

ehealth: global perspectives

Dr. Balwant Godara

Asia Pacific College
12 August, 2014

how i came to ehealth



SAW filters for CDMA

Conception of novel wideband performance-controllable RF circuits in SiGe: Impedance matching circuit, single-ended to differential baluns, and single-ended and differential LNA

Wireless systems for biomedical applications: low-power reconfigurable MAC protocols for MICS and heterogeneous body area networks; validation of UWB as radio interface.

An analysis of the current landscape on the application of mobile ICT in and around the field of TB diagnostics

Formulation of the WHO's country strategy on the use of ICT in healthcare.



health system overview

The Philippines vs India

✿ 90.371M

✿ 48%

✿ 68

✿ 26 (22)

✿ 0.5

✿ 1.15

✿ 6.12

✿ 140.3 USD

Population 2008

OOPS 2006 (total health expenditure)

Life expectancy at birth 2008

IMR per 1000 live births 2008 (2011)

Hospital beds per 1000 people 2008

Doctors per 1000 people

Nurses per 1000 people

Health spending per capita, PPP 2008

✿ 1,174.662M

✿ 76% - 86%

✿ 65

✿ 51 (47)

✿ 0.9

✿ 0.58

✿ 1.27

✿ 114 USD

✿ Same challenges: High OOPS; Internal & external migration; ...

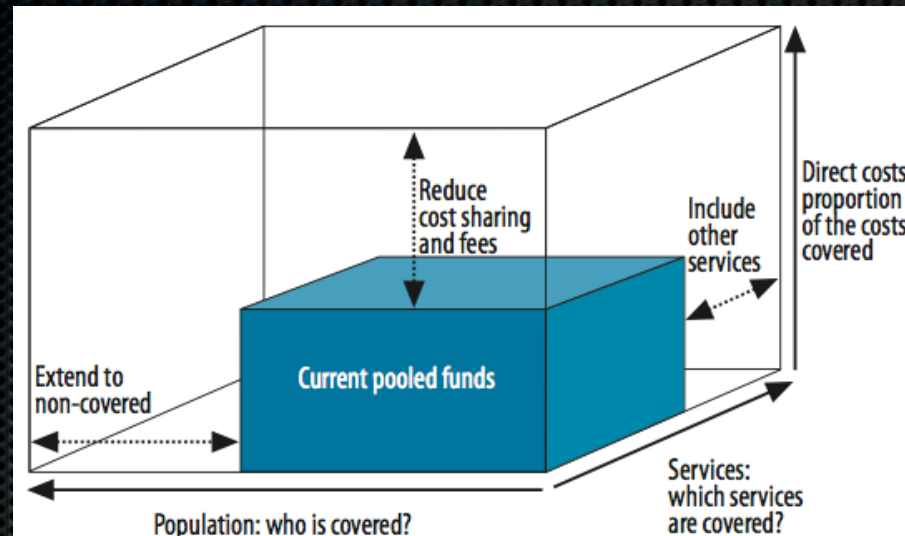
✿ Same challenges in many other countries

millennium development goals

- ❖ 8 international development goals
- ❖ Established following the 2000 Millennium Summit of UN
- ❖ All 189 committed to help achieve these by 2015
- ❖ 2010 review: uneven progress; adoption of global plan to achieve MDGs by target date
- ❖ 2010 review: Philippines slow/late on 10 of 22; India slow/late on 12 of 22



universal health coverage



- ❖ Definition: “The goal of universal health coverage is to ensure that all people obtain the health services they need - prevention, promotion, treatment, rehabilitation and palliation - without risk of financial ruin or impoverishment, now and in the future.”
- ❖ Importance
 - ❖ “The third global health transition” , after the demographic and epidemiological transitions
 - ❖ Ambition for all nations at all stages of development: 2005, all WHO member states committed to achieve UHC
 - ❖ 20120 Resolution by UN General Assembly: promotes UHC, highlights importance of UHC in reaching MDGs
 - ❖ 2010: 100M pushed below the poverty line because of OOPS for health care (55M in India)

bottlenecks

Delay: symptoms - action

Health system shortcomings:
Supply chain management
Personnel (motivation,
shortage, quality, ...)

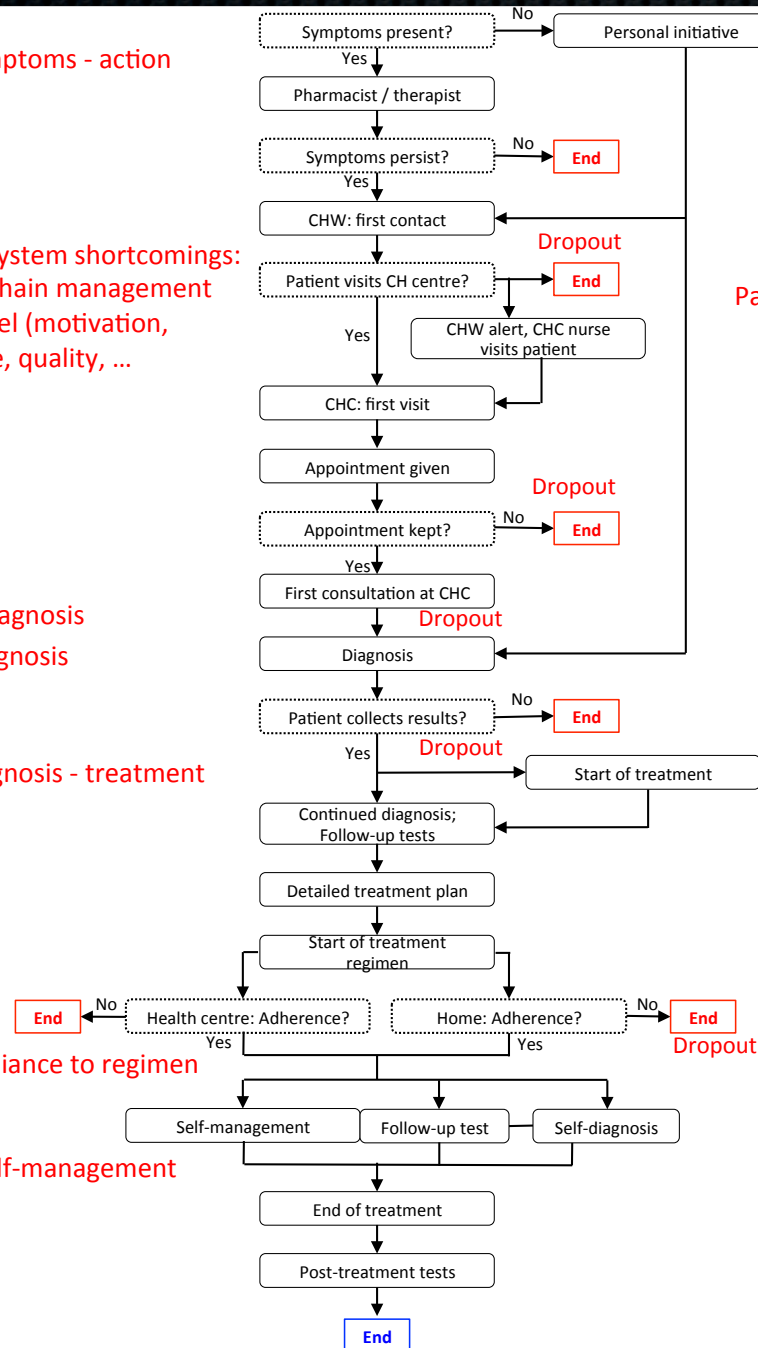
Delayed diagnosis
Wrong diagnosis

Delay: diagnosis - treatment

Non-compliance to regimen

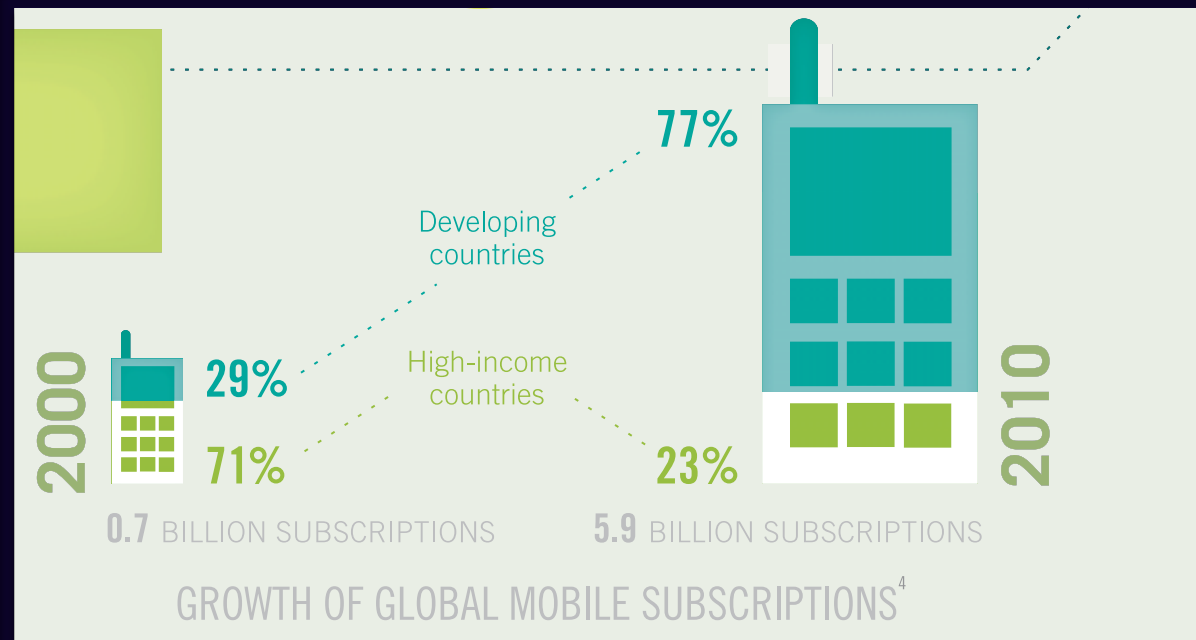
Difficult self-management

Patient awareness



mobile boom & Imic

- ✿ Emerging economies will see strongest uptake of mHealth: market in Asia-Pacific (+ India / China) will grow 70%, to 7B USD by 2017



- ✿ Why? High usage of mobile phones, coupled with the challenges of conventional communication systems, gives the potential for great benefit to be derived from the widespread application of eHealth interventions to improve health-related communications.

definitions: ehealth

eHealth = ICT for health

- ❖ “The use, in the health sector, of digital data – transmitted, stored and retrieved electronically – in support of health care, both at the local site and at a distance.”
- ❖ “The cost-effective and secure use of ICT in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research”.
- ❖ “Use of ICT in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research”
- ❖ A means to ensure that “the right health information is provided to the right person at the right place and time in a secure, electronic form to optimize the quality and efficiency of health care delivery, research, education and knowledge.

definitions: mhealth

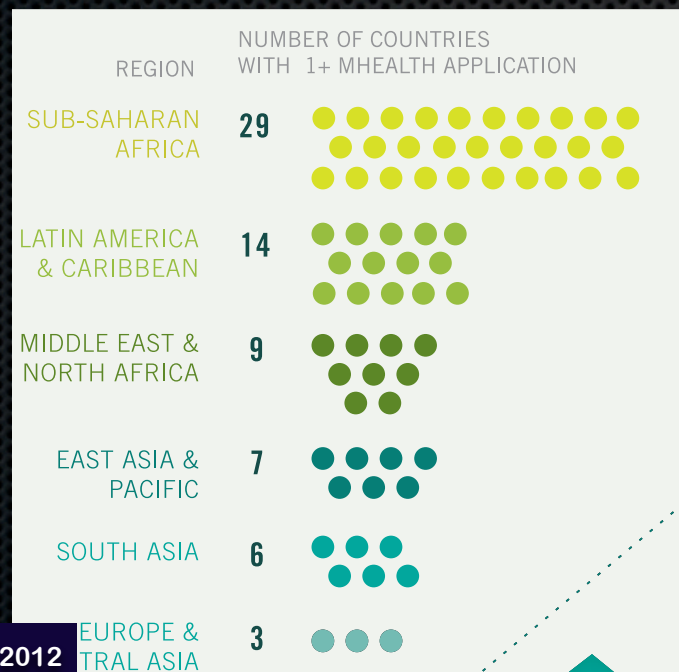
mHealth = eHealth with mobiles

- ❖ 2003/2004: “mobile computing, medical sensors, and communications technologies for health care”. So, mHealth = mobile telemedicine involving telecommunications and multimedia.
- ❖ 2010: “m-health is the use of portable electronic devices for mobile voice or data communication over a cellular or other wireless network of base stations to provide health information”. So, mHealth = means of health information using wireless communication
- ❖ 2011: “Medical and public health practice supported by mobile devices”. So, broader. Information and how to act on it.
- ❖ 2012: “mHealth encompasses any use of mobile technology to address health care challenges such as access, quality, affordability, matching of resources, and behavioral norms [through] the exchange of information”. Broadest definition.

status of ehealth (1)

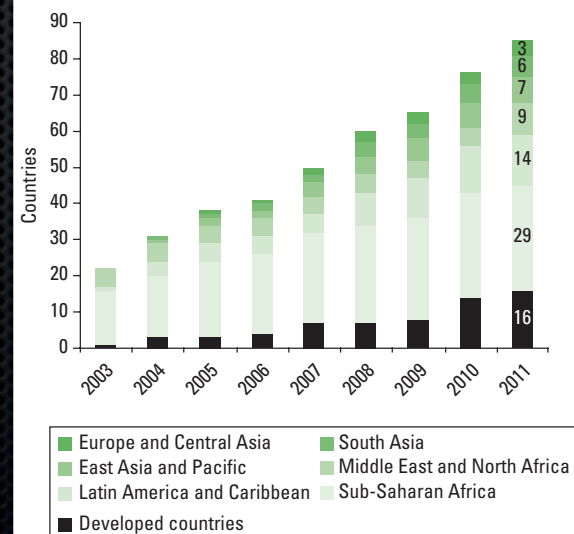
❖ 2009 eHealth survey by WHO's GOe

- ❖ 112 countries surveyed
- ❖ 83% countries: ≥ 1 mHealth (77% LMIC, 87% HIC)
- ❖ > 500 mHealth projects deployed
- ❖ Most countries: >4 programmes
- ❖ Incomplete picture: govt. data, no private sector info



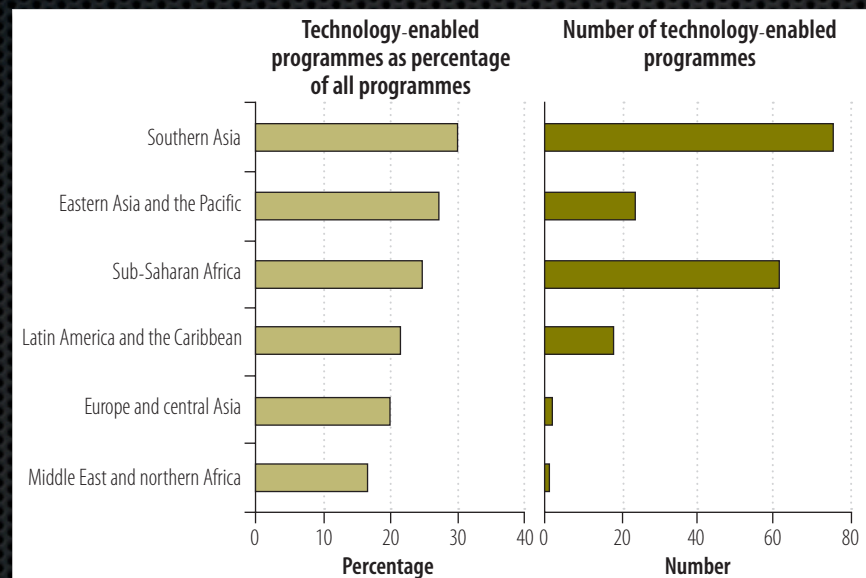
Source: WB 2012

Figure 3.2 Number of countries with at least one mHealth deployment, by World Bank region



status of ehealth (2)

♣ 2012 CHMI survey (+ private sector): 176 of 657 “tech- enabled”



our classification: beneficiary of solution

❖ Personal health (individual):

- ❖ Decision-making (diagnosis)
- ❖ Reminders: appointments/adherence
- ❖ Call centres
- ❖ Emergency response
- ❖ Self-management

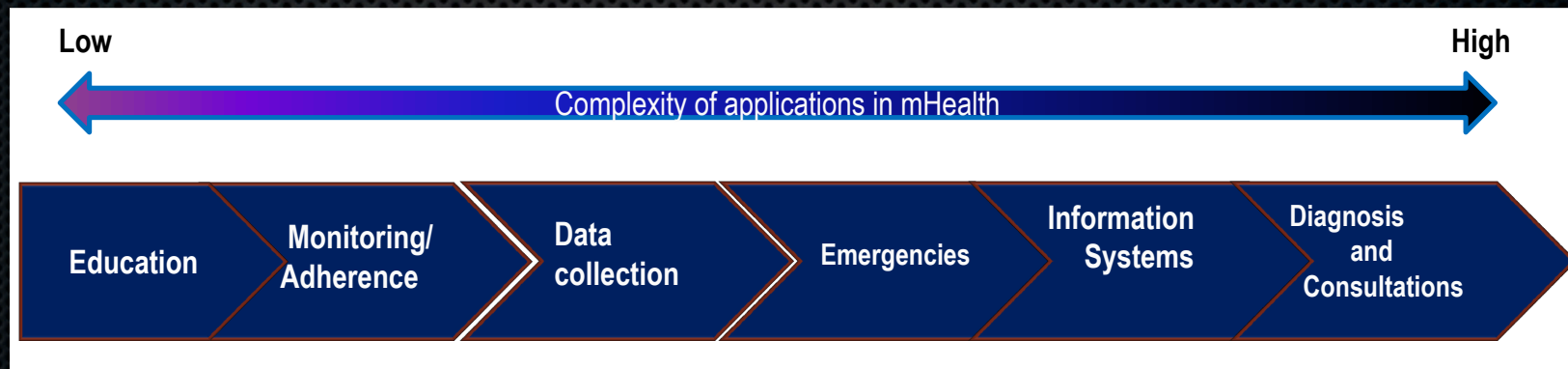
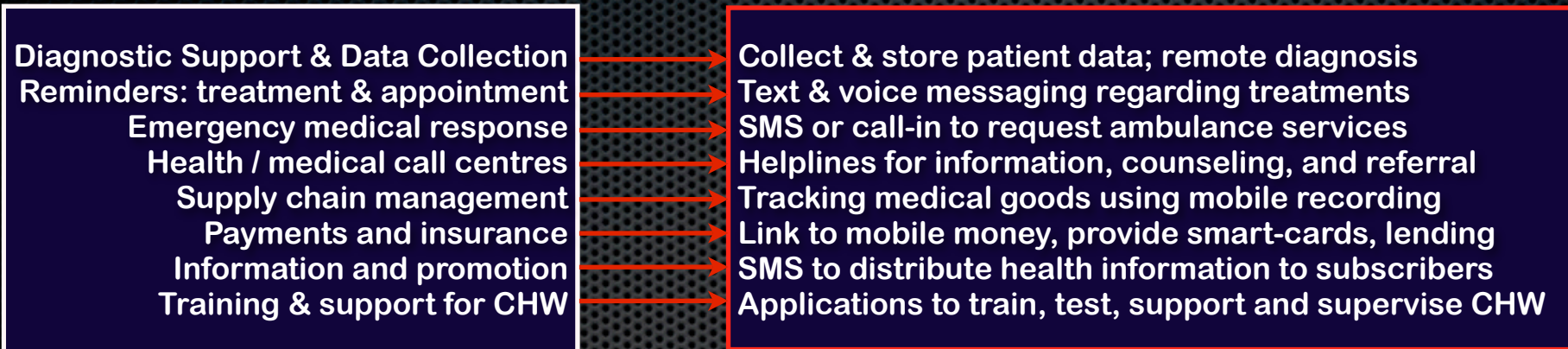
❖ Public health (institutional):

- ❖ Data collection: surveillance, outbreak
- ❖ Supply chain management
- ❖ Financing: payments, insurance
- ❖ Training and support to HRH
- ❖ Accountability

❖ Interaction between individual and public health:

- ❖ Awareness, information and promotion to population
- ❖ Electronic medical records

prevalence of areas



the valley of death

- ❖ First wave of pilot initiatives: small-scale PoC studies.
- ❖ Today: tipping point (end of pilots and start of longer-term financially-sustainable solutions at greater scales).

Scale up	<i>Is the project able to scale from 10 to 1000 to 1, 000, 000 users?</i>
Scale Out	<i>How much is a project tied to a particular setting? Can I take the same concept and reuse it in different settings? (This entails overcoming barriers: language, customs, ...)</i>
Scale in	<i>How does this work for individuals? What about variations within groups? (This entails personalisation and individualisation)</i>
Scale across	<i>How well does a system that is tested for one disease accommodate other diseases? (This entails agility and interoperability).</i>

challenges (1): poor evidence base

Severe lack of formal evaluations



No evidence of impact on outcomes



No interest from stakeholders

Why is evaluation so difficult?

- ❖ eHealth used with others --> difficult to evaluate contribution of eHealth in improvement
 - ❖ Eg. Some projects succeeded in achieving stated goal of rapid result reporting; but this has not necessarily meant rapid start of treatments.
- ❖ Solutions that aim at long-term behaviour change require evaluations over long periods.

challenges (2): interoperability

What is interoperability in eHealth?

- ❖ Co-exist with existing 'offline'. Eg: the protocol for reporting of results or collection of patient data in many countries is still paper-based.
- ❖ Many settings already have eHealth platforms, and eHealth must be able to co-exist and inter-operate (and even cooperate) with them.
- ❖ Co-integration of eHealth solutions across diseases is also critical

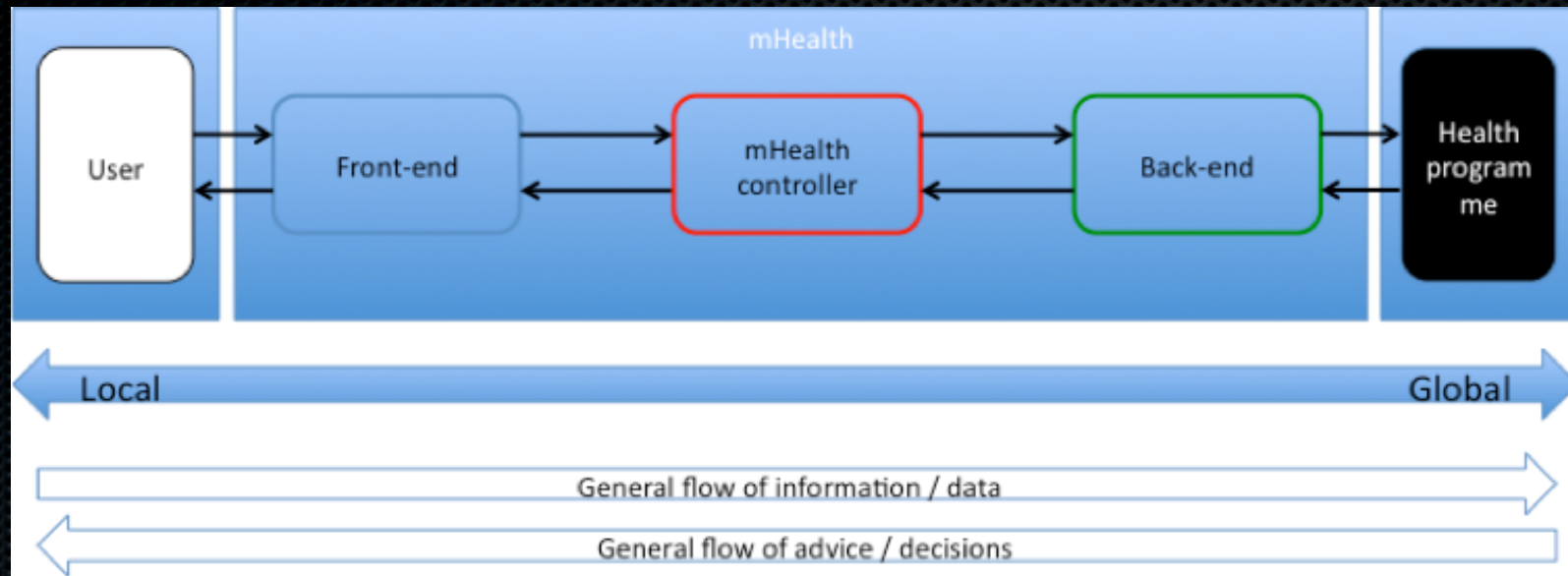
challenges (3): others

- ❖ Security/privacy issues inherent to eHealth using public networks
 - ❖ Address these challenges: through technology & user awareness
 - ❖ Confidentiality: very important in any strategy that uses cell phones, esp. for diseases for which stigma is a major concern (TB, HIV)
-
- ❖ Infrastructure: IT, Network availability / reliability, Power supply; ...
 - ❖ Acceptability: Literacy / language; Training; User empowerment

challenges (4): intelligence

- ♣ Increasingly important
- ♣ Conversion of data into intelligence
 - ♣ Vast amounts of unexploited data available today
 - ♣ How do we use it to help shape health policy and practice?

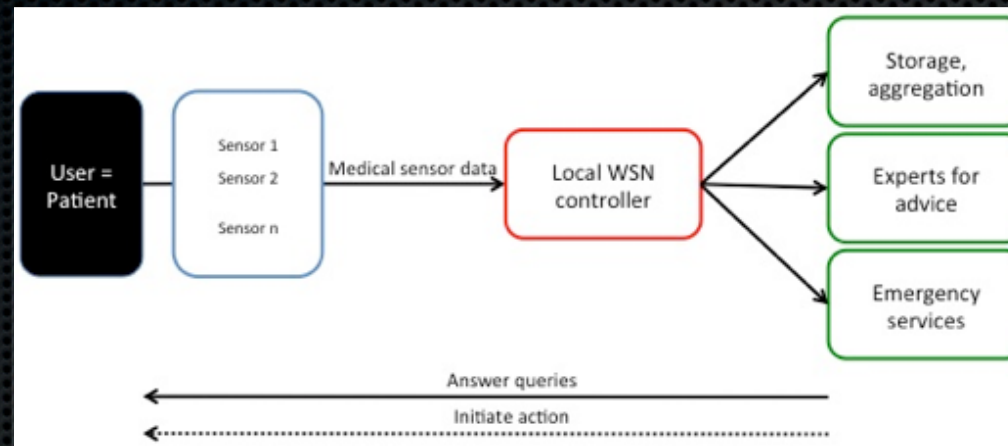
ehealth technology



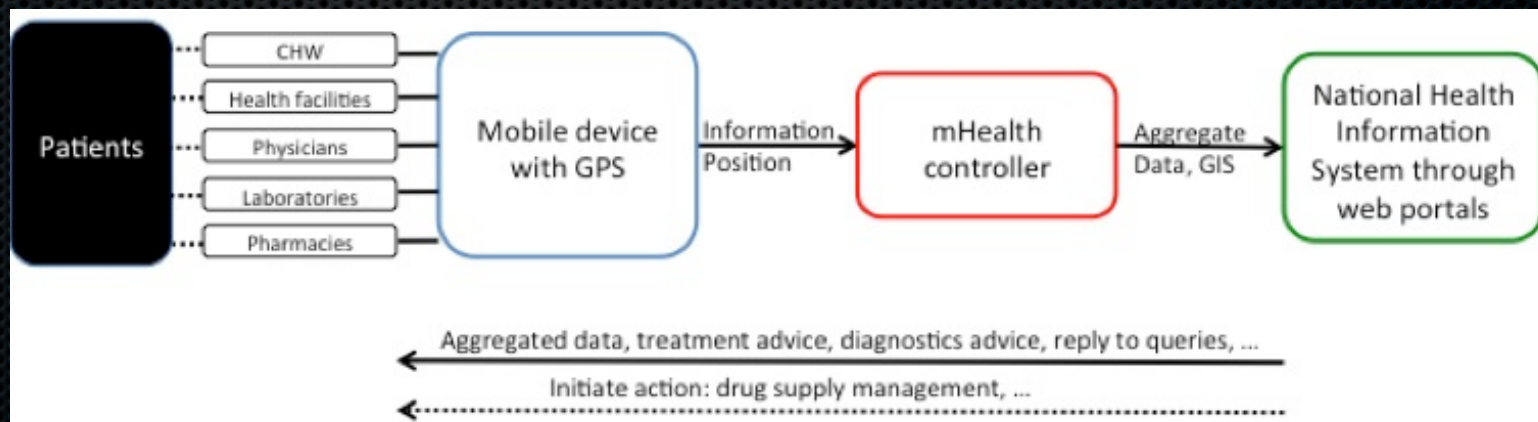
- ❖ Front-end: increasing use of mobiles (basic ... tablets)
- ❖ Communication: most provide SMS as delivery mechanism
- ❖ Controller: 'Apps' for user interface
- ❖ Back-end: Cloud being used, but concerns persist
- ❖ Design paradigm: Open-source platforms gaining ground (RapidSMS / Magpi for front-end; OpenMRS for back-end)

representative architectures

Remote monitoring: sensing technology

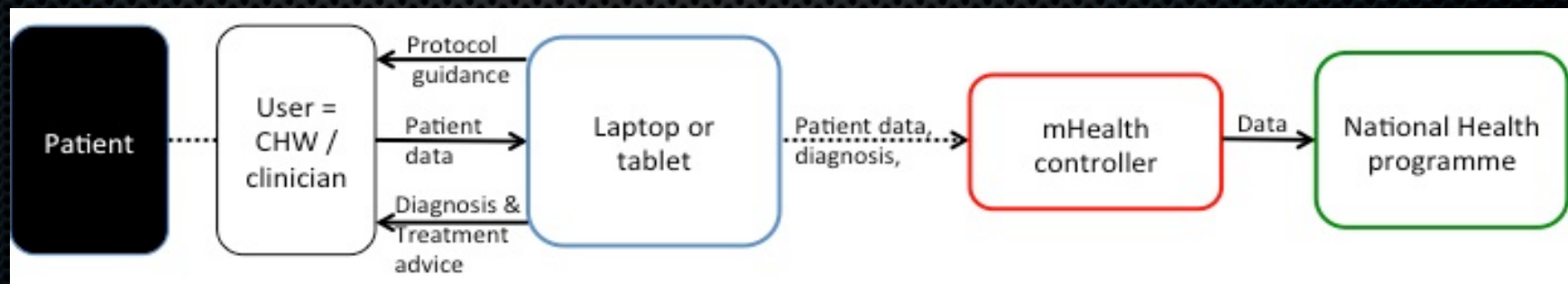


Disease surveillance: geographical information systems



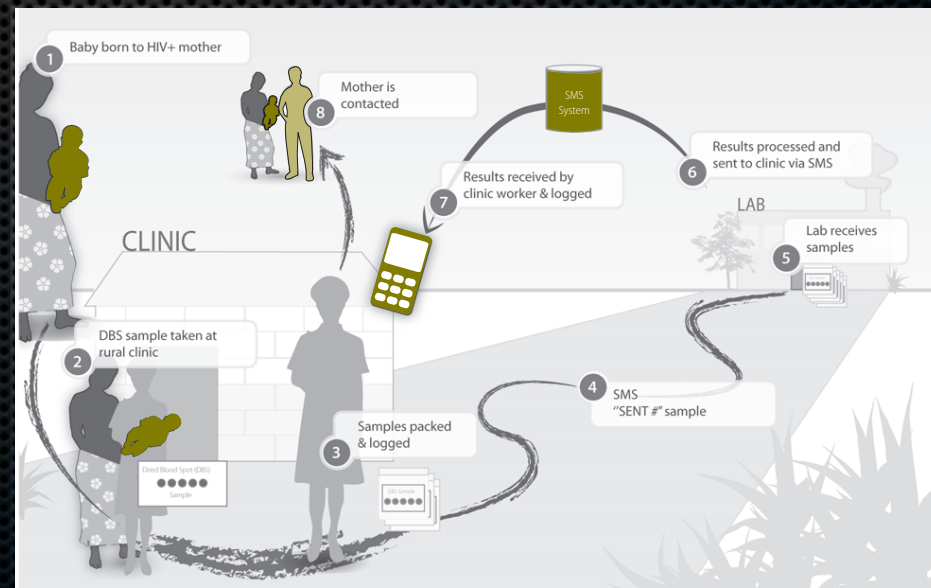
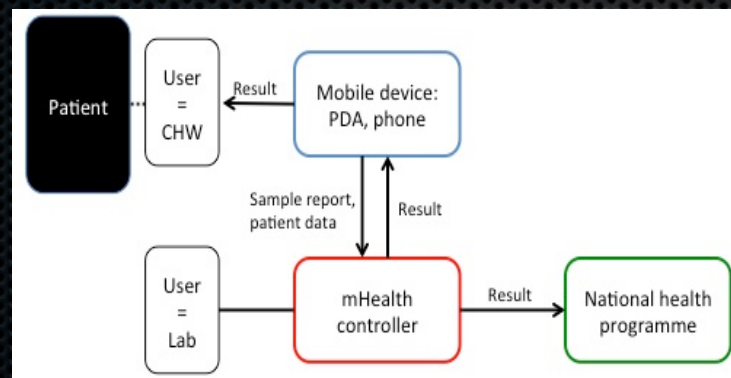
2 of my favourite 'success stories'

Electronic Consult register for Accurate On-site Diagnosis of Childhood illnesses	
Country	Burkina Faso
On-going ?	Yes: currently scaling up
Pathology	Childhood illnesses (including diarrhoea, HIV, ...)
Stage	Implementation and scale-up to national level (planned by 2014)
End-users	Health professionals (physician, nurse, midwife)
User device	Computer, USB dongle
Communication	None. Offline service.
Notes and remarks	An offline web application that guides health professionals throughout the consult to help them strictly apply the Integrated Management of Childhood illness (IMCI). This helps establish clear diagnostic (and thus, prescribe drugs or refer for further testing). A USB-based synchronisation procedure allows for all data to be centralised.



2 of my favourite 'success stories'

SMS-based reporting of results from diagnostics hubs to health facilities	
Country	Zambia
On-going ?	Yes
Pathology	Infant HIV
Stage	Currently being scaled up; will reach national level by 2014
End-users	Laboratory technicians
User device	Mobile phone
Communication	SMS
Notes and remarks	Pilot study showed an improvement in turnaround time (compared to paper-based reporting) of about 50%



2 of my favourite 'success stories'

❖ Mwana is one of the three case-studies in 2013 eHealth survey

- ❖ Real-time results of infant HIV (upstream, downstream). Uses RapidSMS
- ❖ 2 Tools: Results160 to report results + RemindMi to remind CHW about appointment.
- ❖ Process:
 - Lab staff enter results to database
 - Result sent upstream to programme database
 - Message sent to registered phones of sample collection facility
 - Collection facility staff responds with PIN
 - Test results sent to collection facility immediately by SMS
 - SMS sent to prompt staff to record results in registers, delete from phone
- ❖ Web interface: aggregate of samples / results, overall positivity, rejected samples
- ❖ Scale: Covers all 600 health facilities offering infant HIV testing in country.

guidelines for future implementations

Recommendation: Focus on health first	
Implementation guidelines	<p>Choose best technology suited to the setting and the healthcare goal being addressed: solution need not always be at the forefront of technology ⁶⁷.</p> <p>Choose between common-denominator (SMS) and advanced (smart-phone) ^{2,3,41,68,69}</p> <p>Decide whether cloud computing is beneficial.</p> <p>Decide whether the programme requires web-based access to users.</p>
Recommendation: Interoperability with existing initiatives	
Implementation guidelines	<p>Study existing healthcare landscape: identify points of interaction between landscape and mHealth</p> <p>Study existing health data: where it is stored, who controls access to it and who owns it.</p> <p>Study existing HIS landscape: Identify points of interaction between HIS and mHealth ^{1,70}</p> <p>Devise solution for seamless interaction with paper-based data collection standards ^{34,35,61,71}</p> <p>Adopt same data standards: data elements, terminology, common modes of communication ⁴⁰</p> <p>Devise patient medical records as far as possible. These records will be repositories for both downstream and upstream reporting of data (diagnostics results, stocks and advice)</p> <p>Study existing mHealth landscape ^{10,40}</p> <p>Devise solution to prevent patchwork of incompatible solutions ^{2,3,72,73}</p> <p>Plan for interoperability and scale simultaneously ⁷⁴</p> <p>Decide whether open-source development is feasible and beneficial.</p>
Recommendation: Equity in health	
Implementation guidelines	<p>Implement usability engineering (gathering user needs, assessing risks, drafting usability specifications to reduce use errors, training users and evaluating usability) ^{16,75}</p> <p>Quantify modes of interaction between device and user, time and training required for operation ³³</p>
Recommendation: Sustainability	
Implementation guidelines	<p>Build sustainable economic models.</p> <p>Ensure evaluation of mHealth impact so as to guide further investment ⁴¹</p> <p>Dimension technology with scale in mind ^{10,39}</p> <p>Consider scaling up (number of users), scaling out (number of sociocultural settings), scaling in (variations within user group), and scaling across (number of diseases) ⁷⁶.</p> <p>Be flexible to ensure adaptation to new technologies and evolving disease programme priorities ².</p>
Recommendation: Evidence base	
Implementation guideline	<p>Integrate indicators to evaluate solution ⁴¹.</p> <p>Evaluate trade-off between benefits (success in addressing healthcare challenge) and costs incurred.</p>
Recommendation: Participatory approach	
Implementation guideline	<p>Enable patient participation in health decisions.</p> <p>Ensure two-way communication using which patient can also inform the mHealth initiative.</p>

conclusions

- ✿ Congratulations: Philippines seem on the right track (in UHC and eHealth)

Some suggestions

- ✿ Concentrate on the health aspect where 'e' is to be used: look at eHealth in light of UHC; includes continuum of care, changing epidemiology, ...
- ✿ Devise ways to convert data into health intelligence --> show that eHealth can actually help adapt policy and actions according to need. Only then can eHealth be taken seriously (eg. my WHO experience)
- ✿ Research in frontier areas, eg integration of devices (50B internet-connected devices by 2020). For now, ill-adapted to needs. Eg. RxBox
- ✿ Research on how to integrate fragmented ehealth for best results (eg. RxBox + CHITS + NTHC). This will expose interoperability issues also.

some sources to keep up to speed

- ✿ WHO:

- ✿ Global Observatory on eHealth: surveys (2005, 2009, 2013)
- ✿ Compendium (eHealth, medical, assistive)
- ✿ Bulletin

- ✿ Centre for Health Market Innovations

- ✿ World Bank's ICT unit

- ✿ International Telecommunications Union

- ✿ mHealth Alliance

- ✿ Joint Learning Network for UHC

- ✿ ...