

## Breaking barriers: innovative strategies for improving healthcare access in remote areas

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### Abstract

Access to quality healthcare is a fundamental human right, yet access in remote areas remains a major challenge. This article explores the innovative strategies that have emerged to bridge the healthcare access gap in remote regions. By leveraging technology, community engagement and policy changes, these initiatives aim to enhance healthcare delivery, improve patient outcomes, and create a healthier, more equitable society, reducing disparities in vulnerable regions.

### Abbreviations

CHW – community health workers

RCT – randomised control trial

WHO – World Health Organization

### Introduction

Access to healthcare is a fundamental human right, but for millions of people residing in remote and underserved areas, this right remains elusive. Geographic isolation, limited infrastructure and resource limitations present substantial barriers to delivering appropriate and effective medical services. This disparity in healthcare access has led to poorer health outcomes and increased morbidity and mortality rates in these areas. Underrepresented populations, such as racial and ethnic minorities, low-income individuals and those living in rural areas, often experience greater health disparities and worse

health outcomes compared to the general population.<sup>1</sup> This article explores pioneering approaches that have revolutionised healthcare delivery in remote regions, enabling better health outcomes for vulnerable populations.

**Table 1** provides a comprehension of the situation of healthcare and its associated challenges in several different countries, as measured by various health indicators. Afghanistan's maternal mortality rate in 2020 was high, at 620 deaths per 100,000 live births compared to a remarkably low mortality rate of 10 deaths per 100,000 live births in the UK in 2020.<sup>2</sup> The maternal mortality ratio reflects the risks faced by women during childbirth and pregnancy. Higher ratios suggest that more women face life-threatening complications during pregnancy and childbirth. Bangladesh, Afghanistan and Togo have higher maternal mortality ratios, indicating significant challenges in ensuring safe maternal healthcare. In contrast, the UAE, Germany and the UK have lower ratios, suggesting better maternal healthcare and lower risks for pregnant women.

The under-five mortality rate, also known as the infant mortality rate, is a crucial indicator of the quality of healthcare in a country. A higher infant mortality rate suggests that a higher number of infants do not survive their first year of life. Bangladesh, Afghanistan and Togo have higher infant mortality rates, indicating that they may face challenges in providing adequate maternal and child healthcare. In contrast, the first world countries have lower rates, indicating better healthcare systems and more favourable conditions.

The World Health Organization (WHO) measured the impact of communicable diseases on a population's overall health and life expectancy. Higher numbers indicate a greater burden of communicable diseases. Bangladesh, Afghanistan and Togo are just three of the lower income countries that face relatively higher burdens, suggesting challenges in controlling and preventing communicable diseases. In contrast, countries such as the UK have lower burdens, indicating better control and prevention efforts in these countries. The disparities in the impact of communicable disease measured between countries are complex and multifactorial, and some of it is suggested to be due to poor access to healthcare and lower rates of education.

In summary, these statistics serve as a compelling response to action, highlighting the crucial role of improved healthcare access in remote and underserved areas. Access to healthcare is not just a matter of convenience; it is a matter of life and death. By addressing these disparities and expanding healthcare access, we have the potential to save countless lives and improve the overall health and well-being of vulnerable populations in remote regions across the globe.

## Telemedicine: a virtual connection

Telemedicine has emerged as a game-changer in providing healthcare access to remote areas. Utilising video consultations, remote monitoring devices and mobile applications, healthcare providers can reach patients located miles away. This virtual approach to healthcare reduces the need for travel and associated expenses. In addition, it allows patients to connect with healthcare providers in the comfort of their home, reducing the anxiety of getting to the healthcare provider. Telemedicine not only facilitates routine medical check-ups but also enables specialist consultations, increasing the scope and quality of care available to patients in remote regions. In a recent study investigating adult patients' perceptions of telemedicine-delivered medical care, a substantial 72% of rural patients expressed moderate to extreme satisfaction with the service.<sup>3</sup> While telemedicine has shown immense potential, challenges such as limited internet connectivity in remote regions and the need for technology literacy among both healthcare providers and patients need to be addressed. Additionally, concerns about data security and privacy in virtual healthcare must be carefully managed. Overall, it can be inferred that telemedicine interventions can contribute to management of chronic conditions, decreased hospitalisations and increased patient satisfaction.

## Mobile clinics: medical outreach on wheels

Mobile clinics are proving to be an effective solution for bringing healthcare services closer to remote communities. These medical units equipped with essential medical supplies can reach even the most remote areas, providing a range of medical services. They are staffed by healthcare professionals and offer primary healthcare, preventive services, and health education. Mobile clinics play a crucial role in the early detection and management of health issues, thereby reducing the burden on hospitals and improving health outcomes. A comprehensive study that examined 163 articles, including nine RCTs and 4604 participants, found that mobile clinics had a significant positive impact on chronic disease outcomes. They not only improved clinical results but also demonstrated cost-effectiveness in delivering healthcare services.<sup>4</sup> They serve as a bridge between remote populations and larger healthcare centres, ensuring continuity of care for patients requiring specialised treatment. The sustainability of mobile clinics depends on funding and logistics. Long-term financial support and effective supply chain management are essential to ensure these clinics can continue to reach underserved communities. Moreover, quality control and the training of healthcare professionals on board are critical aspects to maintain the effectiveness of mobile clinics.

## Drone delivery of medical supplies

In areas with limited infrastructure and difficult terrains, the use of drones has emerged as a revolutionary method to deliver medical supplies promptly. These unmanned aerial vehicles can transport essential medicines, vaccines, and diagnostic samples to remote health centres, providing critical support during emergencies and improving the overall efficiency of healthcare delivery. "Time from launch to delivery was  $20.77 \pm 0.05$  minutes. Resupply by foot would take 5.1 hours."<sup>5</sup> This shows that the use of unmanned aerial vehicles is both efficient and this has the potential to be the best way of delivering medical supplies. Although drone delivery is efficient, regulatory frameworks, airspace management, and the cost of implementing and maintaining drone fleets can pose challenges. Ensuring the safety and reliability of medical supplies transported by drones is also utmost.

## Community health workers: the local connection

Empowering and training community health workers (CHWs) has proven to be an effective approach to enhancing healthcare access in remote areas. "These individuals, often from the local community, are trained to provide basic medical care, health education and raise awareness about preventive practices. The study revealed that there are few evaluations of mobile health in low-income countries. Although there is sizable documentation, there are limited studies explaining an effect on clinical outcomes." More studies need to be conducted to evaluate the effectiveness of CHW. By leveraging their knowledge of local customs and languages, CHWs build trust and acceptance among community members, breaking down cultural barriers that may impede healthcare utilisation. They are a vital link between the community and healthcare services. The efficacy of CHWs relies on proper training, supervision and integration into the broader healthcare system. Ensuring that CHWs have access to necessary resources and support is essential for their success. Additionally, rigorous research is needed to better understand the impact of CHWs on clinical outcomes and their cost-effectiveness.

## Conclusion

The innovative strategies discussed in this article demonstrate the transformative potential of technology, community engagement, and policy changes in improving healthcare access in remote areas. Telemedicine, mobile clinics, drone deliveries and community health workers are reshaping the landscape of healthcare delivery, making essential medical services more accessible to those who were previously underserved. It is crucial to address the disadvantages and barriers that may hinder their widespread adoption.

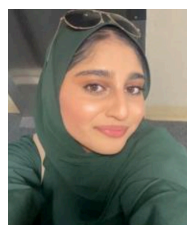
In conclusion, while these innovative approaches hold tremendous promise for improving healthcare access in remote areas, careful consideration of their limitations and challenges is essential for their successful and sustainable implementation. As we continue to explore and invest in these innovative approaches, we move closer to achieving healthcare equity and breaking the barriers that have long hindered healthcare access for vulnerable populations in remote regions.

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### Malaika Mehmood

My name is Malaika, and I am a third year medical student at the University of Plymouth. My journey into medicine was inspired by my personal experiences and my unwavering determination to make a positive impact on people's lives. My primary interests lie in cardiology and paediatrics.

| Countries and areas  | Data type  | 2021   |        |            | 2019 |        |            | 2019 |        |            | 2020                 |                  | 2013-2022            |                      | 2021                 |                      | 2021                 |                      | 2021                 |                      | 2021                 |                      | 2021                 |              | 2020                 |              | 2021 |  |
|----------------------|--|--------|--------|------------|------|--------|------------|------|--------|------------|----------------------|------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|--------------|----------------------|--------------|------|--|
|                      |  | Male   | Female | Both sexes | Male | Female | Both sexes | Male | Female | Both sexes | Comparable estimates | Primary data     | Comparable estimates | Comparable estimates | Comparable estimates | Comparable estimates | Comparable estimates | Comparable estimates | Comparable estimates | Comparable estimates | Comparable estimates | Comparable estimates | Comparable estimates | Primary data | Comparable estimates | Primary data |      |  |
| Alghanistan          | Total population <sup>a</sup> (000s)   | 20 235 | 19 845 | 40 099     | 63.3 | 63.2   | 63.2       | 54.7 | 53.2   | 53.9       | 620                  | 62               | 56                   | 34                   | 0.04                 | 189                  | 6.3                  | 0.39                 | 14 367 281           |                      |                      |                      |                      |              |                      |              |      |  |
| Bangladesh           | Life expectancy at birth <sup>b</sup> (years)  | 83 998 | 85 358 | 169 356    | 73.0 | 75.6   | 74.3       | 64.2 | 64.4   | 64.3       | 123                  | 59 <sup>st</sup> | 27                   | 16                   | <0.01                | 221                  | 0.5                  | 0.51                 | 56 381 566           |                      |                      |                      |                      |              |                      |              |      |  |
| Germany              | Healthy life expectancy at birth <sup>b</sup> (years)  | 41 154 | 42 255 | 83 409     | 78.7 | 84.8   | 81.7       | 69.7 | 72.1   | 70.9       | 4                    | 96 <sup>th</sup> | 4                    | 2                    | -                    | 5.0                  | -                    | 0.21                 | 131                  |                      |                      |                      |                      |              |                      |              |      |  |
| Togo                 | Maternal mortality ratio <sup>c</sup> (per 100 000 live births)                              | 4 345  | 4 300  | 8 645      | 61.5 | 67.2   | 64.3       | 54.7 | 57.8   | 56.2       | 399                  | 69 <sup>th</sup> | 63                   | 24                   | 0.38                 | 33                   | 297.5                | 3.27                 | 5 128 595            |                      |                      |                      |                      |              |                      |              |      |  |
| United Arab Emirates | Proportion of births attended by skilled health personnel <sup>d</sup> (%)                   | 6 512  | 2 853  | 9 365      | 75.1 | 78.4   | 76.1       | 65.8 | 66.2   | 66.0       | 9                    | 99 <sup>th</sup> | 6                    | 3                    | -                    | 0.8                  | 0.0                  | 0.02                 | 41                   |                      |                      |                      |                      |              |                      |              |      |  |
| United Kingdom       | Under-five mortality rate <sup>e</sup> (per 1000 live births)                                | 33 239 | 34 042 | 67 281     | 79.8 | 83.0   | 81.4       | 69.6 | 70.6   | 70.1       | 10                   | -                | 4                    | 3                    | -                    | 6.3                  | -                    | 0.41                 | 0                    |                      |                      |                      |                      |              |                      |              |      |  |
|                      | Neonatal mortality rate <sup>e</sup> (per 1000 live births)                                  |        |        |            |      |        |            |      |        |            |                      |                  |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |              |                      |              |      |  |
|                      | New HIV infections <sup>f</sup> (per 1000 uninfected population)                             |        |        |            |      |        |            |      |        |            |                      |                  |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |              |                      |              |      |  |
|                      | Tuberculosis incidence <sup>g</sup> (per 100 000 population at risk)                         |        |        |            |      |        |            |      |        |            |                      |                  |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |              |                      |              |      |  |
|                      | Malaria incidence <sup>h</sup> (per 100 000 population at risk)                              |        |        |            |      |        |            |      |        |            |                      |                  |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |              |                      |              |      |  |
|                      | Hepatitis B surface antigen (HBsAg) prevalence among children under 5 years <sup>i</sup> (%) |        |        |            |      |        |            |      |        |            |                      |                  |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |              |                      |              |      |  |
|                      | Reported number of people requiring interventions against NTDs <sup>j</sup>                  |        |        |            |      |        |            |      |        |            |                      |                  |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |              |                      |              |      |  |

**Table 1. Maternal and infant mortality rate in different countries around the world.** An extract from the full table available at <https://www.who.int/data/gho/publications/world-health-statistics>