E-HEALTH SCENARIOS AND VISIONS FOR BANGLADESH

REPORT

Dhaka, Bangladesh

21 August-23 August, 2011

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EXECUTIVE SUMMARY

Can e-health - consisting of: e-records to track patients and carers; e-pharmacy to monitor medicines; telemedicine, using web-links for remote diagnosis and surgery; and e-patient, to empower patients to create their desired health futures via "apps" for smart phones and diagnostic devices- transform the nature of the Bangladeshi health system? If so, how? And who can deliver this vision?

To answer this question, the Bangladesh Ministry of Health, Health Information System, Bangladesh Enterprise Institute in collaboration with the Rockefeller Foundation promoted a three-day foresight workshop on the futures of digital or e-health. Participants came from a number of areas – e-health start-ups, hospital directors, leading physicians, professors of public health, e-health practitioners, international e-health experts, Ministry of Health directors and digital information/business providers.

The workshop was facilitated by Professor Sohail Inayatullah with assistance from Mridul Chaudry, CEO of Click Diagnostics, Ali Shah and Umar Sheraz, both researchers from the Organization of Islamic Conference's Standing Committee on Scientific and Technological Cooperation (COMSTECH). The methodological framework employed was the Six Pillars approach developed by Inayatullah.[1]

The Six Pillars approach is a step-by-step futures method that seeks to identify, map, and create alternative and preferred futures. Alternative futures thinking ensures that "more of the same" is challenged and that technological adoption is contextual and culturally appropriate. Moreover, the Six Pillars approach is focused on visions of desired change – in terms of the workshop in question, how would the participants like to see e-health develop in Bangladesh? Finally, an investigation of the weights that need to be overcome to create these visions is equally critical. These weights are physical (in terms of infrastructure) but also narrative weights or mindsets that do not allow new futures to be created. Thus, futures are tested for robustness and resilience through a number of other methods, particularly, scenario planning, the futures wheel, and the futures triangle.

Four visions of the futures of e-health were articulated by participants.

1   LEAP-FROG 2025

The first was the Leap-frog. In this future, the smart use of technology through low-cost diagnostic devices such as medical "apps" and bio-sensors created a dramatic transformation in healthcare. The traditional (modern Western) health system was leapfrogged. Individuals throughout Bangladesh gained access to inexpensive interactive technologies. The e-health infrastructure developed from the bottom up. The Ministry of Health provided the standards and other rules to ensure integration and interoperability.
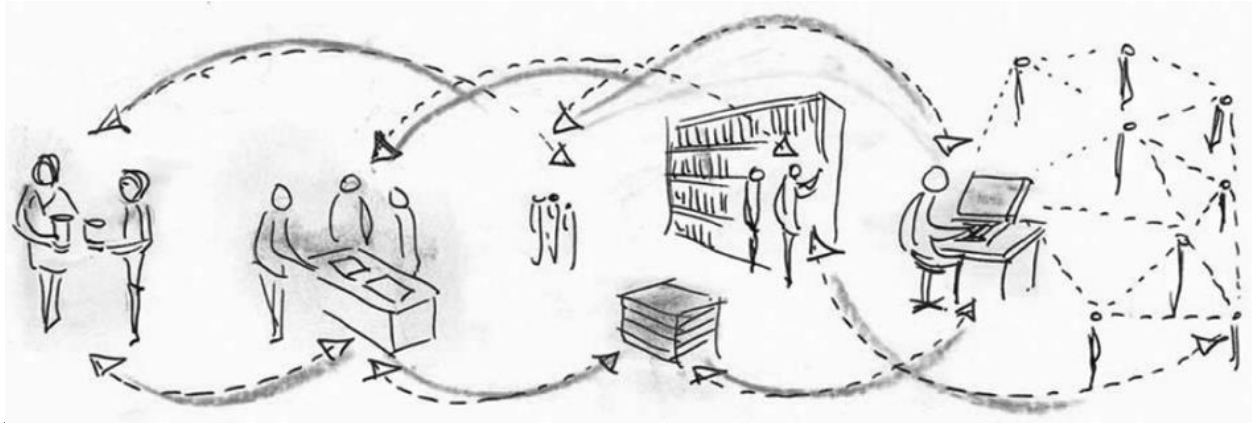
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The metaphor used by the Leap-frog group was the "fly-over". Given traffic congestion in Bangladesh and the inability of more roads to solve demand, the guiding metaphor was aptly named, "Fly-over." The leap-frog was possible as though an integration of extensive stakeholders, a "fly-over" from the current state of affairs (politicization of health, high demand, but inability to meet health needs, lack of penetration of new ICTs, and high penetration of mobile phones[3]) to a desired E-health future was created.

A day in the life of a case worker in this future might consist of the following: (1) Rupa receives an alert on the mobile device; (2) she then retrieves past patient information from the EHR (electronic health records database); (3) Rupa collects recent patient vital statistics using mobile medical devices and bio-sensors; (4) she then forwards the information to the doctors' platform for remote diagnosis; (5) she facilitates a healthy and meaningful relationship between doctor and patient through quality service provision; and (6) helps keep the geo-mapping and profiling of patients and diseases proactively. There is high-tech with meaningful human contact.

In the Leap-frog/fly-over future new mobile smart technologies are used instead of the landline. Instead of the desktop, there are new mobile interactive diagnostic devices. However, the service provider is the key in this future. The rural or urban community worker is the knowledge health navigator that bridges the world of the patient and the medical system. New applications are created.

As a vision of the future, one participant described it as:

Imagine a three-tier system with the patient (client at the centre) and community workers as entrepreneurs servicing a kiosk pharmacy and a one-stop shop for medical supplies and perhaps even government programmes such as immunization, family planning etc. (they could be a combination of nurses/paramedics/health workers). Due to easy access to mobile technology each of the households have access to a smart phone. The phone number itself is the ID of the Household and each of the members in the household (according to ascending order of age or otherwise can have another digit added to the phone number). Depending on which Upazila (sub-district) the phone is registered at (with the address) the call is directed to the call centre triage. Depending on the emergency the following steps could be taken:

(1) In case of simple medical advice the operator can confirm with the basic algorithm and suggest advice. This advice/prescription is also sent to the community medic who is responsible for that household. Usually we can have 1 community medic responsible for 250 – 300 households and every 3 or 4 community medics could have 1 kiosk pharmacy. In case of urgency in medicine delivery the community medic can deliver the medicine at a certain location or the patient can pick it up from the 24 hr kiosks. In case it is not any urgency the patient can come to the kiosk they are registered at to pick up the medicine the following day.

(2) In case of an emergency the doctor is put on the phone and the Upazila (sub-district) community medic registered to the area is alerted. Ambulance is dispatched if needed to a specific pick-up point and taken to their choice of hospital. If they choose a free, government hospital they are not charged a fee for the ambulance. On the other hand, if they choose a private hospital (implying that they can afford the fee) a fee is charged.

(3) The fees structure of these services can be based on the location of the patient and the type of hospital they go to. Also, all medicine should be charged for.

2   THE E-HEALTH CAR 2025

The second vision of the future is similar to the "Leap-frog" future except that the present is more important, that is, they are concerned about the drive from the present to the future. Indeed, it is activities from the present and the role of the primary champion – the Directorate-General of Health Services, Management of Information – that creates this future. While all stakeholders are important, in this metaphor the owner is the government, the navigator is the entire healthcare system but the driver is the Ministry. Individual tailored solutions are developed for patients in rural and urban areas.

While it is certainly Ministry-driven the nature of healthcare is individual, decentralized and personalized. The system has complete interoperability everywhere thus leading to

total health data capture. The link between the Ministry – the state – setting the rules of standardization and a mix of public and private partnerships creating new mobile health technologies leads to cost-effective digitalization. For example, instead of the normal 100,000 dollar cost for hospital-based ultrasound device, mobile devices are likely to cost a 1000 dollars. Already in 2011, they cost 7500 dollars.[5]

In 2025, a day in the life of a qualified and technologically proficient health worker is similar to the leap frog scenario with the addition that the health worker also creates customized health solutions whether as "apps" or the appropriate technology of 2025. The health worker is not a passive recipient of new technologies but an active creator.

3 THE HEALTH CLOUD 2025

[6],[7]

In this vision of the future, the guiding metaphor is that of the "cloud" referring here to cloud computing, wherein applications, health information etc., are available ubiquitously to all. The "cloud" is a public space, however, for administrative purposes. Health is organized through upazilas or sub-districts (currently there are 500 in Bangladesh). The beginning of the Cloud health network is through tracking of the birth of every child in Bangladesh. Once the births are registered then their health life-cycles can be tracked, monitored and life stages health-enhanced.

For example, a day in the life of an end-user could look like this:

Rahima Begum just delivered a baby boy in Shadullapur health complex. Within 25 minutes, she and her family received a birth certificate and national registration number. Baby Zahir receives a baby bracelet with an embedded RFID tag, which will allow any health worker to check and update his health record. When baby Zahir's vaccines are due, his family, and his community health worker will receive an SMS notifying them of the vaccine and the near test

health centre where the vaccine is in stock. After the first week of life, Rahima Begum receives a visit from the health extension worker who delivers her postpartum vitamin A, which is registered, using the RFID bracelet, to update the cloud health record. Her cloud health record is updated, and the district civil surgeon's statistical flat panel screen is updated, so he can plan with the District Education Officer the probable size of the incoming primary school class in that village. Rahima Begum's husband, who is a migrant worker in Dubai can access on the internet, with a secure password, the updated health record of his family, and motivate the family to ensure they get vaccines on time, and to make sure baby Zahir receives only exclusive BF. He has used the Cloud Learning function to learn about infant nutrition, and insists that the grandmother not feed any animal milk.

In the Cloud, persons do not need to move, only data does. Health information, expertise and wisdom come to the patient. Multiple stakeholders support the system.

4 SUSTAINABLE PUBLIC PAYMENT FOR HEALTH 2025

[8]

In this fourth vision of the future, the other scenarios are accepted, but the primary question is the payment mode of future systems, their financial sustainability.

This future is centralized with individuals provided financial incentives to stay healthy via public disbursements. This system had already begun to occur in 2009.[9] Thus, prevention as a worldview has become dominant.[10] Donors and insurance agencies, along with the government and health professionals, have a major role to play in this future. Information is not just one way, i.e., giving citizens health education but through the financial incentives and new mobile technologies it has become two-way. Citizens use new digital devices or work with local health case workers to enhance their own understanding of their personal tailored health futures. They are empowered and thus costs are lowered. [11] While inequity may become a problem, the system does not negatively discriminate against those that are unhealthy due to genetic or environmental factors. These are taken into account.

A day in the life of Hassan may look like this in 2025

Hassan gets up in the morning with a stomach ache. The e-health bracelet on his arm is buzzing, notifying him about an anomaly in his body structure and that an automated interview has been set up with his doctor, complete with his bio-data and current symptoms. Hassan can sense trouble; the overdose of samosas last night is going to cost him a hike in his insurance premium, which also means another visit by the insurance guys shortly. As he got up from his bed, he also realized that he had to notify his landlady to receive the medications, which automatically would be sent over to his house, immediately after his visit to the doctor. The phone bell rang up; it was his HR manager at office, who had requisitioned a half-day leave for him, as his sickness had been notified to his workplace. As his health costs have gone up, Hassan is far more careful about over-eating. And he knows he should have used the applications on his health phone to monitor his diet but …he did not. In the future, he will be more careful.

Employers thus provide incentives to workers to stay healthy via wellness programs and mobile health solutions. They monitor their own health, and thus have incentives to stay empowered.

E-Health Scenarios 2025	Leap frog	E-health car	Health cloud	Sustainable public payment for health
Litany or headline	Smart use of technology Usage of low-cost diagnostic devices	Cost-effective digitalization of health sector for enhanced health service customization	Every birth in Bangladesh is registered	Paying people to stay healthy through public disbursement of health expense funds
System	Integrated and interoperable universal e-health system	e-health records system interoperable everywhere achieving total data capture	Shared Public Utility Cloud	Data collection and data management for public disbursement
Dominant worldview/deep structure	Decentralized systemic governance promoting participation and collective ownership	Individual, decentralized and personalized health car	Universal right to health and information	Welfare-based model of public funds transfer for inducing health consciousness in people
Metaphor	Fly-over	e-health car/bus, driving to the new future	Connectivity cloud	Raise the price of vice, lower the cost of virtue

DIGITAL HEALTH SUCCEEDS

Digital health in Bangladesh is likely to succeed because of technological advances and because the current health system is faltering (low doctor/patient ratio, low public access to health services) and the leadership being exhibited by the numerous stakeholders. E-health visions promise futures wherein patients are more empowered; community health workers use health diagnostic devices to monitor, link with medical professionals and track individuals. Revolutions in e-records, e-pharmacy, e-diagnosis and e-prevention transform Bangladesh health leading to greater wellbeing and economic productivity. The Ministry of Health provides the standards and safeguards to ensure public health benefits. Medicine – data, information and wisdom – come to the patient. This system is especially important given potential future shocks such as dramatic climate change (and an ageing society[12]).

WORKSHOP INTRODUCTION

Can e-health - consisting of: e-records to track patients and carers; e-pharmacy to monitor medicines; telemedicine, using web-links for remote diagnosis and surgery; and e-patient, to empower patients to create their desired health futures via "apps" for smart phones and diagnostic devices- transform the nature of the Bangladeshi health system? If so, how? And who can deliver this vision?

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The Six Pillar approach is a step by step futures method that seeks to identify, map and create alternative and preferred futures. Alternative futures thinking ensures that "more of the same" is challenged and that technological adoption is contextual, culturally appropriate. Moreover, the Six pillar approach is focused on visions of desired change – in terms of the workshop in question, how would participants like to see e-health develop? Finally, the investigation of the weights that need to be overcome to create these visions is equally critical. These weights are physical in terms of infrastructure but also crucial are the narrative weights or mindsets that do not allow new futures to be created. Thus, futures are tested for robustness and resilience through a number of other methods, particularly emerging issues analysis, the futures triangle, and scenario planning.

Four visions of the futures of e-health were articulated by participants.

WHY E-HEALTH?

On the first day as context for the workshop, participants provided the following reasons for making e-health a national priority. Negative reasons included: (A) a low doctor-patient ratio, low access to public services, poor and incomplete health coverage, a poor state of patient data and information storage, a time consuming health system, lack of medical professionalization, a lack of information system for public health forecasting and a lack of public health monitoring and feedback mechanisms. Positive drivers for e-health included: (B) advances in telemedicine, availability of affordable information and communication technologies, the relative increase in access to ICTs, the desire for health system transparency (and the ability of e-health systems to provide that), provision of low-cost digital health services, the desire to raise standards

and quality, the transition from a paper-based system to a web-based system, and the possibility of increased productivity through e-health.

Thus, the reasons for the need to establish efficient digital health systems in Bangladesh were motivated by a mix of positive new developments and negative past problems. The former was understood to rectify the latter. For instance, a consensus was found amongst the participants that the long-standing issue of restricted and low access to health services could be addressed by means of door-step digital health provision, either directly through each person having full access to health services or through a community health worker who had e-access to medical and health applications and to medical professionals. The most important step was to create a robust and resilient system that was comprehensive and could be as decentralized as possible while also stayed centralized in so far as the creation of overall infrastructure standards was concerned.

To create alternative futures to address the future, four groups were created. Each went through the "Six pillars" process and completed their work through the creation of scenarios or stories of the future. Participants arrived at four different but overlapping visions of digital health in Bangladesh 2025 in which individual empowerment was coupled with technological integration. The main weight identified that could impede the progress of these scenarios developing was political – short-termism, party politics, bureaucracy – interfering.

FUTURES THINKING - BASIC CONCEPTS

To develop the alternative futures, the scenarios, participants engaged in a series of conceptual exercises to open up how they thought about the future. These focused on the default, the used and the disowned futures.

Default Future

The default future is realized if the present trends patterns continue unchanged and unabated. It is intended to focus participants on the consequences and effects of persisting in the present course of action, and thereby to become aware of the underlying assumptions.

The groups outlined the following default futures for health system in Bangladesh in 2025:

(A) Current major problems:

(1) Low doctor/patient ratio would continue to exist, simply because in default of any attempt to change the current trend in the production of medical graduates and the growth of population, the number of doctors would increase in arithmetic proportions and population would grow in geometric proportions,

(2) Even though health delivery and systemic management would improve over time, yet increased demographic pressures on the available medical resources would mean public health coverage would continue to remain a tricky issue,

(3) Urbanization-related disease hike/ risks related to urban slum-dwellers and shanty-town residents because of the dearth of quality and timely medical outreach would go on hampering the establishment of a comprehensive health system,

(4) Food adulteration is an abiding concern in Bangladesh and the seemingly probable continuation of this form of commercial and mercantile malpractice will lead to increased risk of disease, and

(5) Increased morbidity and mortality rates may increase as a result of urbanization related disease and bio-security problems.

(B) Current consequences would include:

(1) Productivity and economic growth may suffer as a result of relatively poor public health coverage as labour/workforce is an important factor input and sub-optimal workforce beset with disease and illness may mean a retarded production function, and

(2) Political support and intervention in these problems would continue to be a mixed blessing facilitating and thwarting at the same time.

(C) Possibilities of change include:

(1) Effective prevention of communicable/ preventive diseases will be in place as a result of normal incremental improvements in the capacities of the public health system, and, as a part of it, of the health professionals collectively.
(2) Better quality of life for patients having non-communicable/ non-preventive diseases would be able to sustain as a result of the introduction of life-style improvement techniques and trappings.
(3) Market-driven processes in health services, like privatization of health care, would spell medical entrepreneurs, companies and firms win relative to popular and public stakeholders but at the same time the influence of the market would lead to the standardisation of services and products as attempts would be made to approximate the local standards and conventions to global best practices and as efforts would be made to introduce global best practices more directly into the health system of Bangladesh. In the trade-off between the quest for larger profits on one hand, and skills standardization, on the other, there may be positive health externalities for the society at large resulting in the diffusion of medical knowledge, skills and new technologies across both the society and Bangladeshi health system.

(D) Some issues of concern are:

(1) Operational overlap between digital health system and conventional health services would mean the relative extent of both would stay limited, and,

(2) Medical bureaucratization would be minimized with the help of the increasing role of ICTs but on the downside may produce yet another privileged layer of medical cadres monopolizing the use of technology itself to inhibit its own

inclusive tendency. This would serve the authoritative magisterial tendencies implicit in the relationship of doctor to his/her patients.

Used Futures

A used future comes about once the default future is challenged and a new future a-contextually adopted. The used future is a colonized image or practice of the future that does not fit into the Bangladeshi political or cultural practice. It is used in that it has been discarded and unconsciously adopted by others. By identifying used futures, more authentic alternative futures can be created. The used future is often passive, unconscious and not based on evidence.

For e-health in Bangladesh key used futures identified were:

(1) A one-size-fits-all e-health strategy failing to distinguish between different levels of asymmetry existing in the health sector of Bangladesh. Apart from this more specialised and technical unevenness, different grades of unequal and asymmetrical access to health provision in the society will also be ignored in this omnibus version of e-health. Diversification of e-health strategies would be marginalized.
(2) Consideration of e-health as a universal solution to each and every problem/crisis instead of wisely using place-based health solutions when appropriate.
(3) Top-down centralized command and control systems in digital health leading to the neglect of a decentralized e-health system.
(4) Corporate-style vertical management and the minimization of the horizontal care-based human interaction.
(5) Emphasis on quantity over quality in terms of coverage.
(6) Urban/rural divide in health coverage and further urban-rural poor drop-out from the digital health cosmos.
(7) "Technologism" that is, technology for technology's sake, irrespective of its appropriate use.
(8) Formation of patients suffering from the same disease into cohorts to save time and control costs.

Disowned Futures

The third crucial concept in ensuring a successful e-health strategy is identifying the disowned futures. These are possible futures pushed aside in the strategic focus to create the preferred future. The act of 'disowning' these plans and choices does not mean they are eliminated. These choices continue to shadow the process of implementation by becoming a constant undertow of the dominant strategies for future. They exist as the opportunity cost paid for doing something rather than another. For every preferred future, there always exist futures that were disowned. Identifying the disowned futures ensures that strategy is more robust, resilient and successful in the long run.

Disowned futures for e-health identified by participants were: (1) The focus on e-health would lead to a loss of face-to-face human interaction. Touch, even if mimicked by software systems, would not be the same. (2) Holistic, traditional and nature, indigenous-based systems could be rolled over in the "technologisation" of health. (3) The seamlessness of the e-health system may reduce privacy and free access to information. While the goal is to ensure this does not occur, technological and institutional imperatives may ensure a slippery slope such that over time privacy and access disappear. This leads to the fourth issue. (4) While the e-health system needs to be decentralized, the challenge and cost of developing the infrastructure and economies of scale could mean centralization by the bureaucracy could prevail. And finally, (5) political interference will ensure that the strategy will stall as political actors either lay claim to credit or, if of a different political persuasion, blame and critique.

ALTERNATIVE FUTURES – THE SCENARIOS

The fourth crucial concept in Futures thinking, in the six pillars approach is alternative futures.

Alternative futures thinking or scenario planning has a number of purposes. First, it moves us out of the straightjacket of one future. Second, it prepares us for contingencies, for surprises. Third, it allows for new possibilities, innovations and ideas thus opening up the future. Fourth, it best ensures that the default, used and disowned futures do not eventuate. And fifth, by clarifying alternatives, deciding on the preferred future becomes more effective.

Participants developed the following alternative futures: (1) the **Leap-Frog 2025**, a decentralized enabling e-health system, which allows Bangladesh to "fly-over" industrial technologies and infrastructure and create new digital environments; (2) The **E-health car/bus**, which while similar to the Leap-frog future, is more focused on the relationships between the main institutional actors (the Director General of Health Services, the government, and the national healthcare system with its numerous nodes) –this scenario focuses on who will deliver the health outcomes; (3) The **Health Cloud**, a decentralized system, which, again while similar to the Leap Frog, relies on cloud computing-based future technology and (4) **Sustainable public payment**, a scenario less concerned about the nature of e-health per se and more on ensuring that the finances occur through payments systems that incentivize health.

1 LEAP-FROG 2025

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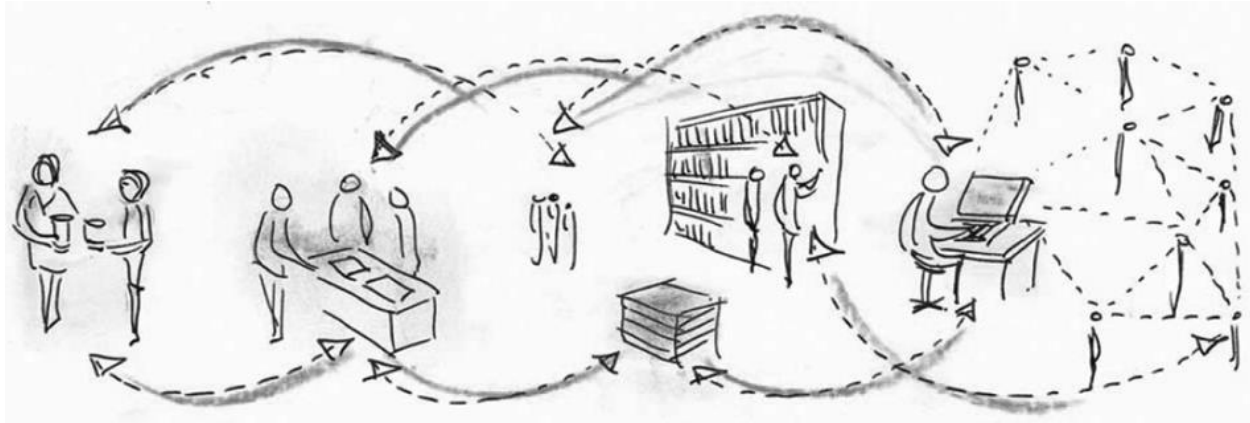
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(3) The fees structure of these services can be based on the location of the patient and the type of hospital they go to. Also, all medicine should be charged for.

Steps to realize this future include:

2012-2015: Health care delivery, human resources development, management, education (from traditional to virtual).

This is the transition from:
- client server to cloud computing
- physical servers to more virtualization
- wired to wireless
- notebook to tablets
- telemedicine to virtual medicine

2016-2021: Transition from 3rd generation mobile telecommunications to 3GPP (3rd generation partnership project) and continued long term evolution

E-Health Scenarios 2025	**SCENARIO 1: LEAP FROG**
Litany or headline	Smart use of technology Usage of low-cost diagnostic devices
System	Integrated and interoperable universal e-health system
Main stakeholders	Public health sector, private firms, NGOs, donors, community/citizen associations, rural and urban citizens
Dominant worldview/deep structure	Decentralized systemic governance promoting participation and collective ownership
Metaphor	Fly-over

2 THE E-HEALTH CAR 2025

The second vision of the future is similar to the "Leap-frog" future except that the present is more important, that is, they are concerned about the drive from the present to the future. Indeed, it is activities from the present and the role of the primary champion – the Ministry of Health Information Systems – that creates this future. While all stakeholders are important, in this metaphor the owner is the government, the navigator is the entire healthcare system but the driver is the Ministry. Individual tailored solutions are developed for patients in rural and urban areas.

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While it is certainly Ministry-driven, the nature of healthcare is individual, decentralized and personalized. The system has complete interoperability everywhere thus leading to total health data capture. The link between the Ministry – the state – setting the rules of standardization and a mix of public and private partnerships creating the new mobile health technologies leads to cost-effective digitalization. For example, instead of the normal 100,000 dollar cost for a hospital-based ultrasound device, mobile devices are likely to cost 1000 dollars. Already in 2011 they cost 7500.[16]

In 2025, a day in the life of a qualified and technologically proficient health worker is similar to the leap-frog scenario with the addition that the health worker also creates customized health solutions whether as "apps" or the appropriate technology of 2025. The health worker is not a passive recipient of new technologies but an active creator.

To arrive at this future, one participant[17] suggested the following steps.

> 2015: (1) HMIS of Bangladesh will be collecting, analysing and reporting data in globally accepted standard formats. (2) There will be sufficient number of trained and motivated human resources to implement that. (3) There will

be a formal (autonomous) authority for e-health policymaking, planning, guiding, certifying, and accrediting all e-health activities in Bangladesh

2018: All healthcare delivery personnel will be formally trained in e-Health tools and technologies during their graduate training courses as mandated by the respective professional councils.

2020: Internet connectivity (through countrywide optical fibre networks) and power supply will be adequate.

2021: All (public and private) healthcare facilities will be electronically connected in an interoperable manner.

2023: Cost-effective and cost-benefit analyses will reflect the usefulness of e-Health in Bangladesh

E-Health Scenarios 2025	**SCENARIO 2: E-HEALTH CAR**
Litany or headline	Cost-effective digitalization of health sector for enhanced health service customization
System	e-health records system interoperable everywhere achieving total data capture
Main stakeholders	Government, Line Ministry, Healthcare system and concerned citizenry
Dominant worldview/deep structure	Individual, decentralized and personalized health car
Metaphor	e-health car/bus, driving to the new future

3 The Health Cloud 2025

[18], [19]

In this vision of the future, the guiding metaphor is that of the "cloud" referring here to cloud computing, wherein applications, health information are available ubiquitously to all. The "cloud" is a public space; however, for administrative purposes, health is

organized through upazilas or sub-districts (currently there are 500 in Bangladesh). The beginning of the Cloud health network is through tracking of the birth of every child in Bangladesh. Once the births are registered then their health life-cycles can be tracked, monitored and life stages health-enhanced.

The components of this future include:

- Pregnancy registration.
- ANC/PNC services.
- Birth notification/registration.
- Nutrition/growth monitoring.
- Morbidity monitoring.
- Central database.
- Business intelligence/analytics & GIS monitoring.

For example, a day in the life of an end-user could look like this:

Rahima Begum just delivered a baby boy in Shadullapur health complex. Within 25 minutes, she and her family received a birth certificate and national registration number. Baby Zahir receives a baby bracelet with an embedded RFID tag, which will allow any health worker to check and update his health record. When baby Zahir's vaccines are due, his family, and his community health worker will receive an SMS notifying them of the vaccine and the near test health centre where the vaccine is in stock. After the first week of life, Rahima Begum receives a visit from the health extension worker who delivers her postpartum vitamin A, which is registered, using the RFID bracelet, to update the cloud health record. Her cloud health record is updated, and the district civil surgeon's statistical flat panel screen is updated, so he can plan with the District Education Officer the probable size of the incoming primary school class in that village. Rahima Begum's husband, who is a migrant worker in Dubai can access on the internet, with a secure password, the updated health record of his family, and motivate the family to ensure they get vaccines on time, and to make sure baby Zahir receives only exclusive BF. He has used the Cloud Learning function to learn about infant nutrition, and insists that the grandmother not feed any animal milk.

In the Cloud, persons do not need to move, only data does. Health information, expertise, and wisdom come to the patient.

The steps to achieve this future in the next fourteen years are:

(1) Public-private partnerships
(2) Digital upazila census.
(3) Establishing upazila-wide wireless.
(4) Develop health information library.
(5) Training healthcare workers.
(6) Prototype one access tablet to one household for every hundred households.

The emergence of Cloud computing, Leap-frog and E-car/bus would also be enhanced by the possibility of universal access to information. For example, if this was to occur then there would likely be, argued participants, the following impacts by 2025:

Universal access to e-info:

> would cause major socio-cultural restructuring;
> would lead to an active civil society on one hand;
> and civil unrest and social conflict on the other;
> would facilitate demand-driven market-based and social interactions;
> would increase critical consciousness and spur efforts to increase literacy;
> would lead to job creation;
> would lead to struggle for control over information would redefine legal system and imply legislative changes;
> would make distribution of information a major incentive for democratization and empowerment;
> would spur decentralized governance, economy and impel distribution of wealth; and,
> would cause the establishment of early warning systems, early prevention and rapid response health crises teams.

E-Health Scenarios 2025	**SCENARIO 3: HEALTH CLOUD**
Litany or headline	Every birth in Bangladesh is registered.
System	Shared Public Utility Cloud
Main stakeholders	Government, ICT companies, digital natives, public health ngos, international agencies and donors
Dominant worldview/deep structure	Universal right to health and information
Metaphor	Connectivity cloud

4 Sustainable Public Payment for Health 2025

[20]

In this fourth vision of the future, the other scenarios are accepted, but the primary question is the payment mode of future systems i.e., their financial sustainability.

This future is centralized with individuals provided financial incentives to stay healthy via public disbursements. This system had already begun to occur in 2009.[21] Thus, prevention as a worldview has become dominant.[22] Donors and insurance agencies, along with the government and health professionals, have a major role to play in this future. Information is not just one way, i.e., giving citizens health education but through the financial incentives and new mobile technologies it has become two-way. Citizens use new digital devices or work with local health case workers to enhance their own understanding of their personal tailored health futures. They are empowered and thus costs are lowered. [23] While inequity may become a problem, the system does not negatively discriminate against those that are unhealthy due to genetic or environmental factors. These are taken into account.

A day in the life of Hassan may look like this in 2025

Hassan gets up in the morning with a stomach ache. The e-health bracelet on his arm is buzzing, notifying him about an anomaly in his body structure and that an automated interview has been set up with his doctor, complete with his bio-data and current symptoms. Umar can sense trouble; the overdose of samosas last night is going to cost him a hike in his insurance premium, which also means another visit by the insurance guys shortly. As he got up from his bed, he also realized that he had to notify his landlady to receive the medications, which automatically would be sent over to his house, immediately after his visit to the doctor. The phone bell rang up; it was his Human Resources manager at office, who had requisitioned a half-day leave for him, as his sickness had been notified to his workplace. As his health costs of gone up, Hassan is far more careful about overeating. And he knows he should have used the applications on his health phone to monitor his diet but …he did not. In the future, he will be more careful.

Employers thus provide incentives to workers to stay healthy via wellness programs and mobile health solutions. They monitor their own health, and thus have incentives to stay empowered.

To further probe the implications of this scenario, participants used the futures wheel. This method seeks to discern first- and second-order implications of an event that occurred. This is done through logic and brain-storming. For the issue of health payments, the following are logical implications:

Paying people to stay healthy:

> - Allows the establishment of a successful health insurance system;
> - This may mean more proactive health recipients;
> - This proactive approach may give rise to public-private engagements aimed at benefitting from reduced passivism and active collaboration of public and private entities in health;
> - This may lead to tax holidays for successful e-health solutions applied by these entities;
> - Incentives may lead to the creation of a health referral system;
> - can lead to improved communication systems for sharing patient and disease information;
> - This may result in the creation of a central information database promoting information sharing, rapid retrieval and effective monitoring;
> - It may lead to the creation of an efficient health workforce through capacity-building;
> - This may mean unit cost-saving on producing a skilled health professional and reducing the cost of maintaining e-info records'
> - Thus leading to the creation of effective surveillance of health information system to prevent misuse of information.

Finally to realize this future, participants believed that by

2014   A new political party would need to be formed that was health focused.

2015   Bangladesh-specific prescription guidelines for all physicians were formulated.

2021   Dramatic advances in medical avatars and pharmaceuticals.

E-Health Scenarios 2025	**SCENARIO 4: SUSTAINABLE PUBLIC PAYMENT FOR HEALTH**
Litany or headline	Paying people to stay healthy through public disbursement of health expense funds
System	Data collection and data management for public disbursement
Main stakeholders	Government, insurance agencies, donors, patients, and health professionals.
Dominant worldview/deep structure	Welfare-based model of public funds transfer for inducing health consciousness in people.
Metaphor	Raise the price of vice, lower the cost of virtue.

E-HEALTH SCENARIOS COMPARED
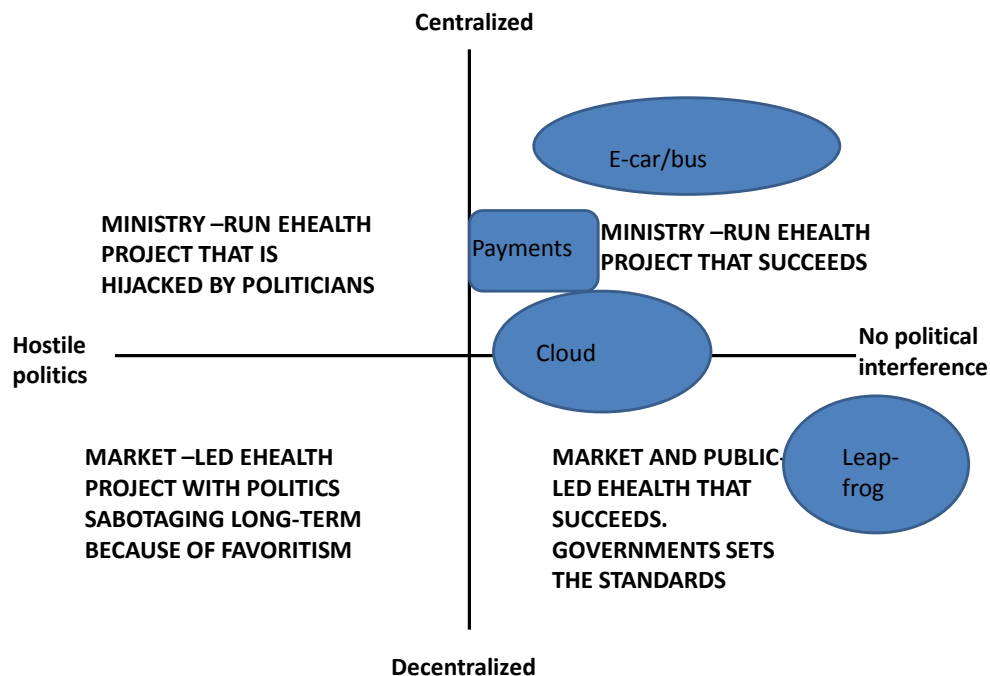
This table below summarizes the four futures*:*

E-Health Scenarios 2025	Leap frog	E-health car	Health cloud	Sustainable public payment for health
Litany or headline	Smart use of technology Usage of low-cost diagnostic devices	Cost-effective digitalization of health sector for enhanced health service customization	Every birth in Bangladesh is registered	Paying people to stay healthy through public disbursement of health expense funds
System	Integrated and interoperable universal e-health system	e-health records system interoperable everywhere achieving total data capture	Shared Public Utility Cloud	Data collection and data management for public disbursement
Main stakeholders	Public health sector, private firms, ngos, donors, community citizen associations, rural and urban citizens	Government, Line Ministry, Healthcare system and concerned citizenry	Government, ICT companies, digital natives, public health ngos, international agencies and donors	Government, Insurance agencies, donors, patients, and health professionals.
Dominant worldview/deep structure	Decentralized systemic governance promoting participation and collective ownership	Individual, decentralized and personalized health car	Universal right to health and information	Welfare-based model of public funds transfer for inducing health consciousness in people
Metaphor	Fly-over 	e-health car/bus, driving to the new future 	Connectivity cloud 	Raise the price of vice, lower the cost of virtue

Indeed, one can convincingly argue that they are all facets of a similar vision of the future. At issue is the whether it is a leap-frog technology or a current technology. Also of import is who drives the future – the Ministry or the private sector, though, generally in all aspects of the future, a public-private partnership with multiple stakeholders aligned through a vision and a common story was considered critical.

TESTING THE ALTERNATIVES – IS THERE SOMETHING MISSING?

The Double-variable method, the fifth pillar of the Six Pillars approach, was used by the groups to test if there were any knowledge areas that had not been addressed, that would challenge the scenarios developed. The double-variable approach focuses on two critical unknowns. The two drivers chosen for this method were "system structure" and "politics". The extremes for "systemic structure" were labeled "centralized" and "decentralized" whereas those for politics were labeled "hostile politics" meaning resisting participatory mobilization and empowerment and "viable or amenable to change" meaning fostering participation and engagement. Four scenarios were created as a result of the different combinations of these four values of the two drivers,

Centralized

E-car/bus

MINISTRY –RUN EHEALTH
PROJECT THAT IS
HIJACKED BY POLITICIANS

Payments

MINISTRY –RUN EHEALTH
PROJECT THAT SUCCEEDS

Hostile
politics

Cloud

No political
interference

MARKET –LED EHEALTH
PROJECT WITH POLITICS
SABOTAGING LONG-TERM
BECAUSE OF FAVORITISM

MARKET AND PUBLIC-
LED EHEALTH THAT
SUCCEEDS.
GOVERNMENTS SETS
THE STANDARDS

Leap-
frog

Decentralized

As can be noted by the above table, participants focused on successful projects and not on futures that would be lost to national party politics. This likely reflects both the optimism of participants and their own perceived ability to influence the future. Indeed, the "payments" group even imagined creating a new health based political party-movement. This does not mean they are unaware of party politics negatively influencing the future; rather, that they selected to describe, imagine and create futures that would enhance the health of each and every Bangladeshi. This is evidenced in the appendix through the Futures Triangle methodology which maps the past, present and future.

Transformation - Aspects of the Desired Future

Moving into futures space, with respect to participant's desires, the following attributes were articulated:

(A) Systemic changes including: (1) reduction of service time; (2) cross-sectoral collaboration for increasing e-health effectiveness; (3) efficient and cost-effective patient data storage; (4) development of a critical mass of technologically proficient health personnel including doctors, nurses, community health workers; and (5) increased investment in e-health through public and private partnerships.

(B) Worldview change including: (1) a paradigm shift from centralized and closed health system to decentralized open e-health system entailing public empowerment: (2) a paradigm shift to a preventive system including early warning systems for epidemics and quick response to emergencies.

(C) With an overall goal of affordable healthcare for all leading to improved quality of life and feelings of well-being.

(D) Contradictions: finally, participants understood that there was no contradiction-free future and thus it was crucial to wisely manage the new technologies by minimizing negative externalities of digital infrastructure and combining the freedom of access and use of e-health records system with its surveillance against possible misuse/ ensuring privacy of patient information with speedy access to it on need-to-know basis.

The workshop concluded with participants envisioning their desired-for e-health future in Bangladesh. This was a closed-eye creative visualization. What participants generally saw was that because of the success of e-health initiatives – an integrated and easily accessible health system - the health of Bangladeshis was transformed. Specific outcomes were: (1) increased life expectancy, (2) lower mortality, (3) the elimination of maternal and infant mortality, (4) universal healthcare, (5) economic growth and (6) increased wellness.

APPENDIX

THE FUTURES TRIANGLE

The Futures Triangle maps the future through three variables: the pull or image of the future, the desired future, in this case; the push or the drivers of the present; and the weight of history, the barriers in creating a particular future. The Futures triangle enables us to make appropriate strategy for creating the desired future by promoting the action of drivers or pushes, eliminating or weakening the drag of barriers or weights, and determining the relative importance of various drivers in terms of their lesser or greater ability of the pushes (drivers) to facilitate the realization of prioritized images or pulls. It also allows us to discover the mutual effects of pushes and weights on each other and transformation of drivers into barriers and the distinction between primary and secondary pushes and weights.

Pulls (Images)

The main pull identified was an amalgamation of the scenarios – a Public Health ensured through an efficient and easily accessible e-health service delivery and the establishment of a decentralized and exhaustive public health information system providing an integrated public-private-community-individual interface.

http://www2.wi.fh-flensburg.de/eHealth/
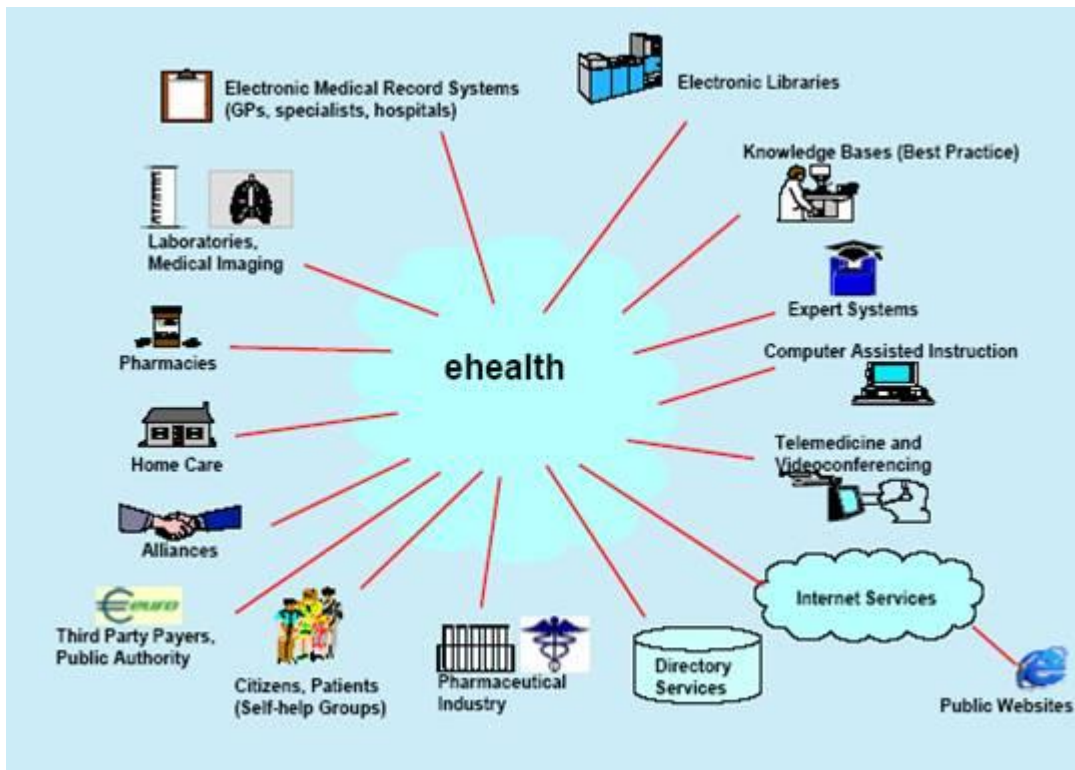
Pushes (Drivers)

The pushes identified were largely technological, and, to some extent, economic and community-based. Political drivers were the least important. However, when it came to the weights of the future, politics was considered the most important weight, followed by lack of e-technologies.

Technology drivers

(1) Cultural value-neutrality of technology.
(2) Change in popular perceptions regarding technology.
(3) Relative increase in access to information.
(4) Technology as a way to accelerate the progress towards achieving MDGs.
(5) Availability of medical devices with embedded mobile technology enabling health workers to take patients' vital statistics and diagnose remotely e.g., mobile ultrasound device.
(6) Literacy no longer a prerequisite to the use of technology.
(7) Increased availability of knowledge
(8) Rising scale economies in technological consumption.
(9) Developing physical and technological infrastructure in health sector.

Economic Drivers

(1) Increased general health funding and public-sector allocation for health.
(2) Falling cost of availability of technology.
(3) Long-term cost saving through by-passing physical and spatial barriers.
(4) Rising demand for healthy life and timely and quality health provision.

Public and community drivers

(1) Popular demand for across-the-board public accountability of health professionals and associated services.
(2) Preventive public health strategy.
(3) Capacity-building in health services.
(4) Transformation of human resources in health into human capital.

Political Drivers

(1) Strong political will.

Weights (Barriers)

Technological weights

(1) Low penetration/coverage of technology.
(2) Lack of modification and adaptation in health information system installment and e-health practices to suit local conditions.
(3) Lack of technologically proficient and skilled health workforce.
(4) Lack of a comprehensive e-record system.

(5) Lack of cellular usage as an e-health connectivity medium.

(6) Lack of open architecture and national system for e-health solutions.

Economic Weights

(1) Relative scarcity of funds devoted to e-health.

(2) High cost of e-health architecture and resource-constraints in low-income economies.

Political/Bureaucratic weights

(1) Political differences and lack of consensus.
(2) Bureaucratic fear of transparency.
(3) Corruption.
(4) Policy conservatism.
(5) Lack of active public participation
(6) Lack of stakeholder ownership.
(7) Entrenched power-based hierarchies in society and government.
(8) "Pilotitis" (too many pilots programmes and projects and no actual take-off).
(9) Lack of systemic/legislative change.
(10) Lack of coordination of e-health solutions.
(11) Conventional top-down governance.
(12) Delay in strategy implementation (time barriers).

Public/Knowledge Weights

(1) Lack of popular awareness of the potential of e-health to revolutionize health provision and coverage in Bangladesh.

(2) Lack of knowledge of real costs of establishing e-health solutions (no proper evidence for what really works).

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