Ministry of National Health
Services Regulations & Coordination
GOVERNMENT OF PAKISTAN

amp | The Alliance for Malaria Prevention

Photo courtesy of Indus Hospital & Health Network (IHHN)

Review of the Use of Technology to Facilitate Insecticide-Treated Net Distribution for Vector Control in Complex Operating Environments

CASE STUDY: Pakistan's Leadership in Designing and Implementing the Digitalization of Insecticide-Treated Net (ITN) Campaign Microplanning with District Health Information Software (DHIS2) in Complex Operating Environments (COE)

Background

Pakistan's population of more than 252 million is spread across four provinces—Balochistan, Sindh, Punjab, and Khyber Pakhtunkhwa (KP). In 2010, Pakistan underwent decentralization, dissolving 17 federal ministries including health, and devolving legislative, operational and financial responsibilities to the four provinces.[1]

Considered a moderate malaria endemic country, Pakistan in 2024 screened and tested approximately 15.6 million suspected cases for malaria, with 2.1 million malaria positive cases identified, at public and private health facilities across the country. Of these, 64% were *Plasmodium vivax (P. Vivax)*, 32% *P. falciparum*, and 4% mixed.[2] Currently, 69% of the population live in areas of low and medium risk of malaria, with 29% in areas of high risk, and only 2% in areas classified as having no risk.[3]

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1 Zaidi SA, Bigdeli M, Langlois EV, et al. Health systems changes after decentralisation: progress, challenges and dynamics in Pakistan. BMJ Global Health 2019;4:e001013. doi:10.1136/ bmjgh-2018-001013. Retrieved September 29, 2025, from https://ecommons.aku.edu/cgi/viewcontent.cgi?article=1707&context=pakistan_fhs_mc_chs_chs.

2 Common Management Unit, Pakistan Ministry of National Health Services, Regulation and Coordination.

3 Saeed, A (2024). Climate change causes malaria cases to triple in northwest Pakistan. Gavi, VaccinesWork. Retrieved September 29, 2025, from https://www.gavi.org/vaccineswork/climate-change-causes-malaria-cases-triple-northwest-pakistan#:~:text=Credit:%20Adeel%20Saeed-,Limp%20on%20his%20stretcher%2C%2032%2Dyear%2Dold%20Muhammad%20Jan,of%20Public%20Health%2C%20Peshawar%20District.

Pakistan experienced devastating floods in June 2022, leading to a four-fold increase in malaria in 2022 compared to 2021. This led to a rapid upsurge in reported malaria cases, particularly in the highest-burden provinces of Balochistan, Sindh, and the Khyber Pakhtunkhwa which border Iran and Afghanistan.[4]

These provinces with highest malaria burden also face significant challenges which increase the complexity and risk for ITN distribution. Challenges include a substantial influx of refugees from Afghanistan in the tribal districts of the Merged Areas of the Khyber Pakhtunkhwa, who are fleeing war, extreme poverty and collapsed public health infrastructure including malaria vector control.[5] Attacks have also increased in frequency and intensity in Balochistan and Sindh Provinces, which have experienced increasing threats from violent extremism, crime, kidnapping for ransom, tribal feuds, and nationalist and separatist movements.[6,7]

Introduction

This case study will examine the evolution of ITN mass campaign digitalization approaches in Pakistan, with a focus on their leadership as the first country to incorporate data collection and compilation for microplanning into the District Health Information Software (DHIS2) platform. The focus is both Pakistan's approach to using DHIS2 for microplanning as well as the role of DHIS2 in reinforcing national ownership of ITN campaign data. Alongside these achievements, data for decision-making and ITN campaign quality and coverage were also reinforced through digitalization of ITN campaign activities overall, including household registration (HHR) and ITN distribution.

Previous ITN Campaigns, Digitalization, and Challenges

Within the COE described above, Pakistan has conducted six ITN mass distribution campaigns since 2018 to reach between 6 to 13 districts in each campaign. In 2018, the Red Rose ONEapp and ONEplatform were piloted in Thatta district (Sindh Province) using a Bring Your Own Device (BYOD) approach to manage beneficiary registration, data management and analysis alongside use of a paper-based coupon.

While this digitalization of some campaign activities provided necessary data for the campaigns, the National Malaria Elimination Programme (NMEP), the Common Management Unit (CMU) for The Global Fund grants and the Indus Hospital & Health Network (IHHN) identified several areas for improvement. These included:

- Strengthening data visualization through updates to legacy dashboards;
- Building on the Ministry of National Health Services, Regulation and Coordination (MNHSRC), Provincial health departments and Indus Hospital & Health Network (IHHN) integrated supervision process to incorporate ITN campaign activities;
- Addressing delays faced regarding timely availability of the coupons and payments previously made internationally to the Red Rose team; and
- High costs and other challenges for the sustainability of the third-party digital platforms used, as hosting of the campaign household data outside the country was not allowed.

4 World Health Organisation (WHO) (2022). Disease Outbreak news: Malaria – Pakistan. October 17, 2022. Retrieved September 29, 2025, from https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON413#:~:text=Situation%20at%20a%20glance,of%20the%20national%20health%20system.

5 Karim AM, Yasir M, Ali T, Malik SK, Ullah I, Qureshi NA, Yuanting H, Azhar EI, Jin HJ. Prevalence of clinical malaria and household characteristics of patients in tribal districts of Pakistan. PLoS Negl Trop Dis. 2021 May 3;15(5):e0009371. doi: 10.1371/journal.pntd.0009371. PMID: 33939717; PMCID: PMC8118523. Retrieved September 29, 2025, from https://pmc.ncbi.nlm.nih.gov/articles/PMC8118523/#:~:text=Conclusions/Significance,malaria%20in%20the%20tribal%20district.

6 Verma A, Baloch, I, Valle, R (2025). The Baloch Insurgency in Pakistan: Evolution, Tactics, and Regional Security Implications. Combating Terrorism Center of West Point. April 2025. Retrieved September 29, 2025, from https://ctc.westpoint.edu/the-baloch-insurgency-in-pakistan-evolution-tactics-and-regional-security-implications/.

7 WHO (2022).

Microplanning for an ITN campaign is the process of creating and compiling detailed, local-level operational plans to ensure successful and efficient distribution.

A critical gap during these campaigns and digitalization initiatives was the inability to digitalize the campaign microplanning process. Manual data collection, tracking, and consolidation for microplanning in Pakistan had previously been costly, error-prone and time consuming. Often the districts selected for planned ITN campaign distribution were very large, with at least 50-60 distribution points and many villages. Thus, manual data entry using Excel led to numerous data and formula errors, due to manual calculations in templates which were often unlocked for functionality. Within the time and bandwidth challenges inherent to campaigns, manual data entry is prone to typos or mistakes, for example in recording the name of distribution sites as well as data aggregation errors. Manual data entry was also laborious and tiring work, and yet still led to delays in data consolidation and tracking. These challenges for microplanning also led to a lack of visibility for the process at central and provincial levels and challenges in version control across districts.

ITN distribution and digitalization in COE settings has presented challenges overall, including:

- Safety of campaign workers;
- Disruption of campaign activities;
- Difficulty in accessing some populations prioritized to receive ITNs;
- Data security and confidentiality;
- Community trust and acceptance; and
- Damage to or theft/ robbery of the ITNs.

Pakistan's 2024-25 ITN Campaign

Up to 10 districts were selected, based on annual parasite incidence to receive approximately 5.2 million standard ITNs through distribution in two phases, funded by The Global Fund.

- **Phase-1**: 6 Districts (1 in Balochistan, 2 in Khyber Pakhtunkhwa, 3 in Sindh)
- **Phase-2**: 4 Districts and sub-divisions in the Merged Areas of KP (formerly the Federally Administered Tribal Areas)

Pakistan's NMEP has set ambitious objectives of reaching 100% of the rural households with HHR, coupons, and messages to ensure their mobilization for the complete and accurate redemption of coupons and receipt of ITNs and messages to reinforce their care and use of at least 80%. Depending on security and other contextual factors, ITNs will be delivered through a standard two-phase, HHR and fixed point distribution strategy as well as two strategies which allow for ITN campaign distribution despite security and other challenges in COE contexts. These include:

- "Hit and Run", which involves distribution at a fixed site the day after the headcount.
- Simultaneous "Hit and Run", in which HHR, health education, and the distribution of ITNs occur within a single visit, during a door-to-door distribution.

Figure 1: Example of Pakistan's DHIS2 Platform data capture interface for registering ITN distribution points.

The national Campaign Coordination Mechanism in Pakistan is led by a National Steering Committee and four sub-committees for Implementation and Monitoring and Evaluation; Logistics; Digitalization; and Social and Behaviour Change. The National Steering Committee is also supported by Provincial and District Coordination Committees. CMU and IHHN are members of the National Steering Committee alongside the World Health Organization and Provincial Programs.

The CMU, IHHN and Provincial Programs are responsible for: stakeholder coordination; coordination meetings at national, provincial, and district levels; Microplanning; Training of Trainers at the national and provincial levels; Warehousing at central and regional levels; Digitalization of data collection for HHR, ITN distribution and supply chain management as well as supervision of all campaign activities.

IHHN is responsible for recruitment,

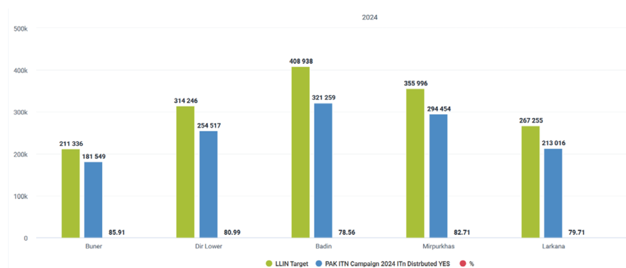

Figure 2: Example of Pakistan's DHIS2 Plastform data visualization to reinforce decision-making.

deployment, and payment of campaign actors; HHR and ITN distribution; data collection; waste management; and social and behaviour Change at sub-district levels; warehousing at district and distribution points and transport of ITNs; procurement and delivery of all campaign materials; supervision of all campaign activities at district and sub-district levels.

Addressing Challenges

Building on their ITN campaign and digitalization experience since 2018, CMU and IHHN prioritized identifying a platform and cost-effective solutions which would address previous challenges, support digitalized microplanning, and ensure MNHSRC ownership of all ITN campaign data.

Considering the potential cost efficiencies and sustainability of the investments, Pakistan needed a digital platform developed and run by the Government for these regularly occurring campaigns.

The CMU and IHHN in collaboration with technical partners and provincial health departments opted to explore the use of DHIS2. This allowed leveraging recent experience in using DHIS2 for surveillance and other areas of malaria control and elimination as well as monitoring flooding and assistance since approximately 2018. DHIS2 is a global, open-source, web-based platform developed by the University of Oslo that is primarily used as a health management information system. To capitalize on this experience and expertise, the decision was thus made to use DHIS2 for ITN mass distribution campaigns. The digitalization team of the CMU led the process, with support from the information technology teams at the Alliance for Malaria Prevention. For the first time, during the 2024 campaign, CMU and IHHN developed modules in DHIS2 for microplanning, HHR using the coupons and distribution of ITNs. All three modules were pilot tested and successfully implemented in six targeted districts for the campaign. Offline modules were available for data entry in areas with poor or no connectivity, with the ability to synchronize data at a later time. Due to security concerns in many areas prioritized for ITN distribution, it has not been possible to capture geographic information systems coordinates for geo-enabled mapping.

District Level

CSV Excel

District	Targets	Total HH Registered	Total Rural Population Registered
Badin	311,550	463,801	2,482,004
Buner	150,753	213,733	1,048,106
Dir Lower	247,613	314,660	1,761,882
Larkana	264,284	270,852	1,499,706
Mirpurkhas	256,852	363,279	2,005,762
Nushki	23,777	30,225	185,264

Showing 1 to 6 of 6 entries

Figure 3: Example of Pakistan's DHIS2 Platform district level data summary.

Likewise, data security and the safety of campaign personnel became major concerns. To counter these, recruitment of campaign personnel from local communities was emphasized with accompanying training for conducting HHR and ITN distribution, rather than mobilization from other areas or districts. For data security, prior permissions were obtained from concerned provincial departments in advance of ITN campaign activities. In most of the districts having security concerns, manual tools were used instead of digital devices, for data collection at the sub-district level. Digital microplanning was developed in government offices, where internet was readily available, using secondary data collected manually.

Outcomes and Achievements of the Campaign and Digitalization

The campaign overcame these challenges and has been successful, with overall achievement at 93% (Table 1). Digital microplanning significantly reduced errors compared to Excel-based systems, which in turn improved the accuracy of microplanning. Real-time data entry in the online DHIS2 module also improved the speed of data aggregation, reporting, and building of the dashboards for monitoring, which reinforced timely decision-making for microplanning. Furthermore, through this initiative, Pakistan has eliminated dependency on external resources for ITN campaign data collection, use, and reporting and maintained all data rights in one central data hub in country for key campaign activities with the support of in-country expertise with other health data.

Future Plans

CMU under the M/o NHSRC and the IHHN, in collaboration with technical partners and provincial health departments, will continue to build on their expertise, experience, successes and lessons learned to date in designing and using DHIS2 in Pakistan. This includes exploration of potential initiatives for digitalizing logistics and warehouse management; micro-budgeting; and volunteer payments as well as improved data visualization, through development of a one-page dashboard template. Further analysis to compare the costs of the ITN campaigns and associated data collection across campaigns since 2018 will also be explored.

The teams in Pakistan will also consider opportunities to share their experience and expertise with other national malaria programmes and partners, through remote meetings, international forums or hosting teams in Pakistan in partnership with the University of Oslo and Alliance for Malaria Prevention.

Table 1: District details are given in the table below for distribution to date.

DISTRICT	MICROPLANNING		REGISTRATION		DISTRIBUTION		PROPORTION DIS VS HHR	
	Population	ITNs	Population	ITNs	Population	ITNs Distributed	Population	ITNs Distributed
Buner	1,041,111	578,437	1,037,081	561,050	952,192	510,115	92%	91%
Dir Lower	1,728,914	960,579	1,774,334	888,600	1,552,408	789,240	87%	89%
Nushki	171,954	95,546	183,997	89,300	172,181	83,768	94%	94%
MPK	1,479,821	822,122	1,975,996	838,100	1,816,094	778,837	92%	93%
Badin	1,866,269	1,041,757	2,199,082	934,300	2,084,926	903,700	95%	97%
Larkana	1,585,691	880,939	1,489,941	730,500	1,333,861	677,683	90%	93%
Total	7,873,760	4,379,380	8,660,431	4,041,850	7,911,662	3,743,343	91%	93%

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