and Local Government (PORALG) of the Government of Tanzania (GoT). The 12-year project aimed to provide technical support to the 26 regions of mainland Tanzania in various fields of the health system, including health insurance reform with the improved Community Health Fund (iCHF, or in Kiswahili “CHF Iliyoboreshwa”), a public–private partnership to complement the health commodity supply chain with a prime vendor system (PVS), health technology management, and participatory community and school health promotion.

The goal of the HPSS project was to strengthen the health system of Tanzania through various interventions, addressing system building blocks from both the demand and supply side, thus supporting the health sector reforms of the GoT [28]. Figure 1 provides an overview of HPSS project interventions in a system’s perspective along the WHO building block framework:

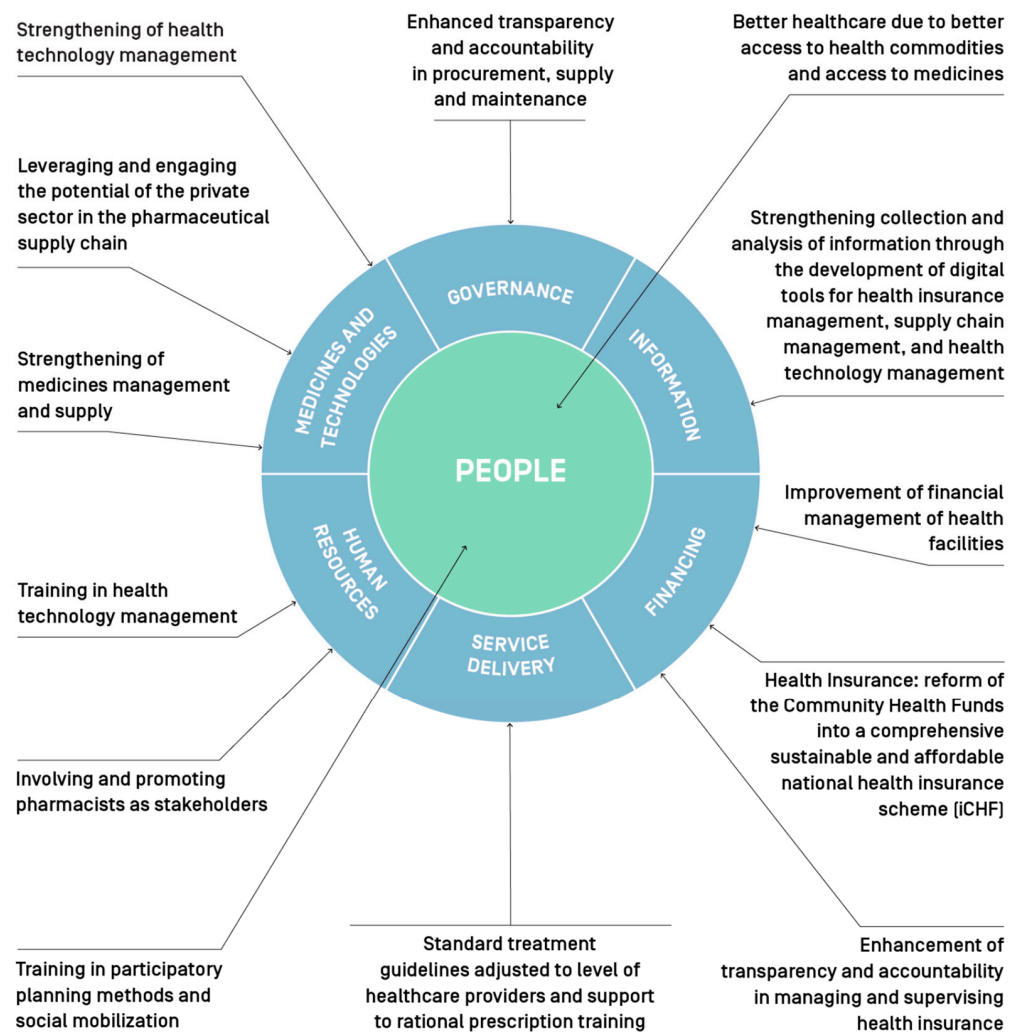


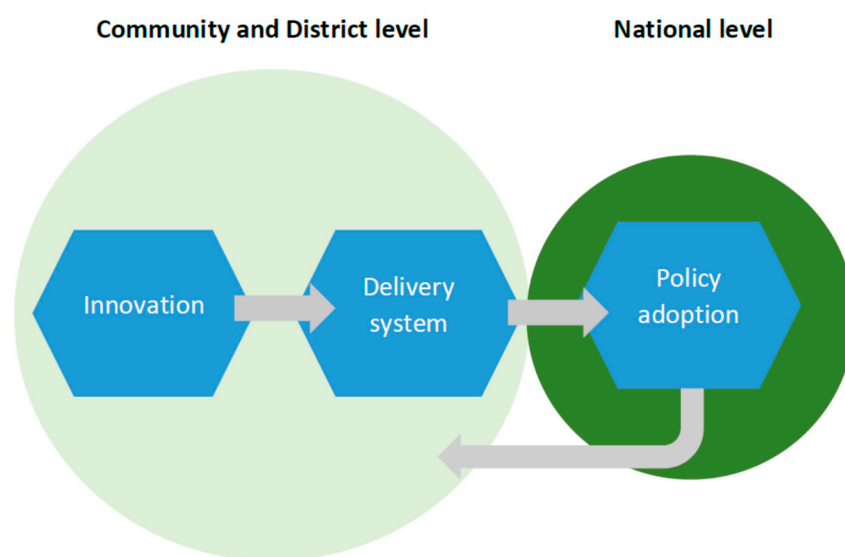
Figure 1. System strengthening approach of the HPSS project [29].

The HPSS project had a clear vision for its support to the GoT to comprehensively address healthcare challenges at various levels with a focus on solutions working at the district and municipality level, and to create sustainable improvements in Tanzania's healthcare landscape. It operated in a multisectoral, interdisciplinary, and systemic manner, pursuing several interrelated and complementary approaches. On the one hand, the Swiss–Tanzanian cooperation project emphasized health promotion and preventive interventions to improve the health of the population. On the other hand, the HPSS project stressed the need for a well-functioning health system in Tanzania. The project's primary commitment was to provide solutions for improving healthcare access, particularly for the most economically disadvantaged. Accessible, high-quality healthcare requires a holistic approach, strengthening the healthcare system in an integrated and comprehensive manner. The project aligned and contributed to a number of national strategies such as the Health Sector Strategic Plans III, IV, V, and specific policies aiming at reaching universal access to primary healthcare services. Innovations were implemented at crucial junctures within the health system, benefiting the entire population while focusing on people living in rural areas and those with low-income jobs in cities [30–32].

The vision comprised ultimately enhancing the institutional capacity of 185 district and municipal councils to improve access to health insurance protection, medicines supply, medical equipment maintenance, and health promotion through technical assistance, digitalized solutions, and operational research for policy dialogue [33].

Working in close collaboration with MoH and PORALG, the HPSS project developed innovative solutions in the Dodoma region from 2011 to 2015 and tested their implementation in the Dodoma, Morogoro, and Shinyanga regions from 2015 to 2018. From 2018 to 2023, following the decision of the Tanzanian government, the HPSS project rolled out its operations nationwide, covering all 26 regions and 185 districts of mainland Tanzania and supported the GoT to integrate innovative solutions into the national health system. From 2019 to 2021, the HPSS project operated through eight zonal offices for rendering close technical support to all regions in Tanzania.

During the implementation process, however, it became evident that simply addressing various building blocks in parallel does not suffice for the successful adoption of innovations in the health system, nor does it strengthen the system. We therefore applied a three-stage approach ranging from developing innovations to their integration into service delivery systems to, finally, their adoption in the respective institutional policy (Figure 2).



**Figure 2.** Stages of developing and adopting innovations in a systems approach.

Figure 2 illustrates a three-stage systems approach for developing and adopting innovations. The first stage, Product and Services Innovation, involves innovating, optimizing, and validating individual interventions and technologies. This phase is crucial for developing effective and reliable solutions tailored to specific healthcare needs. The second stage, Service Delivery System, focuses on the integration of these products into the larger service delivery system. This step ensures that the innovations are effectively incorporated into existing frameworks, enhancing the overall efficiency and reach of healthcare services. The final stage, Policy Adoption, encompasses the transformation of institutions through the adoption of these innovations in policies and the allocation of necessary budgets. This phase solidifies the innovations within the health system, ensuring sustainable impact and institutional support. Once the innovation is anchored at the policy level, it can then be scaled up and implemented at the community and district level in a sustainable manner.

As an example, innovations, such as a new information technology (openIMIS) for managing the social health insurance system (iCHF), were developed on the basis of local assessments and international best practice. During the second stage, these innovations had to be integrated into broader service delivery systems, such as health facilities' frameworks for information technology and electronic payment systems. Finally, after testing, adjustment, and approval, innovations had to be integrated into government policy in the form of guidelines, policy documents, and budget allocations. Each stage, from innovation to delivery system integration to policy adaptation, required cooperation at multiple levels and the explicit commitment of human and financial resources. After adopting the policy,

the GoT started the implementation of the iCHF in all 185 district and municipal councils in 2018.

### 3. Product Innovation: Developing Innovative Service and Product Interventions

The HPSS project aimed at supporting the GoT in strengthening its health system in the four components of the project: health financing, medicine management, health technology management, and health promotion. In the initial phase, the main task was a situation and stakeholder analysis in each of these fields. These analyses would orient the project, assess the current status and development stage of products and services available, and lead to the identification of major bottlenecks in each field of activities. Based on these baseline analyses, the HPSS project took up work on a number of innovations at the product and service level in collaboration with stakeholders and partners from the GoT. Translation of these innovations into guidelines and Standard Operating Procedures (SOPs) provided a physical manifestation of the product or service.

#### 3.1. Social Health Insurance

In Tanzania, both rural and urban households struggle with high healthcare costs, often exceeding 10% of their monthly income. A total of 66% of Tanzanians live in rural areas [34], and 62% of the population are self-employed or farmers earning an average of TZS 169,375 (USD 67) per month from agriculture (in 2020/2021) [35]. The Mainland Tanzania Poverty Assessment supported by the World Bank found in 2018 about 14 million people living below the national poverty line of TZS 49,320 per adult equivalent per month, and about 26 million (about 49 percent of the population) living below the USD 1.90 per person per day international poverty line [36].

Looking beyond financial indicators at multidimensional poverty, the UNDP, for 2021, classified 57 percent of the population in Tanzania as being multidimensionally poor with an additional 23 percent being vulnerable to multidimensional poverty [37]. Despite progress in poverty reduction, approximately 45% of the population in 2023 still live below the international poverty line of 2017 of USD 2.15 per day [38].

This forces families to choose between paying for healthcare and other essential expenses. To make healthcare accessible to all, health insurance initiatives must recognize the importance of affordability, as affordable premiums are crucial for a widespread, positive impact on the population. To mitigate this challenge and propel the Tanzanian Government's Universal Health Coverage (UHC) agenda, the HPSS project collaborated with the GoT to create a comprehensive social health insurance system tailored to rural populations and the informal sector, which employs 29% of the population (in 2020/2021) [35].

Central to this insurance reform is the modernization of the Community Health Fund (CHF) and its transformation to the digitalized "improved CHF" (iCHF). The Community Health Fund as defined in the CHF Act of 2001 [39] displayed a number of structural problems including a very limited benefit package providing healthcare only at a primary level health facility, a lack of active enrolment, and a susceptibility to fraud due to the paper-based management system [40].

The iCHF offers a comprehensive benefit package with an affordable membership premium to the informal sector and the rural population, including healthcare services up to regional hospital level, subject to an exclusion list comprised predominately of specialized procedures and drugs [41,42]. Access to district and regional hospitals is based on referral letters. Provider payment is based on a capitation formula taking into account healthcare utilization by iCHF members, population enrolment rates into the scheme, and population in the catchment area [43].

Key drivers of iCHF's success include an integrated IT system that fosters collaboration among stakeholders and about 16,000 community-based enrolment officers in every village and town quarter of Tanzania. The Insurance Management Information System (IMIS) was developed by Swiss TPH within the framework of the HPSS project and was subsequently

made available as open source software (openIMIS) through an international initiative funded by the Governments of Germany and Switzerland (<http://www.openimis.org>).

The openIMIS IT system serves as a comprehensive health insurance management platform, connecting health facilities with the health insurance scheme through a centralized web- and smartphone-based application for health insurance operations and thus reducing transaction costs for the management of the scheme by replacing previous physical travel through online data transfer. It allows for paperless enrolment, management of different benefit packages, collection of premiums and reimbursements to health facilities, and other data management tasks. The HPSS project supported the GoT in integrating openIMIS into the governmental IT systems for health facility management (e.g., GoTHOMIS, Afy-aCare). Monitoring tools were developed displaying management information based on DHIS2, an open source, web-based platform used as a health management information system (HMIS) in Tanzania and many countries worldwide. openIMIS facilitates billing approaches through its integration with health facility management systems, financial accounting (MUSE), cashless payments (GePG), and linkages to mobile payment systems.

With the centralized operation of the iCHF through the PORALG, a fragmentation of the insurance pool was avoided. Although the PORALG delegated the operational tasks of overseeing funds to the regional level, establishing the 26 Regional Administrative Secretaries (RAS) as Accounting Officers for regional insurance pools, this did not result in a fragmentation of the insurance system. All important elements for health insurance such as decisions on the membership contributions, reimbursement mechanisms, and the definition of the benefit package were centralized and decided at the level of the PORALG in Dodoma. The decision to delegate fund management to the regions was driven by the need to economize on human resources by utilizing the existing manpower of the PORALG at the decentralized level, as the RAS are directly subordinated to the PORALG leadership at the headquarters. The openIMIS health insurance software was operated by the ICT Department of PORAL in Dodoma, ensuring full integration of all districts and regions in a unified countrywide iCHF system, enabling members to join the scheme at any place in the country and receive benefits all over the country.

To ensure affordability for members, membership contributions were kept at a low level as government budget allocations primarily finance the governmental healthcare services. Thus, membership contributions supplement funds from government budgets and do not need to cover the full costs of the services. This approach ensures that the broader population can access high-quality healthcare services at an affordable rate, consequently lowering the risk of encountering catastrophic health-related expenses.

### *3.2. Medicines and Supply Management*

Access to healthcare is determined by the availability of health commodities, including medicines, diagnostics, and other medical supplies. Clinicians depend on effective, safe, and good quality medicines to provide adequate healthcare. Patients equate quality of care with the availability of medicines. If out of stock, patients suffer, lose confidence in health services, and decline to enroll in health insurance schemes.

In 2011, a project baseline study uncovered critical issues in Tanzania's public health system, including a fragmented pharmaceutical system with frequent stock-outs of vital medicines, inadequate supply chain management, insufficient pharmaceutical staff, and irrational medication use. The Medical Stores Department (MSD) serves as the cornerstone of public medicine supply in Tanzania. However, the MSD has encountered challenges in fulfilling orders from health facilities. By 2011, this supply deficit had escalated to over 40%. While health facilities had the option to obtain deficient medicines from the private sector via the district, the process proved to be economically inefficient, bureaucratic, lacking transparency, leading to concerns about the quality of supplies and extended delivery lead times.

In collaboration with the MoH and PORALG and fostering the participation of stakeholders at all levels of the health system, the HPSS project designed a concept for a comple-

mentary supply channel, a Prime Vendor System, registered as Jazia Prime Vendor System (Jazia PVS) [44]. This new strategy established a Public–Private Partnership (PPP) with private sector pharmaceutical suppliers. Procedures to procure complementary supplies from private vendors in a pooled regional approach were developed [45]. This PPP system empowers health facilities to obtain essential health commodities from private appointed regional suppliers, called “prime vendors”, addressing supply challenges and complementing the MSD [46]. When the MSD notifies stock-outs, the Jazia PVS supplements the regular government supply with additional supplies from private vendors based on a stringent evaluation of vendors and without compromising quality and prices.

This groundbreaking logistic system offers multiple benefits, including enhanced planning, faster decision-making, and cost-effective purchasing of medicines and health commodities [47,48]. It introduced accountability, while improving access and healthcare delivery in public health facilities [49]. Initially piloted in Dodoma, this PPP model significantly boosted the availability of medicines. By fostering transparency and accountability, aligning with safety standards, and maintaining fixed pricing, this transformative supply chain model substantially increased health commodity availability from 53% in 2011 to 92% in 2018 in the pilot regions. In 2018, the GoT expanded the successful pilot project across all 26 mainland regions, reaching 185 councils and bridging the gap between MSD supplies and health facilities demand.

Crucially, the new practice model, supported by evidence, resulted in the establishment of implementation guidelines, including Standard Operating Guidelines (SOPs) and a Monitoring and Evaluation (M&E) framework. The implementation of PVS now abides by the Public Procurement Act and its Regulations [50]. In addition to the Jazia PVS, a bundle of systemic supply chain interventions, was introduced to improve accountability, medicines availability, and access to therapy for patients. These include capacity building of health facility staff and peer coaching. Public financial management was revised to standardize and simplify procedures and transactions. Supportive supervision was complemented by inventory and financial auditing at the district level.

Furthermore, the HPSS project developed and introduced the Prime Vendor Management Information System (PVMIS), a web-based system for managing the Jazia PVS. Fully integrated with the GoT Health Operation Management Information System, it enables public health facilities to digitally order, pay, and report on medical commodities. PVMIS overcomes the challenges of the previous paper-based system, providing a faster and more transparent management of logistics data about supply requirements and enabling the timely procurement of supplies. PVMIS gives notifications when MSD products are out of stock and automates pricing, which reduces order creation and processing time, further enhancing the monitoring of Jazia PVS. The system is accessible to multiple users such as health facilities and regional authorities.

However, the HPSS project went beyond a vertical one-dimensional and supply chain-focused approach to the pharmaceutical sector, taking a comprehensive approach to medicines management strengthening, underpinned by a theory of change and focused on building a strong foundation across all facets of the pharmaceutical system.

A well-trained and motivated healthcare staff adapted to level of care and effective tools are vital components to manage a supply chain. The Medicine Dispensers Certificate Course established at St. John’s University of Tanzania addressed the dire crisis in human resources for health evident in the pharmaceutical sector. The accredited one-year course was based on the premise that primary healthcare facilities require pharmaceutically trained technical and vocational staff to avoid task shifting to clinical personnel [45]. The modular course equips pharmacy dispensers with essential skills, improving patient care and commodity utilization.

Considering the importance of responsible medicines use, the HPSS project collaborated with MOH on the revision of the national Standard Treatment Guidelines (STGs) [51]. With a focus on PHC facilities, these were adjusted to level of healthcare providers, offering a user-friendly tool for rational prescription training. The HPSS project, along with the



MoH and the World Health Organization, further facilitated the National Action Plan on Antimicrobial Resistance (AMR) and organized its first national AMR symposium, convening all stakeholders and initiating a Multisectoral Coordination Committee to address AMR [52,53]. The project also supported the Roll Back Antimicrobial Resistance Initiative, to promote responsible antibiotic use and raise community awareness.

### 3.3. Health Technology

In 2011, Tanzania grappled with significant Health Technology Management (HTM) issues. A situation analysis found that inefficient infrastructure and equipment management, coupled with a lack of systematic planning, were primary concerns. Managerial skills were absent at various health system levels, impeding documentation, planning, and budgeting for equipment maintenance. A shortage of trained technical staff, including engineers and technicians, exacerbated the situation. Responsibility for medical equipment maintenance fell primarily on health facilities, leading to suboptimal management, inadequate repairs, and a lack of a comprehensive inventory.

The HPSS project initiated a pilot reform in the Dodoma Region guided by four key principles: alignment with Tanzanian HTM policy and regulations, utilization of all available maintenance resources, integration of infrastructure and medical equipment maintenance, and adaptability, scalability, and sustainability. Key interventions included conducting an infrastructure and medical equipment inventory, reforming the HTM human resource sector, establishing maintenance infrastructure, and fostering policy dialogue and collaboration. The pilot reform achieved significant success, notably enhanced the inclusion of technicians in the District and Regional Health Management Committees, increased inspection rates, and supported the development of and budget allocation for maintenance plans. However, persistent challenges remained, including incomplete data entry, resource allocation issues, and limitations in personnel recruitment.

The national implementation of HTM innovations gained momentum, marked by essential milestones such as the establishment of maintenance workshops in various regions, the introduction and accreditation of a training program for biomedical technicians, enhanced human resource capacity with the employment of biomedical technicians and engineers by districts and regions, and the development and deployment of a National Calibration Centre [54]. At the Mvumi Institute of Health Science, a course capable of training 100 artisans annually was established. While the first batch of students graduated in 2023, the course is being upgraded to offer Diploma Courses in Biomedical Engineering starting from the 2024 academic year.

In support of the government's plan of using digital solutions for their health system's management, the HPSS project helped with the setup of a computerized inventory and equipment management system, openMEDIS, and introduced it to be used as an inventory management system for medical equipment and building infrastructure. openMEDIS was later transitioned into the broader IT system for inventory management, the Medical Equipment Maintenance Information System (MEIMIS). It provides centralized information to the GoT on which equipment is in use, at which health facility, and on its state of function or need of repair. It supports the management of spare parts and facilitates decisions about investing in new medical equipment.

### 3.4. Health Promotion

For health promotion, the situation analysis revealed that mostly a "health education" approach was followed for promoting health at the community level, and that this approach was perceived as being rather top-down and falling short of expected outcomes. The HPSS project focused on re-orienting this approach into a more empowering community action approach strengthening community-driven health actions and mobilizing government resources to support such initiatives. Along the lines of the adult teaching approaches advocated by Paulo Freire [55] and their practical applications, solutions were sought with communities for addressing their problems [56].

Health promotion is a comprehensive, participatory concept that empowers individuals to take control of their health. The HPSS project embraced this holistic approach, overcoming traditional methods of distributing posters and leaflets. The HPSS project thus focused on strengthening community-driven health actions and mobilizing government resources to support these initiatives. The project aimed at equipping communities with knowledge and tools to address their health and well-being needs more effectively, and at fostering collaboration among government and civil society actors in health, education, and community development.

From the interventions, several experiences and lessons learnt from the project were used by the MoH for the development of strategies and policy guidelines such as national school health services and national health promotion policy guidelines and strategies. At the primary level, a mechanism for integrating school and health facilities interventions for health promotion was institutionalized and put into effect, which increased the optimal use of resources and responded to the heartfelt needs of the school populations. Integrated multisectoral approaches for community participatory health promotion were adopted by the primary health system and other departments such as community development, social welfare water, and nutrition. Furthermore, a training on Health Promotion was established at the University of Dodoma to continue providing training on health promotion.

#### **4. Application: Service Delivery Systems Integration**

The development of innovative products and services must be followed by their implementation. A test phase could show their feasibility, utility, and acceptability, but for a wider-scale implementation, they needed to be integrated into a service delivery system, requiring an adjustment or even complete overhaul of the existing systems. The aim was to expand, enhance, and optimize the capacities for handling the newly developed interventions and technologies. A prerequisite were adjustments in terms of government policy formulation, i.e., the development of new policy documents, guidelines and instructions, human resource capacity and availability, and new system elements for operating the technology and communicating with all persons involved, including IT departments. Broad communication and marketing of new procedures and their beneficial impact were paramount for the acceptance and uptake of innovations at the system level. The HPSS project developed a number of such service delivery systems by adjusting existing ones or developing new ones from scratch.

##### *4.1. A New Service Delivery System for Social Health Insurance: The “Improved CHF”*

Following the objectives of the GoT to create a health insurance providing social protection, the reform of the CHF required a new design of the scheme for delivering these social health protection functions. Apart from the Swiss Government-funded HPSS project, a number of other implementation partners worked on improving the CHF in cooperation with the GoT. Efforts to arrive at a reformed model for social health insurance were coordinated with partner organizations such as the German GIZ and KfW, the Dutch-based PharmAccess, and the Health Insurance Management Services Organization (HIMSO) supported by the International Centre for Development and Research (CIDR). The requirements for the reform of the CHF were jointly discussed in meetings between MoH, PO-RALG, and implementing partners.

For operating the reformed iCHF, new procedures and responsibilities were defined and new positions created at the district, regional, and national level, all managed by the PO-RALG. The reformed iCHF created an active marketing and enrolment approach and provided a benefit package covering services from primary to tertiary level (regional specialized services). The development of the openIMIS management platform provided members with access to a broad range of health facilities in mainland Tanzania and enabled the electronic payment of membership contributions and of health service bills.

#### *4.2. The Jazia PVS: Reform of a Health Commodity Supply System*

Due to convincing results and policy dialogue, the government requested to roll-out the successful pilot of the PVS to all 26 regions of mainland Tanzania in 2018. A 12-step approach for implementation was applied for reforming the supply system. Cascade training from the national to facility level was conducted. Funding for scaling up was provided by the government and dedicated basket funds. The PORALG together with the HPSS project planned and implemented the roll-out. A national Coordination Committee was formed, composed of members from ministries and agencies. A task force reviewed documents guiding the establishment of Jazia PVS for adoption, including a training manual, Terms of Reference (TOR) for structures supporting the establishment of Jazia PVS, and adaptation of tender documents in accordance with the Public Procurement Act guided by the Public Procurement Regulatory Authority.

In each region, suppliers were tendered and contracted based on Good Procurement Practice. Pilot implementation was guided by Standard Operating Procedures (SOPs) and closely monitored with performance indicators. All stakeholders from health facilities and councils were trained in applying SOPs. Each selected vendor signed a contract with the respective regional authority. In each region, a regional PVS office was established within the regional administration, represented by a PV coordinator, a dedicated pharmacist, and support staff. Mandated administrative structures such as a Technical Committee and a Board were appointed by the regional authorities to closely manage and support the PVS. While most regions applied and reformed government procedures and operations according to new procedures and guidelines, a couple of regions encountered challenges in setting up the Jazia system. The difficulties included creating new bodies for managing the system at regional level and conflicts of interest leading to resistance, particularly in one region.

#### *4.3. Health Technology Management: Reform of an Infrastructure and Equipment Maintenance System*

Within the framework of the HPSS project, the key innovations for an improved management of health technology were integrated into the wider delivery systems. An intense policy dialogue and collaboration between the HPSS project and the MoH Health Care Technical Services and relevant Tanzanian authorities was established. All activities were designed and discussed in the regional Health Technology Management Technical Working Group and were endorsed for implementation. Systematic planning processes and budget allocation within local government frameworks were supported. Lobbying efforts at the district level sensitized district administrations about medical device management requirements and the need for a specific maintenance budget. The national-level Medical Equipment and Infrastructure Management Information System (MEIMIS) needed to be integrated into the governmental health facilities for guiding planning, budgeting, procurement, and disposal of medical equipment. Policy guidelines were developed in collaboration between the HPSS project, MoH, and the PORALG, providing strategic direction for medical device management, including planning, acquisition, installation, inventory management, training, maintenance, and decommissioning of technologies. An operational manual, finally, translated the guidelines into practical implementation. The newly established training course for biomedical engineering at the Mvumi Institute of Health Science was accredited and integrated into the national academic framework of National Technical Awards (level 6) in Tanzania in order to open up career paths for the participants.

#### *4.4. Health Promotion: Reform of Community Involvement in Health Promotion Approaches*

The service delivery systems relevant for health promotion were the academic institutions for anchoring an understanding of community-led health promotion, the government budgeting to allocate funds for community health activities, and community level organizations developing and testing innovative solutions. To ensure the continuity and

expansion of expertise, the HPSS project developed courses and trained lecturers as part of a specialized and accredited health promotion course at the University of Dodoma, which now leads in teaching health promotion and extends expertise to other training centers throughout Tanzania.

To implement this innovative health promotion approach, the HPSS project invested in building the skills of facilitators. The project developed practical training modules for health officers, community officers, and school health coordinators, transforming them into master trainers. These master trainers then cascaded their knowledge to their peers, creating a cost-effective knowledge sharing network.

### **5. Policy Adoption: Transformation of the Institutional System**

The HPSS project experienced the most difficult level of health system strengthening at the third stage, the level of the institutional system. For creating a long-lasting and sustainable integration of innovations, the transformation of institutions and the creation of ownership for operating innovative service delivery systems and optimized interventions and technologies are crucial. Although “ownership” and “sustainability” are always taking a central place in project documents and log-frames, the actual achievement of such goals proved to be a complex journey, rather than a one-time attainment.

The policy level was crucial for all components of the project. Recognizing the need for a policy framework to back community health actions, the HPSS project supported the government in adopting lessons learnt and experiences from the system integration of the HPSS project innovations for strategy and policy guidelines.

In Health Promotion, documents such as the Policy Guidelines on School Health Services in Tanzania were developed [57] and the utilization of budgets for community-level activities were clarified. The Health Promotion course established at the University of Dodoma strengthens the GoT by providing essential knowledge to government cadres such as Community Development Officers and Health Officers, enabling them to enhance their community interaction approaches.

For health technology management, the HPSS project has played a pivotal role in integrating key operational strategies within government policies and budgets. Between 2011 and 2023, the project facilitated significant policy reforms to strengthen medical device management in the national health system. This included increasing the availability of biomedical engineers through a new training program at the Mvumi Institute of Health Science, advocating for more permanent government positions for biomedical technicians and engineers, and for integrating them into council health management teams at district and municipal levels. Additional district and regional maintenance workshops were constructed and equipped, and the National Centre for Calibration and Training was established for quality assurance of medical equipment. The introduction of the MEIMIS IT system further enhanced the government’s capacity to implement a comprehensive medical device management policy. In 2022, the MoH established the Directorate of Diagnostic and Health Care Technical Services, encompassing Radiology and Imaging Services, Health Laboratory Services, and Health Care Technical Services, significantly elevating the priority of healthcare technology management within the Ministry and increasing personnel and budget allocations.

In the Medicine Management component of the project, the GoT introduced the new Jazia Prime Vendor System as a national policy for all regions in mainland Tanzania. With this complementary supply channel for health commodities, the GoT improved the reliability of medical supplies in the country. Challenges at the policy level revolved around the questions of delineating the roles of the MSD from the supplementary role of the Jazia PVS and the questions of allocations of resources, authority, power, and protection against corruption. Frequent changes in ministerial leadership in both the MoH and PORALG and related conflicts of interest caused delays in signing policy documents.

The introduction of the iCHF as a countrywide social health insurance system improved the access of the rural population and the informal sector to health services. The

iCHF also provides an example of the challenges faced in such a process. From the start, the project developed different options on how the reformed social health insurance could be anchored in the institutional framework of the GoT, and presented them for discussion to the GoT counterparts. In principle, a reformed CHF could be operated as a district-based scheme operated by the 185 district and municipal councils in parallel, be integrated into the NHIF, be established as a separate agency within a governmental supervision similar to the NHIF, or, finally, be managed by the PORALG as the central representation of the governmental local administrations.

The GoT decided to first integrate the iCHF into the PORALG structures and then decide the final institutional anchoring in the upcoming “Universal Health Insurance” (UHI) law. From 2018, the iCHF was rolled out by the GoT in all district and municipal councils of mainland Tanzania, anchored in the structures of the PORALG. In Tanzania, the administration of the Local Government Authorities at the district and regional level is steered through line management by the PORALG. The MoH, on the other side, is responsible for policy setting. A governmental health insurance body could therefore either be managed through the policy-setting MoH, like the NHIF, or, as in the case of the iCHF, by the administrative line of local government management, the PORALG. In this institutional set-up, the scheme benefitted from the advantages of having an established administrative structure at the district and regional level, enabling a rather quick and effective roll-out countrywide. However, the system did not formally establish a specialized central unit for managing the iCHF, awaiting the political decisions on the UHI.

Since the reform of the iCHF, the political and legal context has evolved dynamically. In December 2023, the GoT passed a law establishing the mandatory UHI scheme. The law merges the two governmental schemes of CHF and NHIF and mandates the NHIF to integrate the reformed CHF under the name of “Community Health Insurance Package” (CHIP) into the new UHI scheme for offering a comprehensive health insurance package to the informal sector and rural populations.

This example shows that, through a systems strengthening approach, innovative products and services as well as a service delivery systems can be developed, but at the level of integration into the institutional system, a multitude of factors play a role. As this level is in the realm of political decisions of the country government, development projects can only play a limited role by providing technical support, evidence-based experience, and potential options to inform decision-making.

## 6. Summary of Results and Outcome

In a health system strengthening framework, the HPSS project played a key role in transforming the Community Health Funds into a functional health insurance system, ensuring a consistent supply of medicines, maintaining medical equipment, and empowering communities to actively engage in health promotion. It played a pivotal role in developing IT systems for managing health insurance, medicines procurement, and medical equipment. These IT systems are operated by the Government of Tanzania and are fully integrated into their IT policy. The project introduced new training courses to bridge skill gaps among pharmacy dispensers, health technicians, and health promotion specialists, which now form part of the national educational system as accredited and certified courses. It also enhanced the capacity for managing medical equipment by establishing maintenance and repair workshops and supporting a national calibration center. The project played a significant role in advancing the AMR agenda of the MoH.

This system strengthening approach improved the Tanzanian healthcare system and significantly expanded healthcare access for citizens. As a result, the HPSS project made healthcare delivery more accessible, affordable, and effective for all Tanzanians, regardless of their circumstances, and has had a major impact on improving people’s health and well-being.

In the various components, a number of results and outcomes were achieved. The social health insurance system of the iCHF enables access to healthcare nationwide, en-

compassing over 6000 health facilities in all 185 districts and municipalities of mainland Tanzania, from the primary to the tertiary level (dispensaries, health centers, district and regional hospitals). iCHF introduced an affordable health insurance system, offering an attractive benefits package, simplified enrolment processes and portability, a reliable payment mechanism, and robust IT management. The iCHF paid for 2.6 million treatment visits of beneficiaries since 2018, of which 80% took place in primary health facilities. A total of USD 12.7 million in premiums were collected and USD 9.5 million claims were paid to health facilities.

While the government-operated National Health Insurance Fund (NHIF) mainly covers government employees and part of the formal sector, the new iCHF provided health insurance coverage mainly to rural population and the informal sector. The NHIF provides health insurance to 4.8 million beneficiaries, covering 8.1% of the population of mainland Tanzania (annual report 2021–2022). Since its national roll-out in 2018 until August 2023, on the other hand, the iCHF cumulatively covered 4.5 million beneficiaries, approximately 7.6% of the population. In 2022, 6378 health facilities provided health services to iCHF members, compared to 6100 facilities in 2020/2021, out of which 6356 facilities were public, 20 faith-based, and two private health facilities [58].

The number of households with active iCHF policy varied monthly, peaking in July 2021 with 1.7 million beneficiaries (3.2% of the population). Decisions for enrolment and for dropping out of the iCHF scheme were found to be significantly associated with factors such as presence of chronic disease, perceptions about the quality of services provided, insurance scheme management, the role of traditional healers, and the intensity of CHF communication activities [59–61].

The number of actively covered beneficiaries, however, dropped to about 622,170 individuals (1.1% of the population) in 2023 (data from iCHF IT system, PORALG). This low figure is in part due to preparations for the Universal Health Insurance (UHI) bill by the GoT, resulting in mixed signals from the GoT on the scheme's future and discouraging the population from enrolling.

At the end of the HPSS project, three bottlenecks persisted for the iCHF: First, the institutional set up with a strong and permanent management structure was not finally decided; second, the communication to the population about the reformed iCHF was limited and, through parallel discussion of the UHI, also lead to misunderstandings; and third, the enrolment and marketing mechanism did not fully follow a business-oriented approach. All such bottlenecks can only be addressed and resolved once full institutional integration and ownership is achieved.

The HPSS project endeavored to take a comprehensive approach to medicines management strengthening, committed to building a strong foundation across all facets of the pharmaceutical system. The introduction of the Jazia Prime Vendor System for procuring complementary supplies from private vendors benefits 8000 health facilities and a population of 61 million Tanzanians from this complementary supply of medical products. Over 20 billion Tanzanian Shillings (appr. USD 8 million) annual value of health commodities are procured through this system from all prime vendors. The Jazia PVS complements the MSD with fixed prices, with health commodities of assured quality, safety and efficacy, leveraging and engaging the potential of the private sector in the pharmaceutical system. Funds derive from the health facility's own sources, responding to fiscal decentralization. Anchored in government structures, based on government policies and within regional structures, the PVS is sustainable and not a parallel system. Importantly, transparency and accountability are enhanced and the availability of medicines and health supplies has increased significantly, leading to improved access to medicines for patients.

Over 50,000 staff involved in the pharmaceutical sector attended trainings, workshops, and coaching sessions. The support of the Roll Back Antimicrobial Resistance Initiative to promote responsible antibiotic use and raise community awareness resulted in involving more than 11,500 school children as agents of change from 25 Tanzanian schools [52,53,62].

The 12-year HPSS project serves as a testament to the value of an integrated, systems strengthening approach to HTM. Building technical capacity, introducing training programs, establishing five district and four regional repair and maintenance workshops, and developing IT systems led to tangible improvements in the availability and operability of health technology. Additionally, cost savings through equipment repair were realized. The national rollout holds promise for further strengthening HTM in Tanzania, with milestones such as the National Calibration Centre and regional maintenance workshops. Overcoming challenges at both the technical and political levels and enhancing coordination capacity will be critical for successful implementation and sustainability. The ultimate success of the HTM component hinges on increased government commitment at the policy and funding levels, ensuring a healthier and more efficient healthcare system for Tanzania.

In Health Promotion, in 154 sessions, 90,000 school children were screened with oral, eye, ear, worm, and parasite examination, and as a result 2500 pupils were referred to specialist services. This proactive approach prevented children from missing school due to illness and contributed to better academic performance. One significant achievement of the HPSS project was the marked improvement in school hygiene and community sanitation in the Dodoma region through health promotion. This approach led to a noticeable reduction in diarrheal infections among students and contributed to overall better health outcomes. The project facilitated the formation of health committees, which collaborated with students and the local community to create sanitation action plans. Over 150 Sanitation Revolving Funds (SRFs) were established in 130 villages, leading to the construction of more than 67,000 new public and domestic latrines [29]. Notably, this effort had a dual impact on both public health and local economic development. Local artisans were engaged in designing and manufacturing toilet slabs and constructing latrines, driving economic growth within the communities. This reflected the project's dedication to enhancing community well-being and prosperity through integrated approaches, thus utilizing synergies.

## 7. Conclusions and Lessons Learnt for a Health Systems Strengthening Project

Throughout the three stages from developing individual innovative interventions, to creating and optimizing service delivery systems, to transforming institutional systems, the project achieved successes and faced typical system challenges. The constantly changing policy and institutional environment lead to adaptations over the project's lifetime. Changes in political leadership and policies required constant adjustments of project timelines, fine-tuning of objectives, and resource allocations. Different visions and activities of stakeholders and implementing partners with potentially competing ideas had to be accommodated and jointly agreed solutions had to be sought. Dependence from other actors outside the own project boundaries was certainly a limiting factor, but continuous communication and coordination to find solutions were also necessary preconditions for facilitating ownership of the solutions and ensure their implementation. The unexpected disruption through the COVID-19 pandemic affected all levels of the health system from supply channels to staff, costs, and policy orientation. Technical progress, e.g., the rapid spread of smartphones and increasing availability of internet services, needed adaptation and permanent flexibility.

Despite the intention of applying the WHO framework of health systems, tools to effectively link components, to study linkages, and to apply systematic system thinking were not readily available and had to be developed from case to case. Certain linkages were assumed and could only be partly verified during implementation. For instance, the availability of medicine and functioning equipment creates trust in the improved quality of healthcare services, leading to higher enrolment into health insurance and thus again increases funding for health commodity supply, hence creating self-reinforcing loops. However, we observed that such loops also depend on the knowledge of the population on, e.g., the availability of medicine based on previous experiences, as well as administrative challenges in the implementation of new developments, and that behavior change needs time. We could demonstrate that availability of medicine lead to higher attendance at

health facilities [29]. However, the assumption that improved quality of care would lead to higher enrolment into health insurance could not be verified.

The project developed and provided innovative tools and delivery systems and anchored them in the respective institutions. Hence, the objectives of the project were reached, as snapshots in time. Nevertheless, the fluid policy developments and constantly evolving health system landscape will lead to changes which continue to require further adaptations and integration in new policies. The most visible example here is the development of Universal Health Insurance (UHI), which has been signed into law in December 2023, after the end of the project. In the new UHI law, the reformed iCHF is integrated into the NHIF and continued under the name of “Community Health Insurance Package” (CHIP), thus losing the branding of the iCHF hitherto supported by the GoT and development partners.

The tools and innovations derived from the HPSS project cooperation framework are thus available for future integration and modifications in such policy developments, but may be transformed into new organizational and management structures. Assessing in hindsight whether the development of the iCHF turns out to be a sustainable contribution to improving the livelihood of the Tanzanian population will depend on a number of factors which will only materialize in the future, such as the level of affordability of membership contributions, the maintaining of a broad benefit package, and others.

Finally, the experience of the HPSS project shows that, in order to reach development changes, innovative interventions and enhanced delivery systems need to be developed at the community and district level, and then anchored at national level policies and institutions, to finally create developmental effects again at the community and district level in the process of scaling up. The national-level policy formulation, with the accompanying provision of budgets and human resources, is a prerequisite for the full implementation and operational practice at scale, thus reaching community-level benefits.

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