Trends and challenges for mHealth in developing countries

An information slide pack

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September 2014

eHealth and mHealth - a word about terms

- The WHO define *eHealth* as the cost-effective and secure use of **information and communication technologies in support of health** and health related fields, including health care services, health surveillance, health literature, health education, knowledge and research

- *mHealth* is a part of eHealth, and concerns the use of **mobile phones and related wireless devices** by individuals, families, patients, carers and healthcare professionals to obtain or provide health services and information on health and healthcare

- mHealth applications are being used in many areas including **education, diagnosis, monitoring, recording, decision support, consultation, planning, management and finance**   (see e.g. A B Labrique, L Vasudevan, E Kochi, R Fabricant and G Mehl, mHealth innovations as health system strengthening tools: 12 common applications and a visual framework, *Global Health Science and Practice*, August 6 , 2013)

There are many books and reports on mHealth in developing countries, covering a wide range of application areas

This overview focuses particularly on applications of mHealth to provide *information* about health and health care for the public, patients, lay carers and health professionals
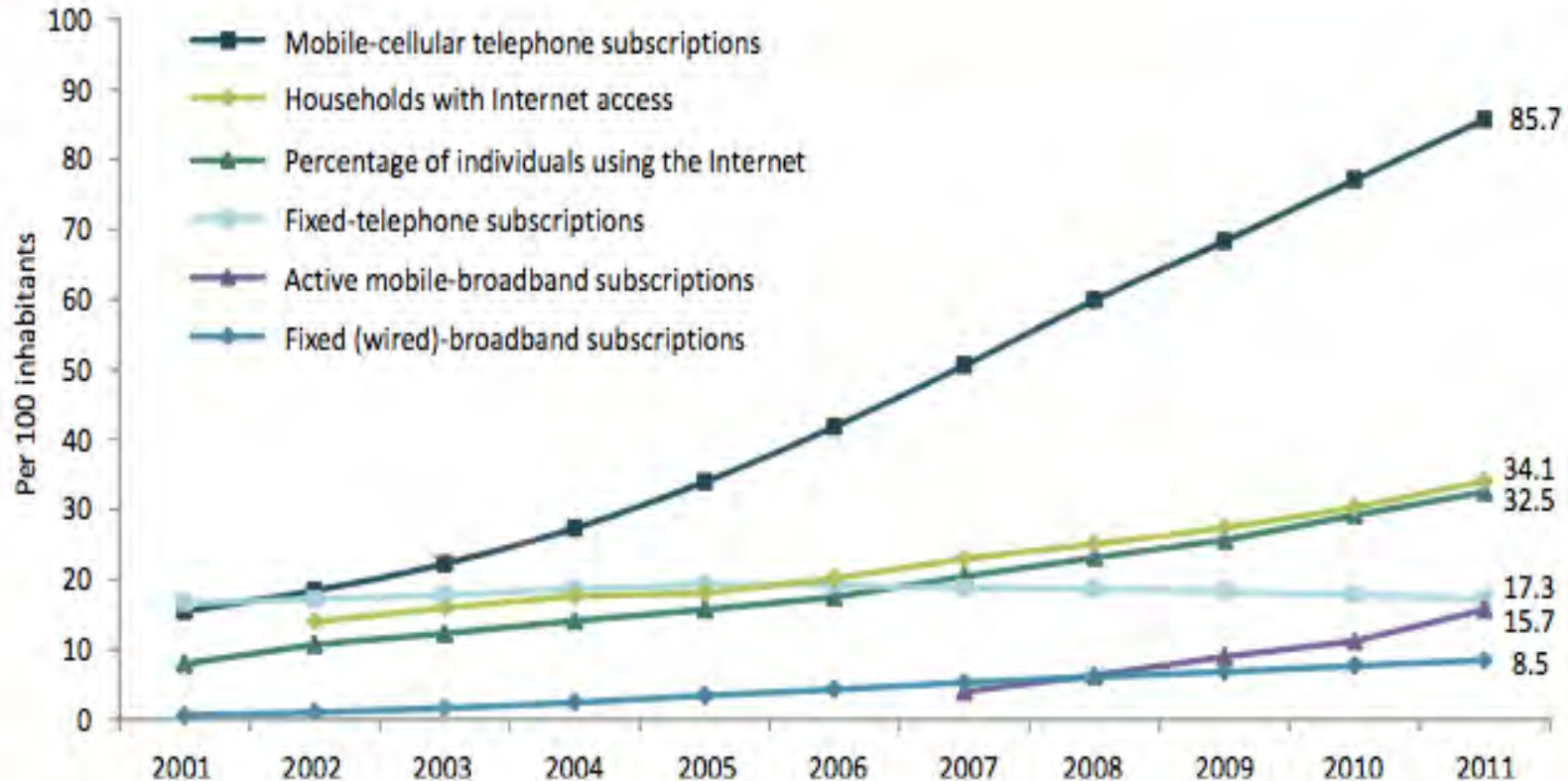
1. General trends in use of mobile information and communication technology in developing countries
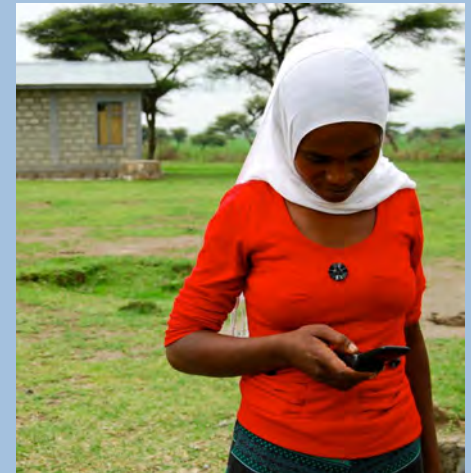
Global growth in access to Information and Communication Technology continues apace, especially for mobile phones
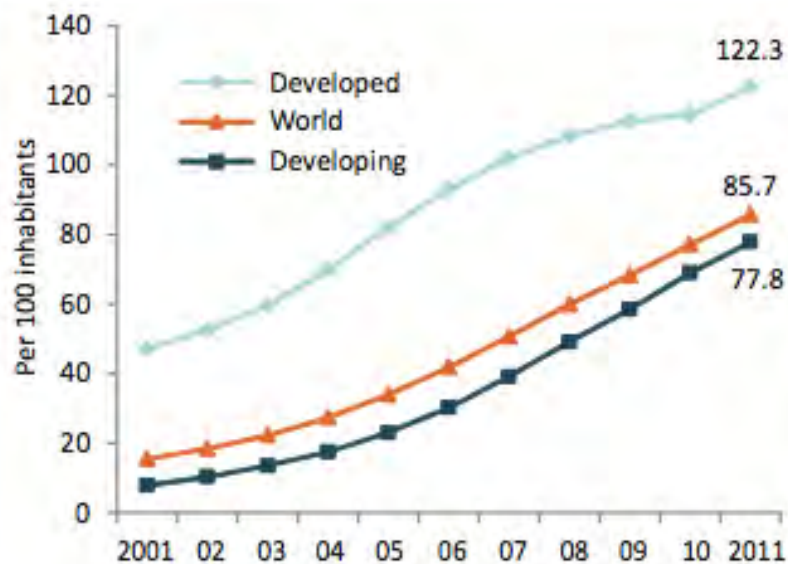
Chart 1.1: Global ICT developments, 2001-2011

Legend:
- Mobile-cellular telephone subscriptions
- Households with Internet access
- Percentage of individuals using the Internet
- Fixed-telephone subscriptions
- Active mobile-broadband subscriptions
- Fixed (wired)-broadband subscriptions

Y-axis: Per 100 inhabitants

2011 values:
- Mobile-cellular telephone subscriptions: 85.7
- Households with Internet access: 34.1
- Percentage of individuals using the Internet: 32.5
- Fixed-telephone subscriptions: 17.3
- Active mobile-broadband subscriptions: 15.7
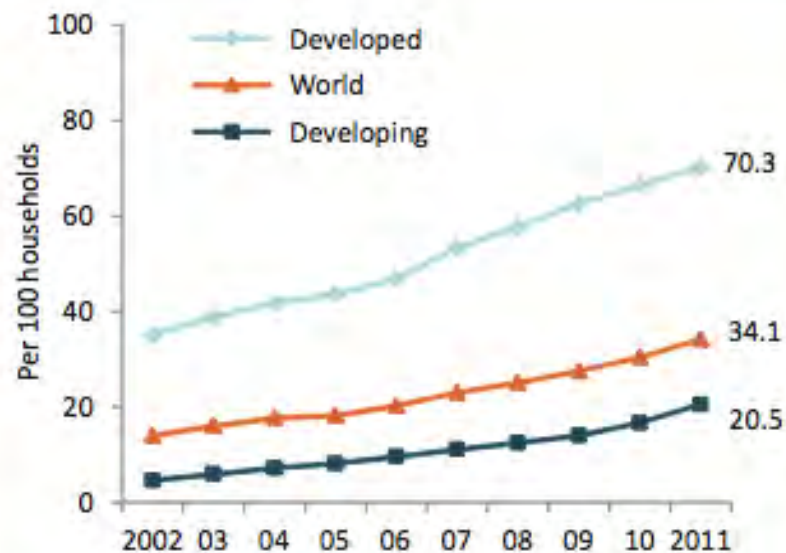- Fixed (wired)-broadband subscriptions: 8.5

Source: Measuring the Information Society, International Telecommunications Union, 2012

This growth is not limited to developed countries

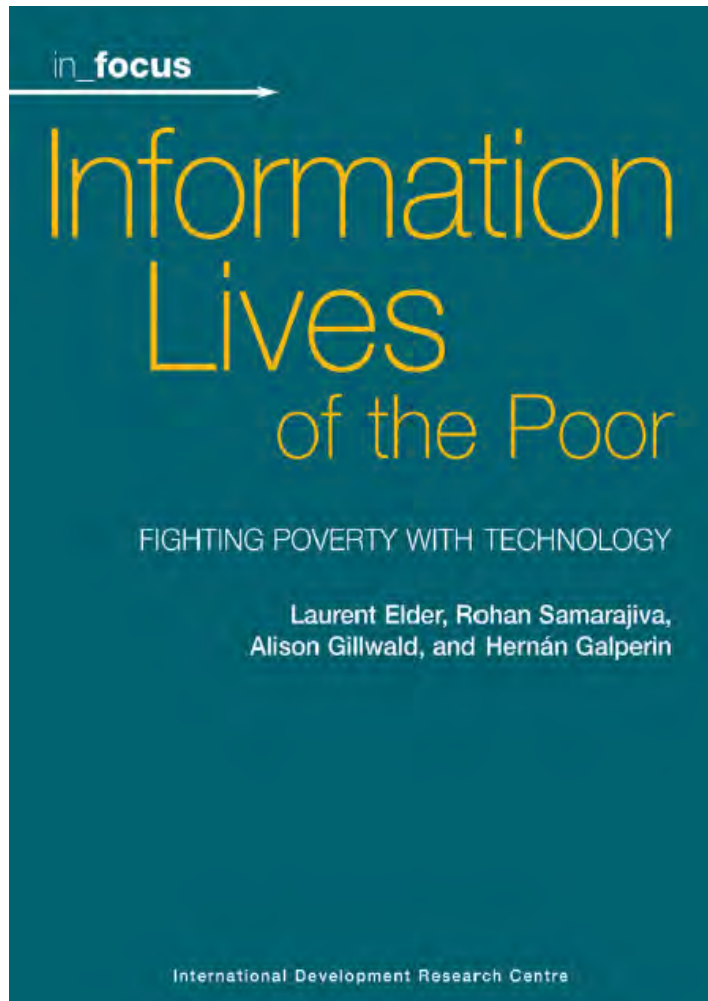| Mobile phone subscriptions 2001-11 for developed & developing countries	Households with internet access 2002-11 for developed & developing countries

Source: Measuring the Information Society, International Telecommunications Union, 2012

Growth is particularly rapid for mobile broadband (internet) services. **Internet use on mobile phones in Africa is predicted to increase 20-fold over the next five years**, double the rate of growth in the rest of the world (Guardian, 6 June 2014)

There remain problems such as access to and use of information technology by the poorest

in_focus

Information Lives of the Poor

FIGHTING POVERTY WITH TECHNOLOGY

Laurent Elder, Rohan Samarajiva,
Alison Gillwald, and Hernán Galperin

International Development Research Centre

Access to those technologies is increasingly recognized as an important means of improving the situation of excluded groups by reducing poverty, improving health and mitigating the impact of geographical isolation. A recent study in East Africa found that access to such technologies, particularly mobile phones and the Internet, helped to reduce poverty among the poorest populations (Ban Ki-moon 2012).

The **internet.org** project is one global initiative tackling this issue

Providing Access to Free Basic Services
The Internet.org app provides free basic services in markets where Internet access may be less affordable. It allows people to browse selected health, employment and local information websites without data charges. Initially launched to Airtel customers in Zambia, the app will continue to expand into other parts of the world.

Mobile phones are helping to overcome some of these problems

Mobile phones are increasingly affordable, can be used by people with low literacy, and can operate in areas without telephone landline or electrical power infrastructures
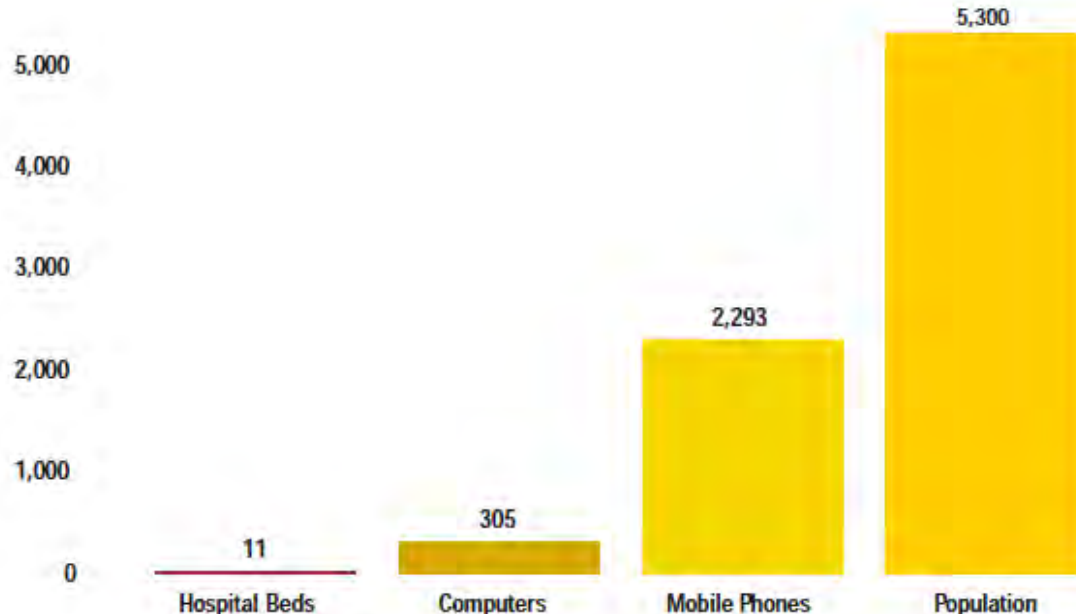

Figure 1. Technology and health-related statistics for developing countries (millions).[4]

"**Mozilla has shown off a prototype for a $25 (£15) smartphone that is aimed at the developing world**"
*BBC News
23 February 2014*

Source: Vital Wave Consulting. *mHealth for Development: The Opportunity of Mobile Technology for Healthcare in the Developing World*. Washington, D.C. and Berkshire, UK: UN Foundation-Vodafone Foundation Partnership, 2009.

For example, over the past decade, mobile phone coverage has grown in Africa at staggering rates

"In 10 short years, what was once an object of luxury and privilege, the mobile phone, has become a basic necessity in Africa" President Paul Kagame, President of Rwanda (Connect Africa Summit, October 2007).

"It's hard to overstate how much mobile phones have changed the shape and form of life in Africa. Every stratum, every fiber of the fabric of life here has changed because of mobile phones". Erik Hersman, Stanford Social Innovation Review , Spring 2013.

- In 1999, only 10 percent of the African population had mobile phone coverage, primarily in North and South Africa.

- By 2008, 60 percent of the population (477 million people) had mobile phone coverage.

Source: J C Aker and I M Mbiti, Mobile Phones and Economic Development in Africa, Center for Global Development , June 2010

The example of Kenya

About 15 years ago: the first mobile operator license was granted by the Kenyan government; although few outsiders believed that Africans could afford to pay for either phones or phone service.

Thereafter: in a single decade the proportion of Kenyans with a mobile phone subscription rose from virtually zero to around 70%;
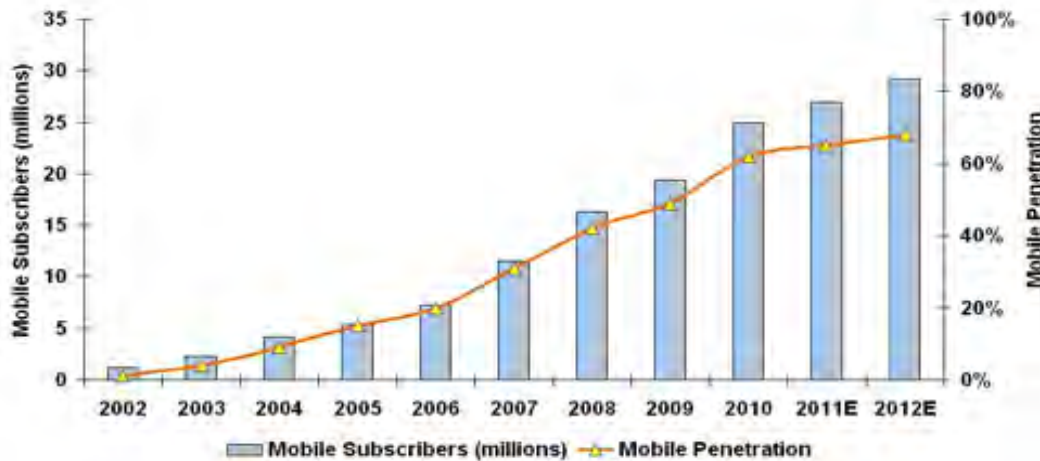
Source: industry sources, Blycroft estimates c. Blycroft 2011

Today: over 90% of Kenyans are mobile phone users. 78% of women and 77% of rural residents are mobile phone users. At least once a day, 81% of Kenyan adults make or receive a call, 61% send or receive a text message, and 22% send or receive money or pay a bill using a mobile phone.

The Afrobarometer survey gives key information about mobile phone use in many countries in Africa

Figure 2: Use of mobile phones, 34 countries 2011-2013
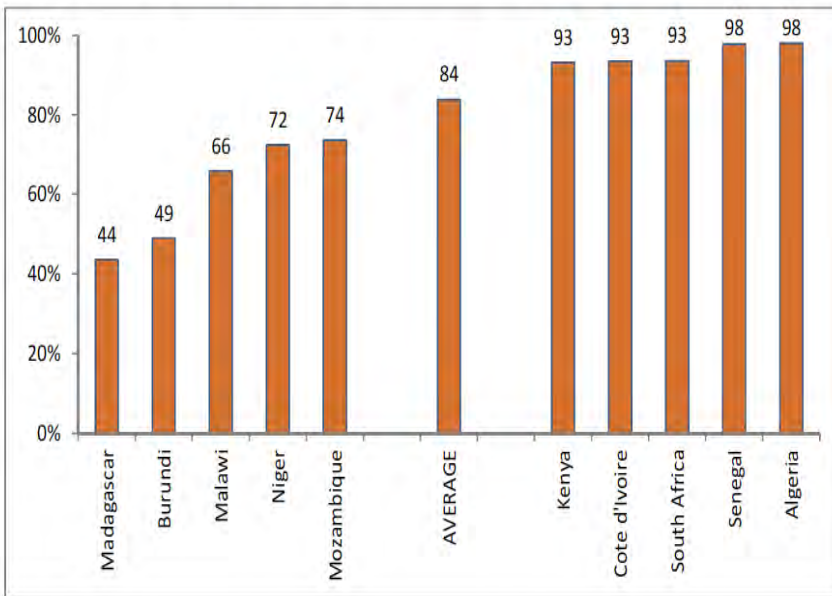
Participants were asked: 'Do you ever use a mobile phone?' (% yes)
* Full results for all countries are available in Annex 3 of the report. Average is for all 34 countries.

Figure 4: Use of internet, by region, 34 countries, 2011-2013
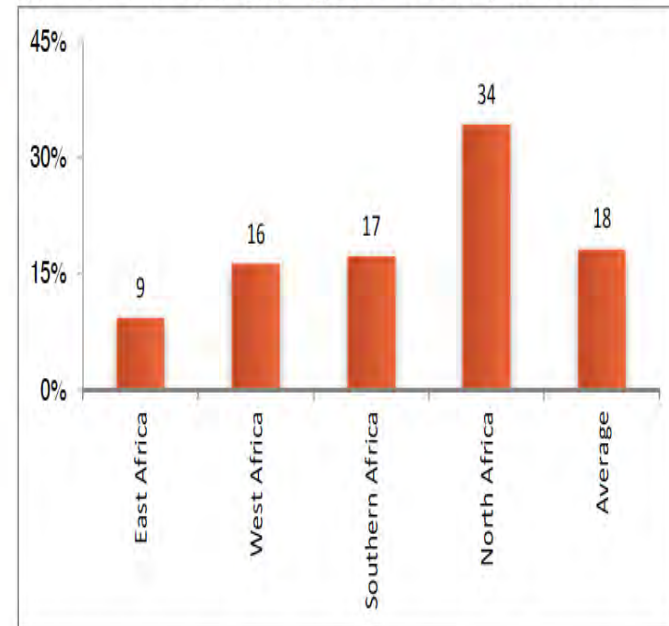
Participants were asked: 'How often do you use the internet?' (% using 'a few times a month' or more)

Source: Afrobarometer survey, 2013, www.afrobarometer.org

Analyses can be done for various population subsets e.g. urban/rural, educational level……
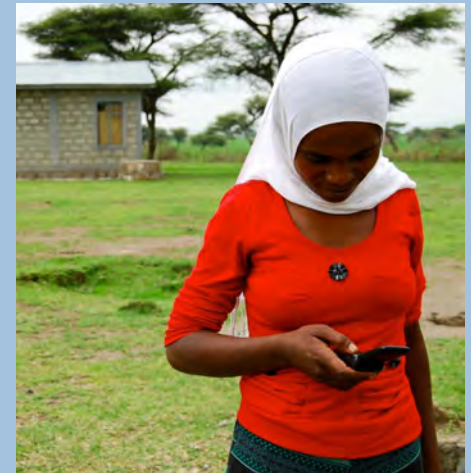
How many mobile phones in household by Country for Urban or Rural Primary Sampling Unit=RURAL

RURAL N=30,455; Weighted results	Total	Algeria	Benin	Côte d'Ivoire	Botswana	Burkina Faso
None	20%	-	27%	7%	5%	7%
1	25%	2%	32%	16%	23%	20%
2	24%	12%	25%	24%	23%	23%
3	13%	12%	8%	15%	19%	16%
4	7%	22%	4%	12%	13%	11%
5	4%	23%	2%	9%	5%	8%
6	2%	12%	1%	6%	4%	5%
7	1%	4%	0%	3%	2%	3%
8	1%	4%	0%	4%	1%	1%
9	0%	1%	0%	1%	1%	1%
10 and more	1%	1%	0%	2%	1%	5%
Missing; Unknown	1%	-	-	1%	3%	-
Don´t know	1%	5%	-	-	1%	1%
Base mean	29,714	388	668	566	414	879
Mean	2.1	4.5	1.5	3.2	2.7	3.3
Standard Deviation	2.00	2.28	1.92	2.20	2.02	2.53
Total RURAL	30,455	411	668	572	433	889

Source: www.afrobarometer-online-analysis.com

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2. Trends in use of mobile phones in health care in developing countries

In developing countries, access to mobile phones is much better than access to basic health services

Comparison of Penetrations of Improved Sanitation Facilities and Mobile Phones in Selected African and APAC Countries, 2014E

Country	Access to improved Sanitation facilities- 2014E	Mobile subscriber penetration- 2014E	Penetration of Mobile connections- 2014E
India	38.0	57.9	96.5
China	59.2	69.5	92.7
Vietnam	91.2	100.0	181.8
Nigeria	32.0	52.4	69.8
Kenya	33.1	58.4	77.8
South Africa	81.2	100.0	142.1

- Access to improved Sanitation facilities- 2014E
- Mobile subscriber penetration- 2014E
- Penetration of Mobile connections- 2014E
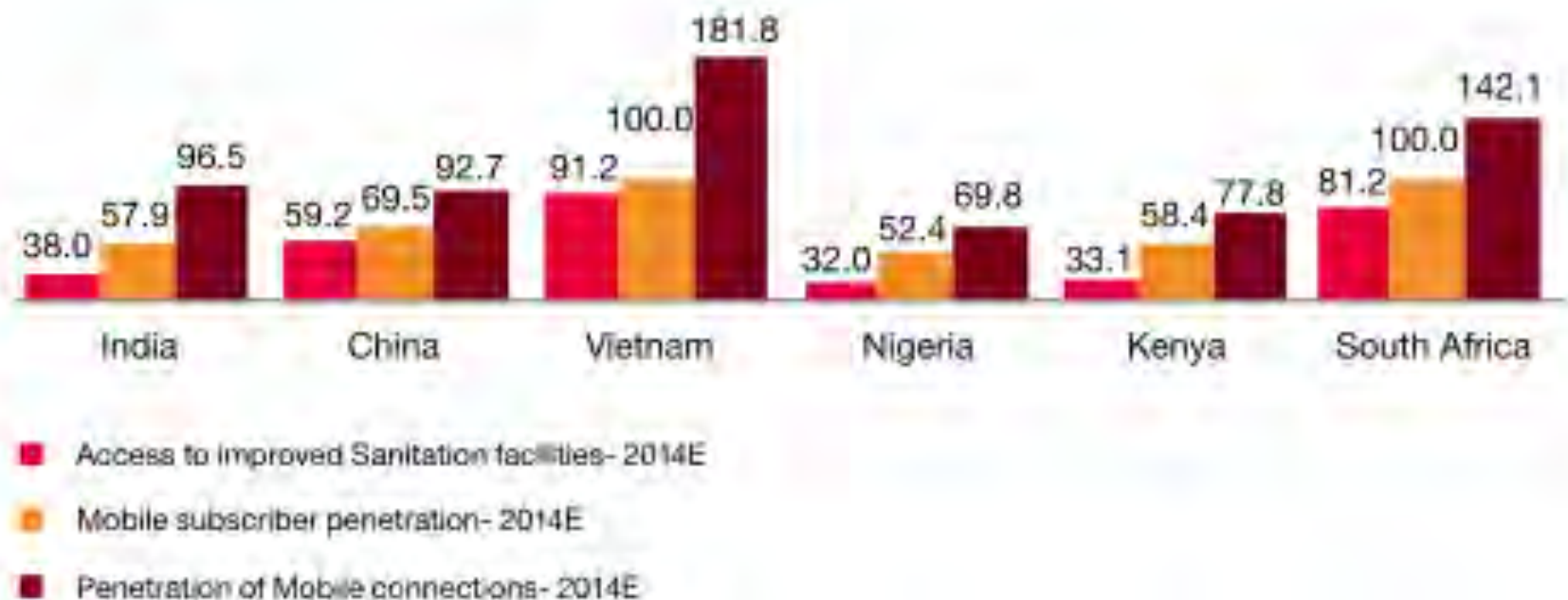
Source: Touching lives through mobile health. Report for GMSA by PwC Feb 2012

Patients and lay carers increasingly get health information from new media

Even 10 years ago mobile phones were increasingly being used to obtain health information in Africa

Table 7.2 Sources of information on antiretroviral therapy.[10] Values shown are percentages of sample (n = 990)

ICT	South Africa (%)	Tanzania (%)
Print	75	53
Radio	88	81
TV	83	50
Video	21	20
Audiotapes	17	18
Telephones	24	4
Face-to-face meetings	77	82
Mobile phones and SMS	31	10
Computer/CDs	23	3
Email	22	2
Internet	25	2

Source: AfriAfya face to face survey of 900 respondents conducted in 2004 , cited in *Telehealth in the developing world*. eds R Wooton, N G Patil, R E Scott and Ho, International Development Research Centre, and Royal Society of Medicine Press, 2009

Health practitioners are often at the forefront of using mobile phones (1)

m-Health projects range in variety and scope, examples in Africa include:

- monitoring measles outbreaks in the Zambia
- supporting diagnosis and treatment by health workers in Mozambique
- sending health education messages in Benin, Malawi, Uganda, Kenya, and South Africa
- extending the reach of medical workers and medical services
- collecting, measuring and monitoring health data

Source: J C Aker and I M Mbiti, *Mobile Phones and Economic Development in Africa*, Center for Global Development , June 2010

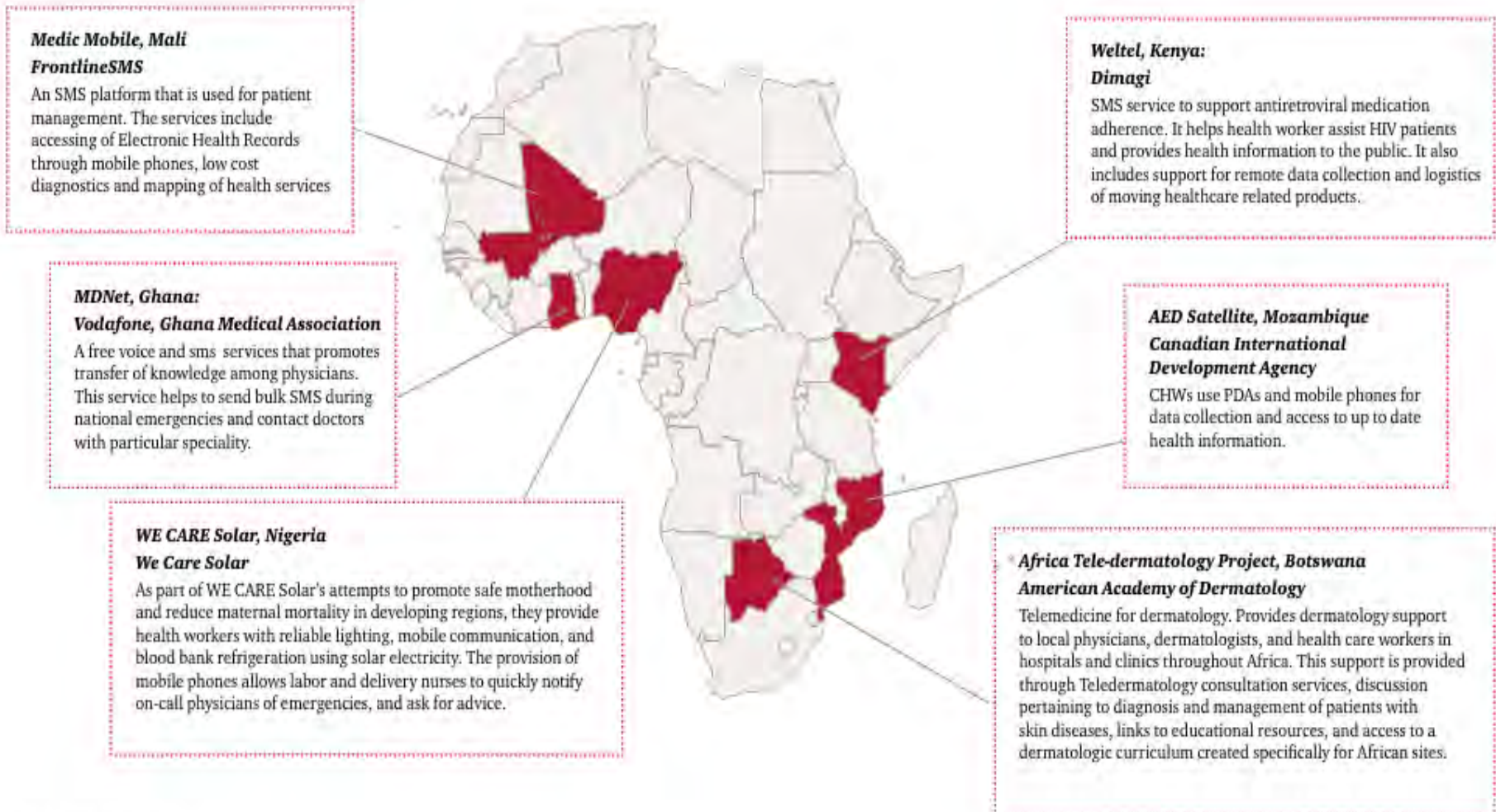*"Connecting health workers with sources of information via mobile technology is a strong basis for empowerment, as it provides the support they need to perform their functions effectively and self-sufficiently"*.
Ref: Iluyemi, A. and J.S. Briggs. *Access and Connectivity for Community Based Health Workers in Developing Countries: Employing Wireless Technologies*, Med-e-Tel 2008 Conference, Luxembourg.
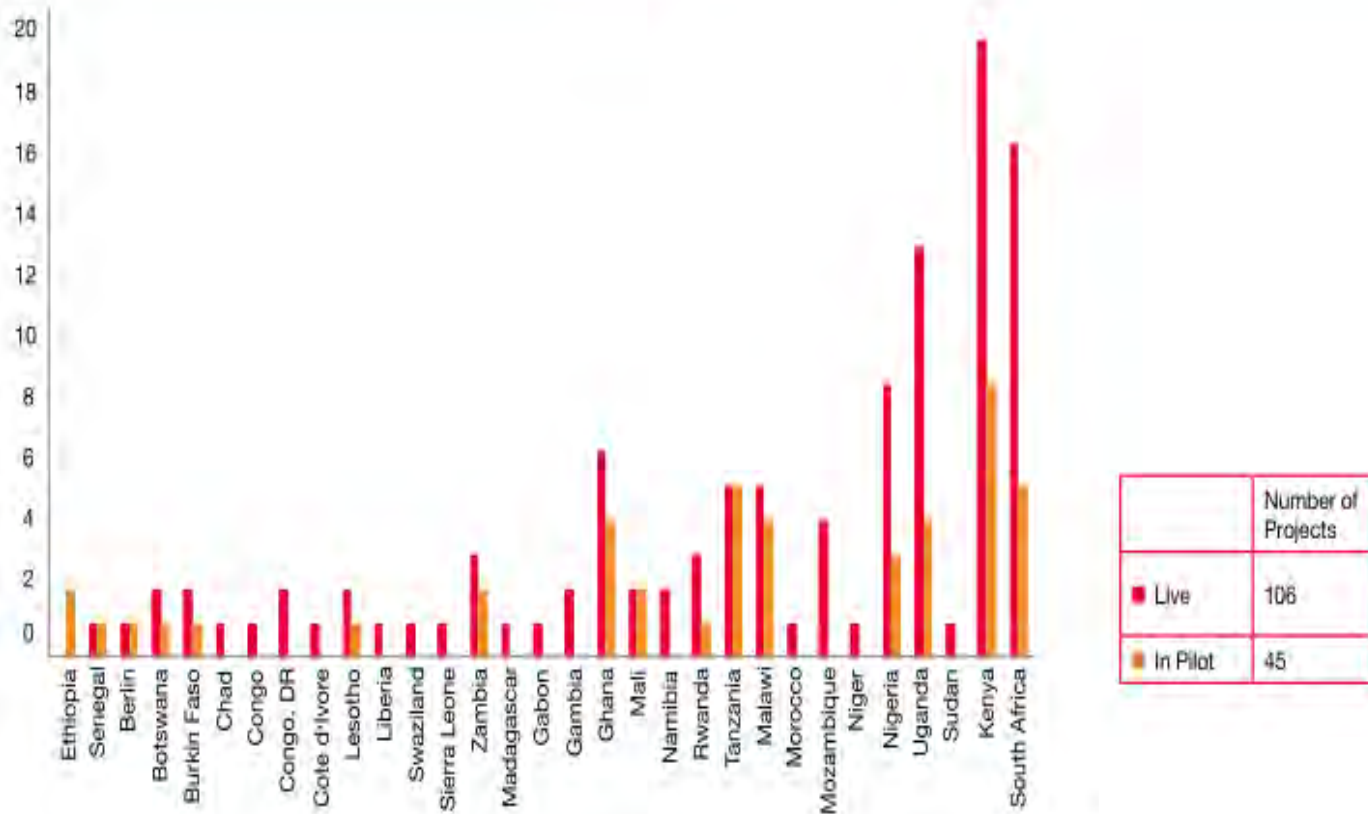
Health practitioners are often at the forefront of using mobile phones (2)

Selected mobile health deployments in Africa, 2011

Medic Mobile, Mali
FrontlineSMS

An SMS platform that is used for patient management. The services include accessing of Electronic Health Records through mobile phones, low cost diagnostics and mapping of health services

MDNet, Ghana:
Vodafone, Ghana Medical Association

A free voice and sms services that promotes transfer of knowledge among physicians. This service helps to send bulk SMS during national emergencies and contact doctors with particular speciality.

WE CARE Solar, Nigeria
We Care Solar

As part of WE CARE Solar's attempts to promote safe motherhood and reduce maternal mortality in developing regions, they provide health workers with reliable lighting, mobile communication, and blood bank refrigeration using solar electricity. The provision of mobile phones allows labor and delivery nurses to quickly notify on-call physicians of emergencies, and ask for advice.

Weltel, Kenya:
Dimagi

SMS service to support antiretroviral medication adherence. It helps health worker assist HIV patients and provides health information to the public. It also includes support for remote data collection and logistics of moving healthcare related products.

AED Satellite, Mozambique
Canadian International Development Agency

CHWs use PDAs and mobile phones for data collection and access to up to date health information.

Africa Tele-dermatology Project, Botswana
American Academy of Dermatology

Telemedicine for dermatology. Provides dermatology support to local physicians, dermatologists, and health care workers in hospitals and clinics throughout Africa. This support is provided through Teledermatology consultation services, discussion pertaining to diagnosis and management of patients with skin diseases, links to educational resources, and access to a dermatologic curriculum created specifically for African sites.

Source: Touching lives through mobile health. Report for GMSA by PwC Feb 2012

African m-Health projects are spread widely

Current status of mobile health projects in Africa, split by countries where they are implemented

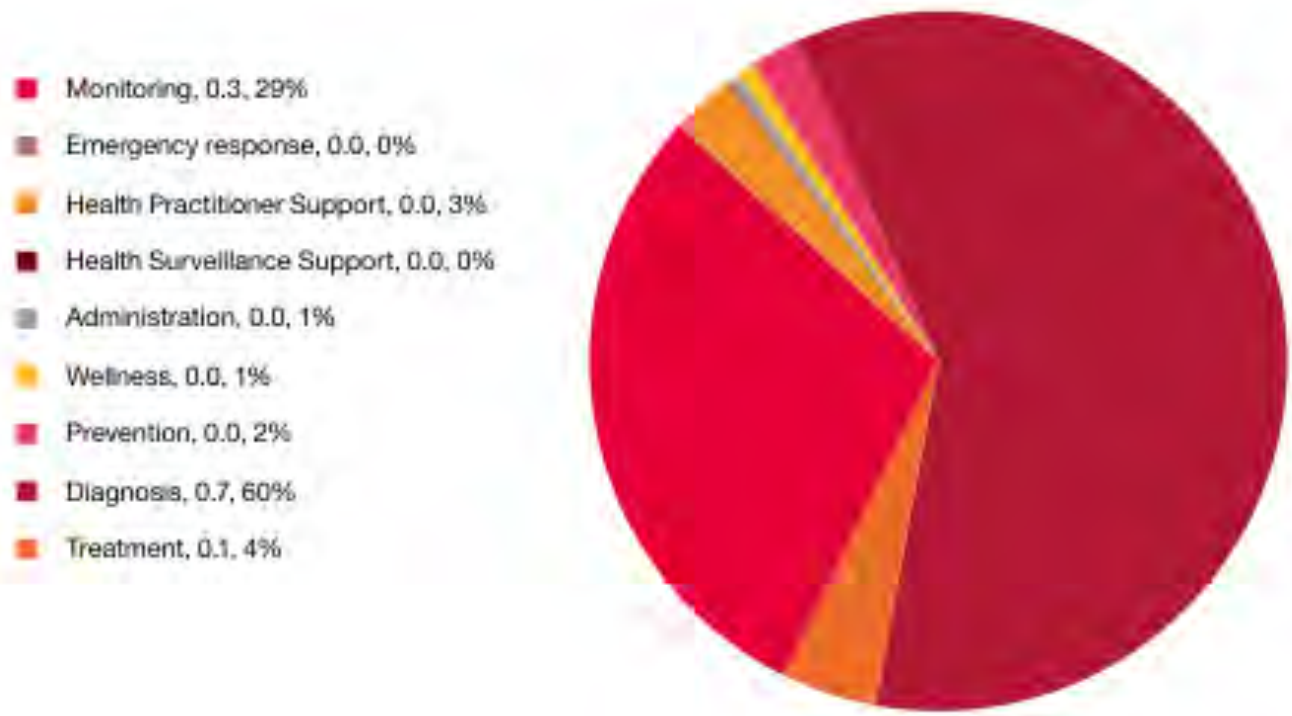|	Number of Projects
■ Live	106
■ In Pilot	45

Growth areas in mHealth

- In recent years some applications, like *disaster mapping* using mobiles, have moved from "nice to have" to "must have"
- Some mHealth applications are now *spreading globally* from higher to lower resource settings, e.g. smoking cessation
- One potential growth area is *distance learning* in health care – useful interaction between mLearning and mHealth
- "*Gameification*" has proved useful in getting messages across
- Lots of potential for *offline applications*, especially now storage capacity is cheap
- Some *impressive technical developments* in use of mobile phones for *diagnostics* in low resource settings e.g.
  - Low-cost mobile phone imaging and remote diagnosis for malaria
  - Use of mobile phone touch screen feature for rapid assessment of respiration rate in diagnosis of pneumonia
  - Use of mobile phones as part of a "lab on a chip" package for rapid diagnosis of e.g. TB

Annual m-Health spend in Africa is projected to soon exceed $1bn, mostly on diagnostic and monitoring services

Mobile health market opportunity by service categories in Africa, US$ billion, 2017

- Monitoring, 0.3, 29%
- Emergency response, 0.0, 0%
- Health Practitioner Support, 0.0, 3%
- Health Surveillance Support, 0.0, 0%
- Administration, 0.0, 1%
- Wellness, 0.0, 1%
- Prevention, 0.0, 2%
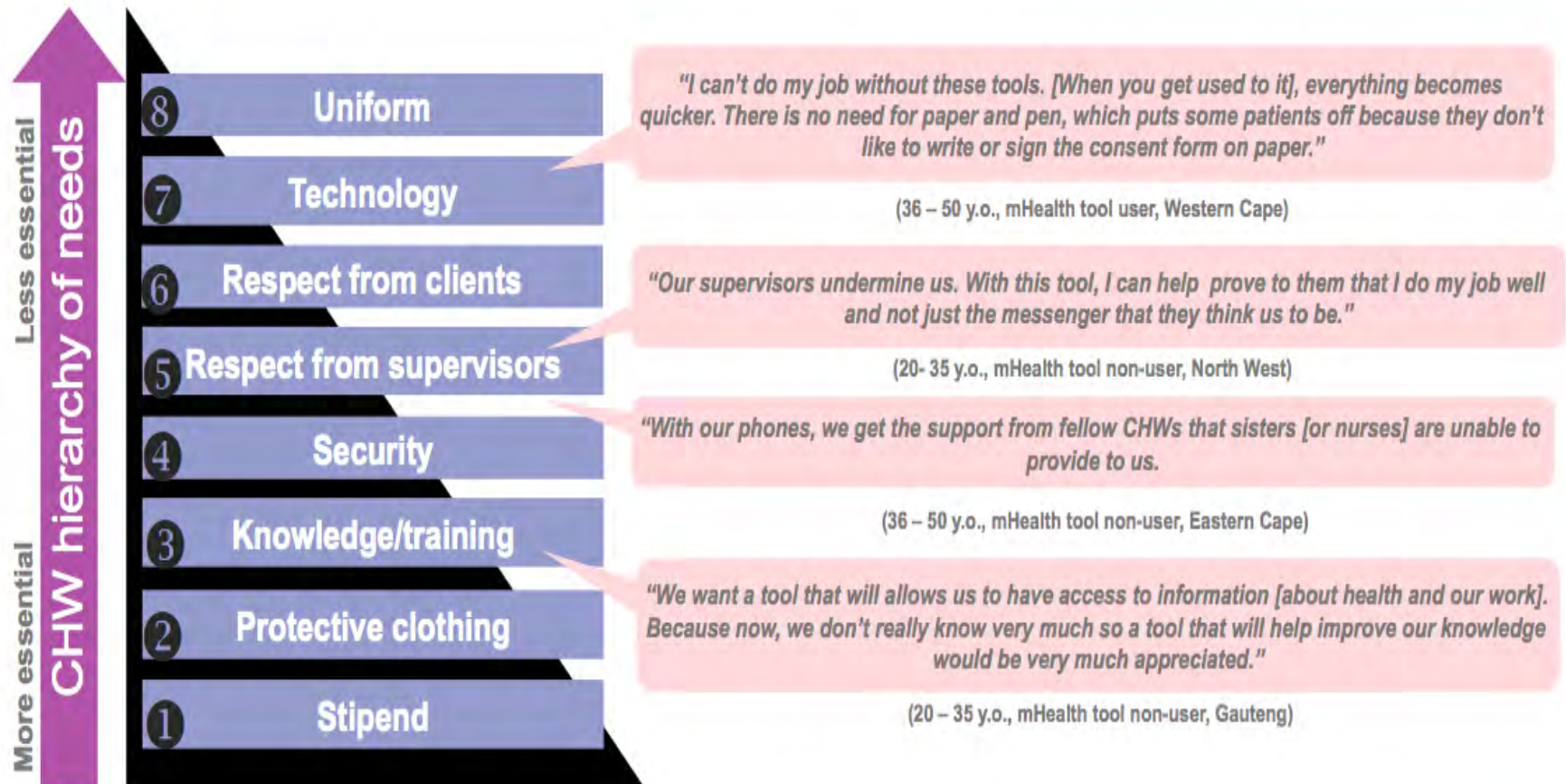- Diagnosis, 0.7, 60%
- Treatment, 0.1, 4%

Spend on m-Health will be higher in north Africa than in the sub-Saharan belt e.g. South Africa, Nigeria and Kenya are estimated to attain mobile health spend per active user of approximately US $14, $3 and $1.5 respectively in 2017.

Source: Touching lives through mobile health. Report for GMSA by PwC Feb 2012

Support to healthcare workers

Many healthcare workers in developing countries are enthusiastic about mHealth

CHW hierarchy of needs (Less essential → More essential):

8. Uniform
7. Technology
6. Respect from clients
5. Respect from supervisors
4. Security
3. Knowledge/training
2. Protective clothing
1. Stipend

"I can't do my job without these tools. [When you get used to it], everything becomes quicker. There is no need for paper and pen, which puts some patients off because they don't like to write or sign the consent form on paper."

(36 – 50 y.o., mHealth tool user, Western Cape)

"Our supervisors undermine us. With this tool, I can help prove to them that I do my job well and not just the messenger that they think us to be."

(20- 35 y.o., mHealth tool non-user, North West)

"With our phones, we get the support from fellow CHWs that sisters [or nurses] are unable to provide to us.

(36 – 50 y.o., mHealth tool non-user, Eastern Cape)

"We want a tool that will allows us to have access to information [about health and our work]. Because now, we don't really know very much so a tool that will help improve our knowledge would be very much appreciated."

(20 – 35 y.o., mHealth tool non-user, Gauteng)

There are many ways in which mobile phones can support healthcare workers in developing countries

FIGURE 1: Definitions of types of mHealth tools used for database research

Type of mHealth Tool	Definition
Patient registration	Registering patients into a project specific or centralized database over the mobile phone; this often includes creating or using unique identifier numbers
Patient assessment	Data collection and/or survey administration for patient identification of a disease using a mobile phone
Patient monitoring entry of ongoing	Supporting the entry of ongoing patient medical data on a mobile phone for monitoring and data analysis
Work planning	Mobile tool supporting frontline health workers to prioritize daily, weekly and/or monthly patient load, in addition to the messages emphasized during an appointment, based on data from patient registration and assessment
Counselling	Supporting frontline health workers to deliver messages on health practices using mobile phone features
Social Networking	Mobile-based platform to facilitate collaboration and/or communication amongst frontline health workers
Clinical Decision Making	Intelligent step-by-step guide for frontline health workers to assess a patient's condition and/or inform treatment decisions; this often includes questions for a frontline health worker to ask a patient, data inputs based on the patients answers to the questions and automated recommendations based on the data inputs
Checklists	Mobile-based lists to guide sub-activities to be performed by frontline health workers to ensure optimal quality (e.g., list for sub-activities during a home visit)
Mobile Learning	Mobile-based platform to enable frontline health workers to learn health concepts, treatment guidelines, role expectations etc.; this may also include options for assessment and certification
Care Coordination	Coordination between frontline health workers and patients, frontline health workers and other health professionals, and for referrals, using the features of a mobile phone
Compensation	Mobile-platform to enable faster delivery of frontline health worker salary, performance incentives and/or resources for transportation or supplies
Performance Tracking	Mobile-based data input of completed activities by frontline health workers to monitor performance and/or calculate salary/incentive pay

Source: H Batavia and N Kaonga,, *mHealth Support Tools for Improving the Performance of Frontline Health Workers* , mHealth Alliance, March 2014

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But existing mHealth features are not fully utilised by healthcare workers

About 1 in 7 households had their information noted by phones

Utilised | **Unutilised**

Communication tool	Data collection tool	Resource / patient care / Planning and security	Continual professional development	Diagnostics
• Communicate with colleagues and patients • Call the healthcare facility to deal with emergency cases	• Gather demographic profiles and healthcare conditions of patients	• Appointment reminder/ plan which households to visit • Identify the exact address/location of patients • Referral/booking system for appointment • Track progress of CHW targets • Track patient progress	• Access to training materials • Enable objective assessment	• Checklist to assess the condition of patients and refer them to emergency services, if necessary

Source: GSMA mHealth, Understanding the Needs and Wants of Community Healthcare Workers, South Africa, August 2014

Education of Front Line Health Workers (FLHWs) is one key health application area

"The education and awareness category includes mHealth tools that support FLHWs to refresh their knowledge on health practices ("mLearning"), and/or support FLHWs ….. during counseling sessions with patients and their families. This was the second most common category of mHealth tools in our database research… suggesting a strong inclination by organizations to focus on using mHealth tools for FLHW capacity building."

"The literature found that mobile phones were being used by FLHWs as a tool to **disseminate and gain knowledge through peer-to-peer networks**, and that mobile job aids not only reduced workload, but also improved adherence to national treatment guidelines, leading to decreased error rates"

Source: H Batavia and N Kaonga,, *mHealth Support Tools for Improving the Performance of Frontline Health Workers* , mHealth Alliance, March 2014

Clinical support is another key health application

"A suite of mHealth tools are used to support FLHWs delivery of quality patient care, including those that utilize algorithms to assist in clinical decision making, provide checklists to support standardized and recommended care and provide directories to coordinate with other health professionals for referrals and advice."

"The literature found examples of mHealth **clinical decision support tools** for FLHWs in Columbia, Kenya and Papua New Guinea, two of which focused on malaria and helped reduce clinical errors and improve compliance to standard protocols."

"Adapting **checklists** for the mobile platform, to support FLHWs in improving the standard of care in LMICs, was the second most common type of tool in this category ……. The majority of the checklist tools identified focused specifically on post-partum hemorrhage and severe pre-eclampsia and eclampsia, diseases both related to maternal health "

Source: H Batavia and N Kaonga,, *mHealth Support Tools for Improving the Performance of Frontline Health Workers* , mHealth Alliance, March 2014

There are emerging patterns of use of mHealth by frontline health workers

"Most mHealth tools for frontline health workers are focussed on supporting patient monitoring, reinforcing learning and strengthening counselling during home visits, through pre-loaded java-based applications"

"Research found a notable shift from "single-function" and "single-disease" mHealth tools, to more integrated solutions that cut across the roles and responsibilities of a frontline health worker, and content related to multiple diseases and commodities."

"The Malaria Consortium and its partners have used CommCare to create an integrated solution for frontline health workers to support malaria diagnosis, treatment and care with a decision support tool, an interactive counselling guide, a patient registry and a mechanism for monitoring FLHW performance in Uganda and Mozambique."

" Preloaded applications on mobile phones most commonly supported FLHWs to deliver counseling messages to pregnant mothers and their families or access refresher learning modules for their own education."

In cases where a single-disease mHealth tool was identified:
"it was typically concerned with HIV/AIDS, reproductive health, pregnancy complications, malaria or child survival."

Source: H Batavia and N Kaonga,, *mHealth Support Tools for Improving the Performance of Frontline Health Workers* , mHealth Alliance, March 2014

Increase in application of mHealth by frontline health workers is driven by various factors

"This trend towards integrated solutions is largely driven by the scale-up of cloud-based mobile platforms that provide the infrastructure to easily develop, manage and monitor unique mobile tools for frontline health workers (FLHWs)."

"This trend is combined with increased mobile phone ownership, and improved technical literacy of FLHWs in low and middle income countries , providing the infrastructure required to deploy an mHealth solution. "

BBC Media Action found that over 90% of a cadre of Front Line Health Workers in India owned a basic mobile phone.

"Development of mHealth tools has become increasingly cost-effective and accessible, even amongst organizations with minimal technical expertise".

Source: H Batavia and N Kaonga,, *mHealth Support Tools for Improving the Performance of Frontline Health Workers* , mHealth Alliance, March 2014

Support to citizens

Mobile "apps" for health information for the citizens of the developing world have begun to take off

Medafrica App

MEDAFRICA APP

Your medical content and information library that enables you to get certified information that enhances your well being from validating a doctor to locating a hospital to monitoring of symptoms to getting diet and drugs information amongst others.

Hesperian Safe Pregnancy and Birth App

Staying Healthy During Pregnancy

Danger Signs During Pregnancy

Danger Signs During Birth

Danger Signs After Birth

How To...

Mobilium Smart Health App

Most current mobile phone health information applications use SMS text messaging

Source: mHealth Compendium, African Strategies for Health Project, Management Sciences for Health, USAID, 2012.

Text messaging can be a low cost and effective form of mHealth but has several limitations:

(i) Users need to be literate

(ii) Mobile network connections are required

(iii) Message content and timing tends to be "pushed" by the sender rather than "pulled" by the user; messaging does not provide a constantly available underpinning health information resource

There are solutions to these problems such as use of audio, pictures and video and pre-loading information onto phones or cheap memory cards

Examples include the *Hesperian Pregnancy App* and the *HealthPhone* video library

HealthPhone™
HEALTH IN YOUR HANDS

HealthPhone™ is a personal video reference library and guide to better health and nutrition practices, for families and communities, including the illiterate, in their language, distributed on mobile phones.

What every health worker, family and community has a right to know

- Over 2,500 videos in our library
- Free Downloads for phones, tablets, PCs
- Customised apps, microSD memory cards

Now in **77** Languages

- HealthPhone™'s health and nutrition content is scripted on knowledge prepared jointly by UNICEF, WHO, UNESCO, UNFPA, UNDP, UNAIDS, WFP and The World Bank.
- It addresses the main areas of concern: Timing Births, Safe Motherhood and Newborn Health, Child Development and Early Learning, Breastfeeding, Nutrition and Growth, Immunization, Diarrhoea, Coughs Colds and More Serious Illnesses, Hygiene, Malaria, HIV, Child Protection, Injury Prevention, Emergencies: preparedness and response.
- This knowledge, in 77 languages, is pre-loaded on microSD memory cards for popular low-cost mobile phones – no signal is required and there is no download cost.

However, so far, only a few mHealth applications empower citizens with off-line health information

A HIFA review of 1700 mHealth programmes found less than 10 that empowered citizens in low-income countries with off-line information on their phones for them to consult as and when they needed it .

First Aid App — American Red Cross

Health eVillages — Health eVillages™

HealthPhone — Mother & Child

Safe Pregnancy and Birth App — hesperian health guides

One World — one world

mMitra — armman

Malezi-Bora — SAVING LIVES AT BIRTH:

Scientific Animation Without Borders — SAWBO™

Newborn Care Series — Global Health MEDIA PROJECT

Source: C Hagar School of Library and Information Science, San Jose State University see www.hifa2015.org/the-first-hifa-smart-goal-mobile-healthcare-information-for-all/
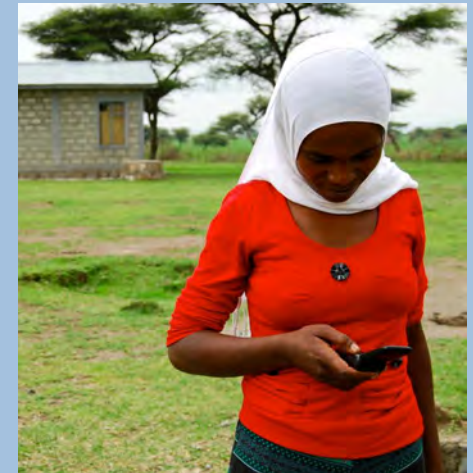
3. Some challenges for use of mobile phones in health care in developing countries

There are many challenges in developing mHealth

- For *financial sustainability* in the developing world mHealth applications will probably need to be "at cost" - similar to essential drugs
- Importance of *tailoring the technology to the situation* e.g. a maternal health application had originally intended to use text messaging but switched to voice messaging when participant literacy levels were checked
- Difficulties in *scaling up pilots* are sometimes owing to technical issues such as lack of access to smartphones but often because funding is available only for short pilots or insufficient attention is paid to getting key people on side
- Concerns about *security of private health-related information*, although many users, e.g. younger people, were less concerned about this than is often assumed
- Concerns about personal security - *risk of theft* of phones
- Need to guard against *risk of widening health inequalities*– technology is not always the answer – keep things simple!
- Some development is being slowed by *fears of legal action* if an application leads to a wrong diagnosis
- The *corporate ownership of software* is a problem in developing countries – although open source software is becoming more used
- Potential problem with indiscriminate use of *unevaluated information or software applications* – but hard to get funding for evaluative work.

Various factors have been perceived to impede the use of ICTs in communicating health information

Table 7.3 Factors impeding the use of ICTs for the fight against HIV/AIDS.[16] Values shown are percentages of sample (n = 990)

Factor	South Africa (%)	Tanzania (%)
Inappropriate language	81	58
Inappropriate and embarrassing messages	73	49
Lack of information, education and communication materials	80	81
Lack of feedback mechanism	82	67
Lack of enabling ICT policies	82	63
Poor infrastructure/physical access	86	80
People's attitudes	85	75
Traditional/cultural beliefs	87	80
Cost	85	68
Illiteracy	90	81

Source: AfriAfya face to face survey of 900 respondents conducted in 2004 , cited in*Telehealth in the developing world*. eds R Wooton, N G Patil, R E Scott and Ho, International Development Research Centre, and Royal Society of Medicine Press, 2009

Proximate and Contextual factors are both important

Some key success factors
• User engagement in project e.g. on user interface design
• Buy-in from key local and national stakeholders
• Training e.g. on use of mobile devices
• User literacy
• Meeting security concerns e.g. about theft of mobile devices
• Attention to social factors e.g. possible impact on work-life balance
• Sustainable funding arrangements

Source: *Telehealth in the developing world*. eds R Wooton, N G Patil, R E Scott and Ho, International Development Research Centre, and Royal Society of Medicine Press, 2009

A cascade of criteria need to be met for a mHealth application to be successful in low resource settings
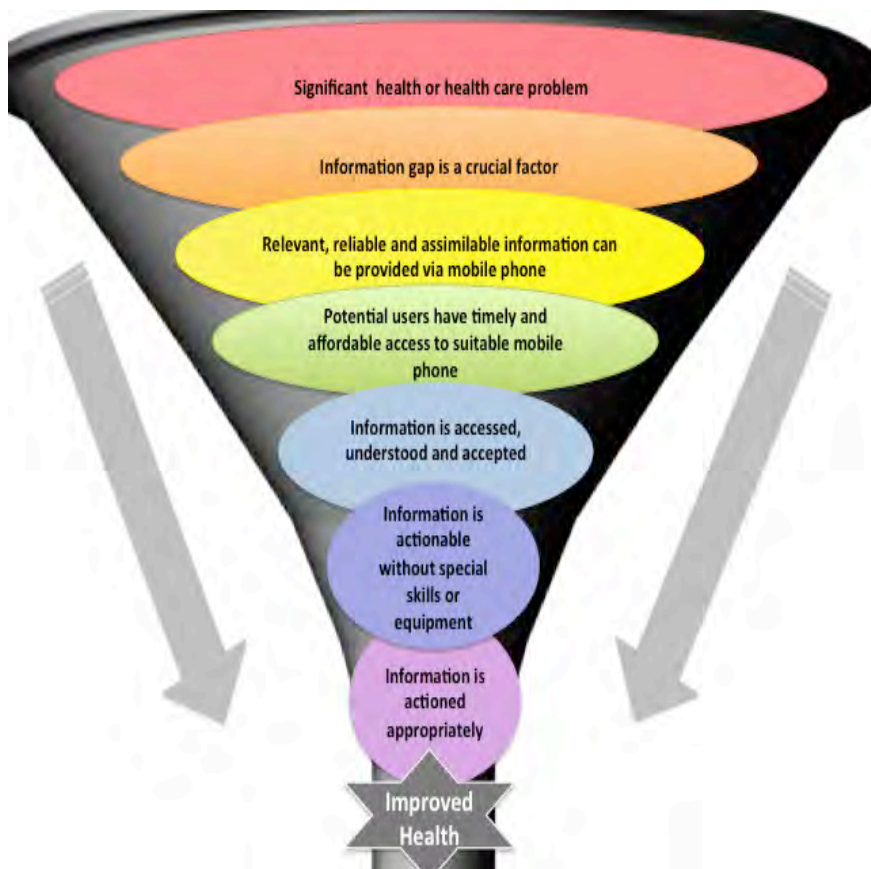
- **Significance of the health problem(s)**: Is the application focused on a significant health or healthcare problem - a widespread serious condition, or an emergency or urgent need?
- **Appropriateness of the targeting**: is the application aimed at use in low resource settings or by low income or other priority groups e.g. mother and child, health educators?
- **Value of the information**: Is the information relevant to users' needs for addressing the health problem; is it reliable; can it be easily related to practical action?
- **Ease of assimilation of the information**: is the information presented in an appealing and easy to understand way such as a video; is it available in local language(s)?
- **Availability of the application**: is the application available across several regions or countries; is it available free to the user?
- **Technological accessibility of the application**: does it have a simple and intuitive user interface, is it accessible on a basic or featurephone; will it work "offline"; will it work on multiple operating systems; is it pre-loaded?

Ref: www.hifa2015.org/the-first-hifa-smart-goal-mobile-healthcare-information-for-all/

Three concluding questions about mHealth in low resource settings

Many issues need clarification if mHealth is to develop appropriately in low resource settings

For example, in low resource settings :

- How far can the phone replace paper?
- How fast will be the switch to feature or smartphones?
- How extensive is the evidence of process and outcome improvements through mHealth applications?

Some points on these issues are made in the following three slides…………

How far can - or should - the phone replace paper in low resource settings ?

- Paper-based information often still the medium of choice in low-resource settings but there are examples of organizations testing the feasibility and cost-effectiveness of replacing paper-based case management tools with mHealth tools and achieving favorable results. E.g.
    - Thailand's malaria program scaled-up the use of mHealth tools for patient case registration and follow-up, following a pilot project testing the feasibility with Front Line Health Workers (FLHWs).
    - A study in Kenya illustrated the feasibility of using mobile video to support FLHWs in remote monitoring of TB patients. This worked by partnering with a patient's treatment partner (as part of the Directly Observed Therapy (DOT) model) to take and send videos to FLHWs of patients taking their medication.

The recent report by the mHealth Alliance sets out a three-step process for adapting paper-based content into mobile-friendly content (pages 32-34)

A note of caution?:
"A recent randomised trial found that teenagers who read material on a printed page understood the text significantly better than those who read the same material on a screen"
M Tobin. Put down your smartphone and pick up a book*. BMJ 2014; 349*

Source: H Batavia and N Kaonga,, *mHealth Support Tools for Improving the Performance of Frontline Health Workers* , mHealth Alliance, March 2014 – see refs 17,18 and 19.

How fast will be the switch to feature or smartphones in low resource settings ?

- Pre-loaded applications on smartphones and java-based phones are the most common format for mHealth tools for frontline health workers (FLHWs)
- However, applications that have scaled up have mostly used low-cost basic technology such as interactive voice response (IVR)
- Obstacles to achieving scale of pre-loaded applications on smartphones and java-based phones include the costs of hardware and data transmission, availability of power for charging, and managing the logistics of training and support.

Source: H Batavia and N Kaonga,, *mHealth Support Tools for Improving the Performance of Frontline Health Workers* , mHealth Alliance, March 2014

However, costs are dropping rapidly – Mozilla is releasing a smartphone that costs about £20; memory cards that can hold an entire library of videos can be obtained for not much more than £1

A note of caution?:
"While most community health workers would like bigger touch screens, they are wary that these may make them targets for robbery"
From GSMA mHealth, Understanding the Needs and Wants of Community Healthcare Workers, South Africa, August 2014

How extensive is the evidence of process and outcome improvements through mHealth applications in low resource settings ?

There is some encouraging evidence, particularly on process improvement -mobile phones have been shown to improve access to health services for remote populations, improve training of healthcare workers and disseminate information to the community

Notes of caution?
- **Most evaluation of mHealth projects in low-income countries has focused on technological inputs or job performance rather than health outputs**
- **There has been very little evaluative attention to contextual factors (e.g. device sharing) which promote or inhibit adoption of mhealth at the margins of healthcare systems**
- **There has been very little evaluation of cost-effectiveness aspects of mHealth in low resource settings**

Source: A Chib The promise and peril of mHealth in developing countries, *Mobile Media and Communications*, 1 (1), 69-75, 2013

To illuminate these and other issues we need more information about experiences in applying mHealth in low resource settings!

Geoff Royston   September 2014