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Leveraging Digital Health Data to Transform the United Nations Systems for Palestine Refugees for the Post Pandemic Time

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Abstract

The Covid-19 pandemic presented a grave threat to the health services that UNRWA provides to 5.9 million Palestine Refugees in the Near East. UNRWA runs 140 primary healthcare clinics for Palestine Refugees, providing approximately 9 million medical consultations a year. However, the continuity of health services was challenged by the COVID-19 pandemic. Digital health played a critical role in supporting continuation of health services during the pandemic. UNRWA has its own electronic medical records system (called e-Health*)* connecting a variety of health services in all its clinics. These digital health records allowed UNRWA to respond to the pandemic by identifying at-risk clients. Other aspects of the integration of digital health also helped the UNRWA health system to transform its services to be more sustainable, efficient, and innovative. Examples of these services include telemedicine and two smartphone applications, called e-NCD and e-MCH. Integration of digital health also allowed UNRWA to identify the needs of its health staff in timely and precise ways. Digital transformations have become an integral part of UNRWA health services in the post-pandemic period.

To systematically evaluate the processes and effectiveness of digital health integration into UNRWA's health services during the pandemic and post-pandemic, the health team thoroughly examined published reports, events, and e-Health datasets from 2019 to 2022. Results indicate that digital health services, including the e-NCD and e-MCH applications, supported mitigation of COVID-19 infections among Palestine Refugees. These innovative applications not only facilitated remote healthcare delivery but also ensured uninterrupted access to essential healthcare services during the pandemic and beyond.

This paper offers a paradigm for future outbreak responses. By harnessing the power of digital health, UNRWA's e-Health system has proven to be a beacon of hope, demonstrating how innovative approaches can empower patients, enhance healthcare outcomes, and ensure equitable access to healthcare services during crisis situations and beyond.

Introduction

The United Nations Relief and Works Agency (UNRWA) for Palestine Refugees in the Near East started operating on 1 May 1950, after its establishment on 8 December 1949 by UN General Assembly Resolution 302.[1] UNRWA's mandate is to protect and support Palestine Refugees and provide essential services, including basic education, primary healthcare, relief and social services, microcredit, and emergency assistance. These services not only support the well-being of refugees but also ensure their protection during times of armed conflict.[1]

UNRWA's health programs in Jordan, Lebanon, Syria, Gaza, and the West Bank including East Jerusalem, play a vital role in delivering primary care services to 5.9 million Palestinians at 140 primary health care (PHC) health centers (HC). These health services encompass three key categories in PHC: general outpatient services, specialized care for noncommunicable diseases (NCDs) such as diabetes and hypertension, and comprehensive maternity and child health care (MCH), including immunization initiatives.[2] However, UNRWA runs only one hospital, the Qalqilya Hospital in the West Bank, and instead relies on hospital services in the host countries.

UNRWA's health reform – The family health team approach

UNRWA initiated a health reform in 2012 to modernize its decades-old primary health care system. The focus was to respond to the emergence of NCDs, which have become the prime cause of morbidity and mortality for Palestine Refugees.[2,3] UNRWA conducted extensive stakeholder consultations and engagements with refugee communities, host countries, and the donor community[2], and selected a family medicine approach, called the family health team (FHT) model, as the central component of its health reform strategy.

The FHT approach is similar to the family medicine or general practitioner (GP) approach that has been widely adopted in industrialized countries as the best practice to ensure person-centered, comprehensive continuity of care for NCDs. UNRWA also sought to establish community-based and community-oriented health services and foster long-term relationships between refugee beneficiaries and healthcare providers.[2] The emphasis on integrated, person-centered care was crucial to address the sociocultural differences and preferences of refugees, aligning health services with the overall needs of the population.[2,4] To monitor the achievement of this objective, UNRWA established target metrics, including: the number of daily consultations per physician; the frequency of outpatient antibiotic prescriptions; and, rates of diabetes management.[2]

Digital health –UNRWA's E-Health system

A critical component of the FHT management was the use of digital health with electronic medical records (EMR)[2], called "e-Health". The incorporation of digital health and the utilization of associated data played a crucial role in the successful implementation of the FHT

reform. UNRWA developed its own electronic medical records system, known as *e-Health*, in 2009. This in-house EMR system operates on an internet-based platform, and its database is securely hosted within the UN's cloud system. The in-house EMR system plays a central role in facilitating the integration of essential health data and streamlining communication between healthcare providers across different UNRWA fields of operation. The internet-based platform allows authorized personnel to access patient records remotely (and, beginning in 2020, to reduce physical interactions and potential exposures to the COVID-19 virus).[5]

The e-Health system at UNRWA comprises ten service-related modules that cater to various aspects of healthcare, patient profiles, outpatient care, maternal health, child health, NCDs, laboratory services, specialist consultations, emergency care, and pharmaceutical management. All pertinent information regarding medical concerns is meticulously digitalized and recorded within the e-Health system.[5] Data are entered by all relevant health staff involved in patient care, including reception clerks, medical officers, nurses, midwives, laboratory technicians, and pharmacists.

The e-Health system is also integrated with the refugee registration information system (RRIS) used by UNRWA to ensure accurate identification and verification of individual Palestine Refugees accessing UNRWA health centers. Additionally, the e-Health system is interoperable with UNRWA's enterprise resource planning (ERP) SAP system for logistical management of medicines and medical supplies. The e-Health system adeptly monitors stock levels and dispensation of medicines, ensuring the availability of essential pharmaceuticals.[5]

Status of PHC services before the Covid-19 pandemic

By end of 2018, UNRWA had expanded the FHT approach and e-Health system to all health centers. This allowed UNRWA to track improvement on several health indicators, rationalizing the daily medical consultations, regular visits by diabetes patients and pregnant mothers, vaccination coverage, etc.

In 2016, UNRWA's eHealth system had commenced monitoring essential services, including Antenatal Care (ANC) visits. This allowed healthcare staff to track the attendance of pregnant women more efficiently for their vital check-ups. Equipped with effective follow-up tools, the percentage of pregnant women attending a minimum of four ANC visits rose from 89.8% in 2016 to 92.0% in 2017. Features of the eHealth system facilitated proactive outreach and streamlined scheduling of ANC visits, culminating in improved maternal care and fostering healthier outcomes for expectant mothers.

The e-Health system also had a positive impact on antibiotic prescription rates. Through the e-Health reports, both pharmacy staff and medical officers were able to closely monitor the prescription of antibiotics. This monitoring allowed for better management of antibiotic usage and reducing unnecessary prescriptions. As a result, the antibiotic prescription rate decreased

from 24.5% in 2016 to 24.3% in 2017, and then to 23.5% in 2018. This reduction in the antibiotic prescription rate reflects the effective utilization of eHealth data to improve prescription practices, ensuring that antibiotics are prescribed only when truly needed, contributing to more responsible and effective healthcare practices.

UNRWA also showed significant progress in digital health. The e-Health system had an repository of approximately three million patient records.[5] This wealth of data empowers UNRWA to generate standardized reports, invaluable for the effective management of its health services. Among the reports generated are the daily curative report, NCD annual report, maternal health care report, growth monitoring report, and antibiotic prescription report.

The International Classification of Diseases, 11th Revision (ICD-11) was integrated in UNRWA's e-Health. This classification system allows for more accurate and detailed coding of diseases and health conditions.[6] The use of ICD-11 within the e-Health system enhances the accuracy of diagnoses, facilitates effective treatment planning, and supports efficient data analysis for epidemiological research and health management.[6]

UNRWA, in collaboration with the Japan International Cooperation Agency (JICA), developed a smartphone application based on a maternal and child health (MCH) booklet. The original MCH booklet was introduced in Palestine in early 2000s, again in collaboration with JICA, and was widely used with pregnant women in all five fields of UNRWA's operation. Encouraged by its wide use, and in line with other progress in e-Health, UNRWA developed a smartphone version in 2017. The MCH application contains essential health information, connected with e-Health, about women and their infants, providing appointment reminders and health and nutritional information.

UNRWA has continued to develop smartphone applications, and by early 2020 had developed an application for NCDs. The e-NCD application, again linked with e-Health, caters to individuals with NCDs to facilitate the management of their health conditions.

Thus, by the time the COVID-19 pandemic started, UNRWA had already developed robust and functional PHC services with health reform and digital health. The organization's annual management of around 9 million medical consultations underscored its success in expanding healthcare access. Notably, UNRWA was responding effectively to the needs of approximately 300,000 patients dealing with diabetes and hypertension, improving disease management and reducing complications. Additionally, UNRWA's comprehensive approach to maternal and child health (MCH) had impacted 90,000 pregnant mothers and infants, leading to healthier pregnancies and better outcomes.

The integration of digital health tools had streamlined services, facilitated data-driven interventions, and empowered communities through health awareness campaigns. This, in

turn, contributed to the reduction of health disparities and improved equitable access to quality care, especially among vulnerable populations.

The PHC services were, of course, far from perfect. One reason is the continued financial shortages facing UNRWA. UNRWA exclusively relies on voluntary contributions from donors. While steadily rationalized, the high level of daily medical consultations reflects a shortage of medical officers in the system. Moreover, the complexity of health needs in the refugee populations extends beyond routine care, encompassing mental health support and specialized treatments for chronic illnesses. In addition, other health-related problems, such as disease outbreaks and epidemics, are often worse in refugee settings and pose significant concerns. Refugee populations are particularly susceptible to communicable diseases due to overcrowded living conditions and limited access to sanitation and clean water in camps.

To address these multifaceted challenges, UNRWA constantly seeks sustainable solutions that encompass financial stability, resource allocation, specialized care provision, and responsive epidemic management. By doing so, the organization can better fulfill its mandate to provide effective and comprehensive healthcare services to refugees in its operational areas.

The environments in which UNRWA operates are always problematic and challenging. In the Gaza Strip, ongoing conflicts, economic degradation, and a blockade hinder healthcare access. In the West Bank, occupation-imposed limitations on healthcare facilities clash with settlements and land disputes, compounding environmental challenges. Jordan is contending with resource strains that are intensified by the refugee influx and water scarcity. In Lebanon, densely populated refugee camps, political instability, and strained resources exacerbate healthcare complexities and environmental pressures. Finally, the prolonged conflict in Syria disrupts healthcare and magnifies environmental hazards, with damaged infrastructure impeding access amid widespread displacement and destruction.

Problem statement

The COVID-19 pandemic presented a new and intense shock to UNRWA health services, further straining the already-burdened healthcare systems in recipient countries, making it even more challenging for refugees to access quality healthcare.[8] Limited access to healthcare facilities and overcrowded refugee camps compounded the difficulties in implementing effective social isolation strategies, consequently increasing the risk of virus transmission among refugees.[8]

Moreover, the pandemic exacerbated the economic challenges faced by refugees, as many rely on part-time or daily wage work to support their families.[9,10] Lockdowns and limited job opportunities have led to severe economic hardships for refugees, resulting in income loss, rising poverty rates, and food insecurity.[10] The closure of schools and restrictions on educational activities have affected refugee children's access to education.[10,11] The lack of digital

infrastructure and technology in refugee settings hinders remote learning.[12, 13, 14] Furthermore, the attention and financing needed for ongoing refugee crises diminished because of the pandemic,[15] intensifying the needs and vulnerabilities of refugees. Humanitarian agencies have faced even more difficulties in providing basic services and support to refugee communities.[16]

Palestine refugees face unique challenges, including fragmentation, occupation, and the Gaza blockade in place for the last 15 years, and the lack of a just and lasting settlement for Palestine refugees' status have significantly impacted their physical, social, and emotional health. The added burden of COVID-19 further exacerbated the challenges faced in managing the Palestinian health sector and ensuring the well-being of Palestine refugees.[17]

Despite these challenges, UNRWA has successfully mitigated and contained the health impact of the COVID-19 pandemic on Palestine Refugees, primarily through the utilization of digital platforms such as the e-Health system. UNRWA's efforts have focused on promoting the health and well-being of Palestine refugees during the pandemic.[18] The groundwork laid by FHT health reforms and digital health initiatives allowed UNRWA to resiliently navigate the challenges of the COVID-19 pandemic, ensuring continuity of care and timely dissemination of health information even in the face of unprecedented circumstances.

The study examines how UNRWA responded to the challenges posed by the COVID-19 pandemic on its health services. It focuses on three main areas: continuity of care for individuals with long-term health needs, adaptation to changing demands for health services, and the use of digital health data to reshape primary healthcare for the post-pandemic era.

Methods

We conducted a multifaceted analysis to investigate the utilization of the digital health system and its data within UNRWA's response to the COVID-19 pandemic. Our approach involved examining published reports, documentation of events, and analysis of e-Health datasets spanning the years 2019 to 2022. We undertook a qualitative analysis to delve into non-numerical data, such as text, narratives, and observations. This qualitative analysis aimed to uncover patterns, themes, and insights, providing a deeper understanding of how the digital health system was employed during the pandemic. We also conducted a quantitative analysis on program records to gain insights into patient uptake and service provision.

Findings

Overview of the UNRWA response to COVID-19 pandemic

UNRWA responded to the COVID-19 pandemic by implementing a range of prevention and control measures across its five fields of operation. These measures aligned with the strategic plan outlined by the World Health Organization (WHO).[19] To ensure the safety of staff and beneficiaries, UNRWA health centers implemented various protocols. These include the

practice of physical distancing, conducting temperature checks, and regular sanitization of facilities.[18] These measures aimed to reduce the risk of transmission within the clinics and maintain a safe environment for everyone involved.

One important aspect of UNRWA's response to the COVID-19 pandemic was the establishment of a triage system within clinics. This system separated patients with respiratory symptoms from other patients, streamlined patient flow, and helped to accurately identify COVID-19 patients.[18]

The effectiveness of UNRWA's triage systems and hotline services was measured using a variety of indicators using the data from e-Health that is collected and stored at the central level.[5,18] These indicators were the number of new patients, the frequency of treatment, and the treatment outcome. For example, in the first quarter of 2020, across all five fields of operations, 69.4% of Palestine Refugees with NCDs regularly attended their medical appointments at UNRWA's health centers. This statistic was 71.2% in 2021, 67.1% in 2022, and 43.7% in 2023.[21] From the trend of attendance, it is important to note that the overall effectiveness of UNRWA's triage systems and hotline services remained high throughout the pandemic's peak.[2] The indicators show that the systems are helping to ensure that Palestine Refugees with NCDs are receiving the care they need.[2]

Procuring personal protective equipment (PPE) for front-line health care providers has been another crucial step in UNRWA's COVID-19 response. By providing adequate PPE, UNRWA ensures the safety of its medical staff, who play a vital role in preventing the spread of the virus.[18] PPE helps to minimize the risk of infection among healthcare workers and allows them to continue their essential work with confidence.

In addition to these medical measures, UNRWA also prioritized psychosocial support for staff and beneficiaries.[18,21] Recognizing the mental health impact of the pandemic, UNRWA has provided support services to help individuals cope with the emotional challenges they may face during this difficult time.[18] This holistic approach acknowledges the importance of addressing not only the physical but also the mental well-being of those affected.

Furthermore, unpublished internal reports indicate that Antigen Rapid Diagnostic Tests (RDTs) are being implemented for COVID-19 detection as part of the comprehensive response to the pandemic. The utilization of these tests varied across different regions. The largest number of tests was conducted in Gaza, where 155,763 tests were performed from March 2021 to December 2022. Among these , 59,407 positive cases were identified in UNRWA health centers. In the West Bank, RDTs were introduced in December 2021, and approximately 1,145 tests were conducted in the first two weeks. By December 2023, around 29,651 tests had been performed in the region. Overall, while the utilization of RDTs varied across UNRWA fields, Gaza conducted the highest number of tests, followed by the West Bank, Jordan, Syria, and

Lebanon. These tests played a crucial role in identifying positive cases and facilitating prompt and appropriate healthcare interventions for Palestine Refugees in need.

To further strengthen its response, UNRWA established close collaborations with host governments, international partners such as WHO, other UN agencies, and civil society. By working together with stakeholders, UNRWA has been able to ensure access to COVID-19 diagnostics, treatment, and vaccinations for Palestine Refugees. These collaborations have been crucial in facilitating the integration of UNRWA's response within the national COVID-19 response plans of the respective host countries.[18]

The role of E-Health in responding to the COVID-19 pandemic

UNRWA has recognized the dynamic nature of the pandemic and the need to adapt its response accordingly. The strategic plan has been periodically updated to account for the changing epidemiological situation in the region. This flexibility allows UNRWA to respond effectively to new challenges and emerging needs, ensuring that its efforts remain relevant and impactful.[5]

Overall, e-Health helped to better manage the COVID-19 response. In four UNRWA fields of operation, e-Health was successfully utilized and present in all the health clinics. Healthcare providers at the HCs utilizing e-Health were able to extract all data about NCD patients, look up COVID-19 vaccination records, and identify which patients were defaulters.[20] This allowed them to contact defaulter patients and increase vaccination rates. It allowed providers to track patient data more easily and reach out to defaulter patients.[20]

HCs that were not utilizing e-Health were used as a comparison group when assessing utilization of UNRWA's e-Health system. Three health centers under the auspices of the Syria Field Office (SFO) were considered “hard to reach” or faced other logistical challenges that prevented them from using e-Health. These were: Mazareeb HC in Der’a camp, Ramadan HC in rural Damascus, and Yarmouk HC, which is an unofficial and hard-to-reach camp pre-pandemic. Healthcare providers at the three non-e-Health utilizing HCs expressed the importance of the community-based relationships they had with their patients. However, they also faced challenges, including the inability to reach patients due to missing data. This resulted in approximately 10% of patients not benefiting from UNRWA's medication home delivery services.[20]

Continuity of existing health services

UNRWA's response to the COVID-19 pandemic included a focus on ensuring the continuity of care for Palestine Refugees. The agency's e-Health system was used to implement telemedicine services to enable regular check-ups and consultations.[21] This was especially important in Gaza, where 30% of all medical consultations during the pandemic were telemedicine

consultations.[21] Building on the success of telemedicine in Gaza, UNRWA expressed its intention to expand this service to other fields, such as Jordan and Syria. By expanding telemedicine capabilities, UNRWA aimed to extend the benefits of remote healthcare consultations to a larger number of Palestine Refugees across different regions. This provided an opportunity for refugees in other areas to access healthcare services, receive medical advice, and ensure the continuity of their care amidst the pandemic.

As shown in Table 1, the number of telemedicine consultations offered by UNRWA across all five fields rose by 150% in 2021.[21] This figure then dropped to 55.4% in 2022, suggesting that most aspects of in-person services were once again offered.[21]

Table 1. Number of telemedicine calls to UNRWA health centers (Source: 2022 Annual Report)

Service	Year	Jordan	Gaza	Westbank	Syria	Lebanon	Total
Telemedicine Services	2020	8,321	263,727	2,787	50,976	0	325,811
	2021	28,818	771,117	3,105	4,096	8,803	815,939
	2022	8,003	347,342	1,393	5,453	1,393	363,584

The decline in telemedicine consultations in 2022 is likely due to several factors. These include the easing of restrictions related to the pandemic, the increasing availability of vaccines, and the fact that many people are now more comfortable returning to in-person care.[21] Despite the decline in telemedicine consultations, the system has proven to be an effective way to ensure continuity of care for Palestine Refugees. It is likely that the system will continue to be used, even as the pandemic subsides.

UNRWA's adoption of telemedicine demonstrates the organization's commitment to utilizing technology to overcome barriers and deliver healthcare services efficiently. By incorporating telemedicine into their response strategy, UNRWA was able to adapt to the challenging circumstances imposed by the COVID-19 pandemic and continue providing essential care to Palestine Refugees.

Telemedicine has been widely recognized and implemented globally to provide remote healthcare services in low-resource settings.[22] This is especially true during times when in-person consultations are limited or restricted.[22] For example, Doctors Without Borders (MSF) utilizes telemedicine to provide remote consultations and medical advice to refugees in different parts of the world.[23] Additionally, IOM and UNHCR also utilize telemedicine.[24,25] Due to its effective e-Health system, UNRWA was able to deliver quality services on par with other UN agencies.

An important aspect of UNRWA's efforts involved addressing the treatment needs of 300,000 Palestine Refugees suffering from diabetes and hypertension by leveraging e-Health to collect detailed information about these patients, including their addresses, contact numbers, and

medical histories.[5,21] By utilizing this information, UNRWA efficiently identified and tracked patients, ensuring that they received home deliveries of necessary medications promptly.[5,21] The implementation of this system reduced the need for patients to visit healthcare facilities, thus minimizing their potential exposure to COVID-19. Host countries, such as Jordan, also leveraged similar e-Health systems to ensure uninterrupted healthcare services.[26] For instance, Jordan responded to a complete lockdown with a collaboration between its pharmacy and information technology departments to design and implement the Internet Hospital Drug Delivery Platform (IHDD), an internet-based system for distributing medications.[26]

In UNRWA's Jordan Field of Operation (JFO), the "UNRWA e-Med" portal was launched on 5 May 2020 to cater to Palestine Refugees with NCDs.[21] This innovative portal allows patients to conveniently update their address details and request regular NCD medications to be delivered directly to their homes. The system ensures a prompt and seamless process, eliminating unnecessary delays in accessing vital medications.[21] By the end of 2020, approximately 1,271 NCD patients had utilized the portal to update their information and request medications. The home delivery services ultimately enabled 79,557 registered NCD patients of the JFO clinics to receive their medications with ease. The development and deployment of this portal were carried out internally by the dedicated staff of the Information Management and Technology Department.[5] It is currently accessible through the following link: https://ehealth.unrwa.org/eMed. Users can access the portal via both personal computers and mobile devices.

The centralized storage and management of patient data within the e-Health system enabled seamless communication and coordination among healthcare providers. By harnessing digital health technologies, UNRWA enhanced the coordination of care for NCD patients and fostered improved communication channels among healthcare professionals. This, in turn, led to more effective and personalized treatment approaches for patients.

Leveraging existing smartphone applications for enhanced delivery of services

From the onset of the COVID-19 pandemic, UNRWA actively utilized smartphone applications to provide support . As discussed above, the e-NCD app caters to individuals with NCDs and facilitates the management of their health conditions. Another app, e-MCH, contains essential health information about women and their infants, including appointment reminders. The e-MCH and e-NCD apps have played vital roles in ensuring the continuity of essential healthcare services, promoting remote healthcare delivery, and minimizing the risk of COVID-19 transmission among Palestine Refugees.[5] The applications also enhance outbreak response and offer telehealth communication channels, ensuring personalized and effective healthcare support for UNRWA's beneficiaries.

Through e-MCH, pregnant women and new mothers receive appointment notifications and medication reminders. Health education notifications are sent to mothers according to either

their gestational age or their children's age. Instant messages can be sent to mothers as needed to ensure continuity of care and to reduce the need for in-person visits.[5]

UNRWA's integration of digital health technologies has revolutionized healthcare service delivery by extending crucial support to vulnerable populations irrespective of their geographical location. These applications have proven to be vital tools for health communication, empowering users to access and monitor their health information efficiently. Table 2 shows the number of registered users for the e-NCD and e-MCH applications as of 9 July 2023.

Table 2. Number of registered users in UNRWA's e-NCD and e-MCH applications as of 9 July,2023

Field	eNCD till 9-July-2023			Non-UNRWA users	e-MCH till 9-July-2023
	NCD users (UNRWA)	Non-NCD users (UNRWA)	Total		
Jordan	74,139	1,182	75,321	4,078	97,949
Gaza	45,862	2,608	48,470		109,303
Lebanon	17,442	691	18,133		16,519
Westbank	9,458	351	9,809		22,440
Syria	14,660	667	15,327		8,375
Total	161,561	5,499	167,060		254,586

The e-MCH and e-NCD applications play a pivotal role in outbreak management and telehealth communication, as evident from the data insights they provide. Over a recent 30-day period, both apps displayed impressive user engagement: the e-MCH app recorded approximately 22,000 active users and the e-NCD app had approximately 21,000 active users. e-NCD boasted a remarkable 75% utilization rate, closely followed by e-MCH at 65%, demonstrating their importance in facilitating access to healthcare services.

User preference data reveals the top three areas of interest within each app. In e-MCH, users sought treatments, appointments, and health advice, while in e-NCD, they predominantly engaged with their medicine lists, medical tests, and medical history. These differences underscore the healthcare needs addressed by e-MCH in maternal and child health management and e-NCD in non-communicable disease management.

Leveraging digital health tools aligns with the global trend towards the adoption of digital health solutions to strengthen healthcare systems, promote patient-centered care, and improve health outcomes in the face of challenges such as pandemics. For example, the International Rescue Committee (IRC) launched its own digital health platform, called IRC Health Connect, in refugee settings in Jordan, Lebanon, and Turkey during the COVID-19 pandemic.[27] This platform enabled the IRC to provide remote healthcare services to the refugees it serves, including telehealth consultations, medication refills, and health education. Another example is the MSF digital health platform called MSF HealthMap.[23] This platform uses data visualization and artificial intelligence to track and predict the spread of diseases in refugee

populations. This information can be used to inform public health interventions and improve the delivery of healthcare services.

The use of digital health technologies by UNRWA and other organizations is a promising development that has the potential to improve the health of millions of people around the world. As the global community continues to grapple with the COVID-19 pandemic and other challenges, digital health solutions will be essential to ensuring that everyone has access to quality healthcare.

Discussion

The COVID-19 pandemic has accelerated the adoption of new digital health technologies, and it is expected that this trend will continue in the post-pandemic era. Digital health has the potential to transform healthcare in a number of ways, as seen in UNRWA's experience with leveraging digital health tools and datasets in response to COVID-19 pandemic.

During the pandemic, many refugees faced challenges in access to health care due to recurrent curfews, movement restrictions, crowding in the camps, as well as lack of access to the latest health information. UNRWA used the available digital health tools to deliver primary health care services to our beneficiaries. Such innovations have defined the future direction of post-pandemic primary health care, with digital transformation making it easier for people to access care regardless of their location or socioeconomic status. For example, telehealth platforms allow patients to connect with providers remotely, and mobile health apps can provide self-management tools for people with chronic conditions, as seen in the examples of e-NCD and e-MCH.

Digital health complements UNRWA's commitment to the FHT approach that emphasizes the importance of person-centered care. Digital health technologies used to collect and analyze data about patients' health helped providers personalize care, including by delivering medicines to patients' homes when needed. In other non-humanitarian settings, these innovations are expanding further with the use of wearable devices used by patients to track their activity levels and sleep patterns. This data was subsequently used to adjust their treatment plans.

In addition, digital health technologies help to improve the efficiency of healthcare delivery. For example, EMRs can help streamline the process of receiving lab tests, and remote patient monitoring can help reduce the need for in-person visits. This has been a major factor in the decision by providers in Syria to continue using telemedicine. Providers in health clinics across Syria state that telemedicine helps them decrease the wasted time on non-serious medical visits, enhance patient-provider contact time, and increase access to healthcare services for refugee patients for whom regularly attending medical appointments can be challenging due to the lack of reliable transportation (which can be attributed to refugees' socioeconomic status

and the rising fuel prices that are a repercussion of the Syrian conflict). This highlights another advantage of digital health: lowering the cost of healthcare by reducing the need for travel to and from appointments, enabling remote patient monitoring that can help to prevent complications of chronic conditions.

The integration of digital health solutions into UNRWA's healthcare response during the pandemic has not only proven highly effective in addressing the immediate challenges posed by COVID-19 but has also established a robust framework for the organization to tackle a range of crises, including ongoing political conflicts and future outbreaks. These pandemic-driven digital innovations have become indispensable components of UNRWA's daily operations, bolstering its capacity for resilient crisis response. For instance, the implementation of telemedicine enables UNRWA to swiftly deliver medical assistance to populations facing transportation issues or residing in areas affected by conflicts, where physical access to healthcare facilities may be disrupted. Moreover, the data-driven approach facilitated by digital health technologies strengthens crisis preparedness, empowering UNRWA detect potential health crises at an early stage, and allocate resources with precision during times of urgency—this was exemplified by the response to a 2022 cholera outbreak in Syria and Lebanon. In that situation, UNRWA leveraged its e-Health system and ICD-11 to quickly detect and respond to potential cases arriving at the health centers. The system was used to monitor symptoms, performs syndromic surveillance, and share the data with decision makers for further awareness campaigns and preventive measures.

Conclusion

Before 2020, UNRWA had successfully and expeditiously reformed the largest quasi-governmental health system under the UN through the simultaneous implementation of the FHT approach and the introduction of digital health.[2] These developments then enabled UNRWA to implement a comprehensive and proactive response to the COVID-19 pandemic: incorporating preventive measures, prioritizing the well-being of staff and beneficiaries, establishing collaborations with various stakeholders, and utilizing its e-Health system. The digital health platforms provided data that was a major asset, providing access to patient records by authorized health users remotely.

Thus, UNRWA has been able to continue providing crucial healthcare services and support to Palestine Refugees, regardless of their physical presence at the HC. It was also able to communicate with beneficiaries through the mobiles apps to provide a wide range of health awareness messages in a timely and effective manner. This multifaceted approach demonstrates UNRWA's commitment to addressing the new challenges posed by the pandemic and to continuously protecting the health and well-being of those it serves.

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