Implementation of information and communication technologies for health in Bangladesh
Sheik Mohammed Shariful Islam\textsuperscript{a} & Reshman Tabassum\textsuperscript{b}

**Problem** Bangladesh has yet to develop a fully integrated health information system infrastructure that is critical to guiding policy development and planning.

**Approach** Initial pilot telemedicine and eHealth programmes were not coordinated at national level. However, in 2011, a national eHealth policy was implemented.

**Local setting** Bangladesh has made substantial improvements to its health system. However, the country still faces public health challenges with limited and inequitable access to health services and lack of adequate resources to meet the demands of the population.

**Relevant changes** In 2008, eHealth services were introduced, including computerization of health facilities at sub-district levels, internet connections, internet servers and an mHealth service for communicating with health-care providers. Health facilities at sub-district levels were provided with internet connections and servers. In 482 upazila health complexes and district hospitals, an mHealth service was set-up where an on-duty doctor is available for patients at all hours to provide consultations by mobile phone. A government operated telemedicine service was initiated and by 2014, 43 fully equipped centres were in service. These centres provide medical consultations by qualified physicians to patients visiting rural and remote community clinics and union health centres.

**Lessons learnt** Despite early pilot interventions and successful implementation, progress in adopting eHealth strategies in Bangladesh has been slow. There is a lack of common standards on information technology for health, which causes difficulties in data management and sharing among different databases. Limited internet bandwidth and the high cost of infrastructure and software development are barriers to adoption of these technologies.

**Introduction** Despite substantial improvements in health in recent years, Bangladesh faces several challenges, including limited and inequitable access to health services, lack of adequate resources to meet the demands of the population and an increasing burden of noncommunicable diseases.\textsuperscript{1,2} Information and communications technologies – such as health information systems, mobile devices to support health systems (mHealth) and telemedicine services – can contribute to the improvement of health systems in developing countries.\textsuperscript{3} Here we describe the implementation of an eHealth policy in Bangladesh.

**Approach** A key aspect of the eHealth policy is the development of an integrated health information system, which includes a health management information system and an integrated human resource information system. A computerized health management information system provides tailored health services to stakeholders\textsuperscript{4} and a human resource information system integrates health workforce data from a range of sources such as ministries, agencies and health sector organizations. All information is stored in such a way that it can be easily found by users in different locations and in a form that is suited to their needs. The integrated health information system should meet international standards – such as ISO/TC 215 for health informatics – and provide access to all digital databases. The completed system combines individual health records of all citizens, registries of organizations, the hospital information system and health workforce data.\textsuperscript{5}

**Relevant changes** Between 1999 and 2005, several telemedicine initiatives were initiated in Bangladesh, mainly to support rural doctors with expert opinions.\textsuperscript{6} In 2006 a mobile phone-based call centre was launched for subscribers.\textsuperscript{7} In 2008, eHealth services were introduced, including computerization of health facilities at sub-district levels, internet connections, internet servers and an mHealth service for communicating with health-care providers. The implementing authority, the Directorate General of Health Services, established a data centre equipped with modern servers, a backup safety system, firewalls, virtual machine software and information security systems to protect the safety of patient records.

The mHealth service is provided by 482 upazila health complexes and district hospitals. The upazila sub-district health centres have 50–100 bed capacity with an operating theatre and junior specialists. A doctor is available 24 hours a day to provide consultations by mobile phone.\textsuperscript{8} Subsequently, all community clinics and union health centres had internet connections installed and laptop computers provided by the Directorate General of Health Services. Several training workshops, which included lectures and demonstrations over several days, were organized by the ministry at district level. Selected health workers were given hand-held tablet devices.\textsuperscript{9}

With recommendations from development partners and the World Health Organization (WHO), the Government of Bangladesh implemented a national eHealth policy in 2011.\textsuperscript{10,11} In July 2011, the Directorate General of Health Services inaugurated the telemedicine service. By 2014, a total of 43 fully equipped government-operated telemedicine centres were in service.\textsuperscript{12} These centres provide medical consultations via the internet by qualified physicians to patients visiting rural and remote com-
Box 1. Summary of main lessons learnt

- Despite successful implementation of health information and communications technologies in Bangladesh, challenges still exist—such as technical problems, definition of services and standards across organizations and financial viability.

- Common standards for health information and communications technologies are needed to facilitate data management and sharing among different databases.

- The private sector was not included in implementation of the national eHealth programme and therefore medical records from this sector are not yet integrated with the national health database.

Lessons learnt

The integration of information and communications technologies in the health system of Bangladesh faces several challenges and constraints, such as defining the services and standards across different organizations, the financial viability of the initiatives and the availability of technical staff.

There is a lack of common standards on health information and communications technologies and software, leading to difficulties in data management and sharing among different databases. Low internet connection speeds are a limitation in many areas. The high costs of infrastructure and integrated software development are also barriers to adoption of these technologies.

The private sector has fallen behind in the introduction of information and communications technologies and medical records from the private sector are not integrated with the national health database. A few large private hospitals have introduced eHealth services and medical record systems. The government has plans to integrate data from the private sector and hopefully the large hospitals will soon join the system. However, organizing national representation of private sector organizations is challenging task. Box 1 summarizes the main lessons learnt.

Despite early pilot interventions and successful implementation of several small-scale health projects using information technology, the progress in adopting eHealth strategies in Bangladesh has been rather slow and lacks robust data on effectiveness and cost-effectiveness which can provide evidence for scaling up to the national level. The information gathered in the health information system is starting to be evaluated. A recent study assessing the potential of an mHealth intervention for diabetes showed that mobile phone messages could be used to support the management of diabetes. The increasing popularity of eHealth services in developing countries can be explained by the rapid increase in mobile phone ownership and limited access to traditional health care and providers. eHealth promises a future where patients are more empowered with respect to their own health, community health workers use health diagnostic devices to monitor patients, to link with medical professionals and to track individuals.

These new methods of information sharing and delivery of services have the potential to improve the health of the population as they are low-cost and are readily accepted by users and service providers. However, development of an integrated health information system is a complex and costly process. Clinicians, managers, policy-makers and researchers need to be better informed about eHealth systems, so that the potential of new technology can be realized. Innovative information and communications technologies for health can strengthen health systems by providing services to underserved people in resource-poor settings, helping to achieve universal health coverage in Bangladesh as well as in other developing countries.

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Lessons from the field
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808

Abstract
Implementation of information and communication technologies for health in Bangladesh

Problem
Bangladesh has not yet established a fully integrated information system for health care, which is essential for the development and planning of health policy and planning.

Approach
Initial pilot programs for telemedicine and e-health were not coordinated at the national level. However, in 2011, a national e-health policy was implemented.

Local situation
Bangladesh has made significant improvements in its health system. However, the country still faces challenges in public health, including limited and unequal access to health services, and insufficient resources to meet the needs of the population.

Significant changes
In 2008, e-health services were introduced, including the computerization of health facilities at the sub-district level, internet connections, internet servers, and mobile health services, allowing patients to communicate with health care providers. In 482 health centers and district hospitals, mobile health services were provided, where a doctor was available 24/7 to provide consultations by mobile phone. In 2014, 43 fully equipped centers were in operation. Thanks to these centers, patients can seek care from centers in their districts or from rural and remote centers.

Learned lessons
Despite early pilot interventions and successful implementation, Bangladesh is still slow in adopting e-health strategies. The country lacks unified standards for health information technology, which makes it difficult to manage and share data between different databases. The limited internet bandwidth and high cost of infrastructure and software development are obstacles to the use of these technologies.

Résumé
Mise en œuvre des technologies de l’information et de la communication pour la santé au Bangladesh

Problème Le Bangladesh n’a pas encore développé d’infrastructure pour mettre en place un système d’information sanitaire totalement intégré, essentiel pour orienter l’élaboration des politiques et la planification.

Approche Les premiers programmes pilotes de télémédecine et de télésanté n’ont pas été coordonnés à l’échelle nationale. Cependant, en 2011, une politique nationale de télésanté a été mise en œuvre.

Environnement local Le Bangladesh a apporté des améliorations significatives à son système de santé. Toutefois, le pays rencontre encore des difficultés en matière de santé publique, et a un accès limité et inégal aux services de santé et à des ressources insuffisantes pour répondre aux demandes de la population.

Changements significatifs En 2008, des services de télésanté ont été mis en place, notamment l’informatisation des établissements de santé au niveau des sub-districts, des connexions Internet, des serveurs Internet et un service de santé mobile permettant de communiquer avec les professionnels de santé. Dans les sub-districts, les établissements de santé ont été dotés de serveurs et de connexions Internet. Dans 482 centres de santé d’upazilas et hôpitaux de districts, un service de santé mobile a été mis en place : un médecin est à la disposition des patients à toute heure pour réaliser des consultations par téléphone mobile. Un service de télémédecine géré par le gouvernement a été lancé et, en 2014, 43 centres totalement équipés étaient en service. Grâce à ces centres, les patients peuvent se rendre dans des centres de santé à 5 kilomètres de leurs habitations, bénéficiant de consultations médicales assurées par des médecins qualifiés.

Leçons tirées En dépit d’interventions pilotes précoces et d’une mise en œuvre réussie, l’adoption de stratégies de télésanté au Bangladesh progresse lentement. Le pays n’a pas de normes communes en matière de technologies de l’information pour la santé, ce qui entraîne des difficultés dans la gestion et le partage de données entre différentes bases de données. Le débit limité d’Internet ainsi que le coût élevé du développement d’infrastructures et de logiciels freinent l’adoption de ces technologies.
национальные стратегические принципы системы электронного здравоохранения (eHealth).

Местные условия За последние годы ситуация с системой здравоохранения в Бангладеш значительно улучшилась. Однако эта страна по-прежнему сталкивается с проблемами общественного здравоохранения. Сюда входят ограниченность и отсутствие равного доступа к медицинским услугам, а также недостаток соответствующих ресурсов на количество населения.

Осуществленные перемены В 2008 году в Бангладеш была запущена служба eHealth. Благодаря этому произошла компьютеризация медицинских учреждений на уровне серверам. В 482 больничных комплексах и районных упазилах медицинскими работниками. Учреждениям здравоохранения районного уровня предоставили подключение к Интернету и серверам. В 482 больничных комплексах упазилы и районных больницах была создана служба mHealth. В рамках данной службы дежурный врач находится в режиме круглосуточного доступа для пациентов и может консультировать их при помощи мобильного телефона. Также была запущена правительственная служба телемедицины, и к 2014 году в Бангладеш работали уже 43 полностью оснащенных центра. Эти центры обеспечивают медицинские консультации квалифицированных врачей для пациентов, приходящих в сельские больницы, медицинские учреждения, расположенные в отдаленных регионах, а также для пациентов профсоюзных медицинских центров.

Выводы Несмотря на успешный запуск пробных проектов, стратегии системы электронного здравоохранения внедряются в Бангладеш медленно. В сфере здравоохранения в Бангладеш отсутствуют общепринятые стандарты информационных технологий. Это приводит к затруднениям в управлении данными и обмене данными из разных баз. Ограниченная эмпирическая способность сети Интернет, дорогостоящая инфраструктура и разработки программного обеспечения препятствуют широкому распространению таких технологий.

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