Smart Health – CSE 40816

University of Notre Dame
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eHealth & mHealth

- eHealth: Using information and communication technology (ICT) for health services and information.

- mHealth: Using mobile communications for health services and information.

mHealth

- "mHealth is the biggest technology breakthrough of our time [being used] to address our greatest national challenge" US Health and Human Services Secretary Kathleen Sibelius in 2011 mHealth Summit keynote

- "the use of devices such as smartphones or tablets in the practice of medicine, and the downloading of health-related applications or 'apps'… [to] help with the flow of information over a mobile network and … improve communication" AHIMA Guide 2013

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mHealth Applications

- Rapid collection/sharing of current data via mobile phones

- Public health and lifestyle messages over mobile phones

- Medication alerts using mobile phones

- E-prescribing for repeat prescriptions via mobile phones

- Tele-monitoring to transmit patient results to clinicians

- Transmission of test results to patients via SMS messages

- Online electronic health records via computer or phone

- Clinical emergency care for accidents, natural disasters

- Patient appointment booking and alerts via wireless e-mail (continuity of care)

mHealth – From Simple to Complex

Simple ← → Complex

Single use mHealth
Focuses on a single purpose for a single user, typically consumer initiated:
· smartphone apps and wearable tech products that support the user to record data which may be communicated to others
· consumer driven, focus on wellness, diet and exercise.

Social mHealth
Drawns upon the support and encouragement provided through social networks:
· gamification and competition based apps which encourage users to meet goals
· consumers likely to pursue activities independently.

Integrated mHealth
Links apps and devices with the formal healthcare system:
· mobile technology linking patients and HCPs
· tailored to multiple end users: consumers, physicians and administrators.

Complex mHealth
Leverages advanced, integrated analytics for decision support:
· predictive analytics applied to complex data generated through mHealth applications
· focus on achieving optimal management of a specific disease.

Source: Four Dimensions of Effective mHealth, Deloitte US Center for Health Solutions, 2014

Emma's Journey Towards Smart Health

Emma feels ill.

She books an appointment online with her physician.

Emma's Journey Towards Smart Health

Her physician prescribes her medical tests at the hospital. He books an appointment for her at the hospital with the specialists by directly checking their agendas.

On the appointed day, Emma checks herself in at the hospital before she meets with the doctor.

Emma does the requested health tests. The information is recorded in the hospital electronic record and automatically sent to the National Electronic Record.

Emma's Journey Towards Smart Health

Before leaving the hospital, Emma goes to a payment station at the hospital, scans her Social Security Card, gets the invoice, and pays directly with her mobile.

She goes back home and waits for the results.

Emma can have access to her medical record on her mobile phone (incl. lab results, medication, radiology results, pathology results) via a secure patient app developed by the hospital. The results are now available. Emma receives a notification and an appointment is automatically suggested to Emma to meet with the physician.

Emma meets with the physician. Unfortunately, Emma has chronic heart failure. She discusses the results and the alternatives for treatment.

Emma is an architect, she's very busy. She doesn't have time to visit her physician at his office every month. She's wearing a smart watch that is constantly measuring specific parameters and sending them in real time to her physicians. Also, once a month Emma has an e-consultation to refill her prescription and check on her health conditions.
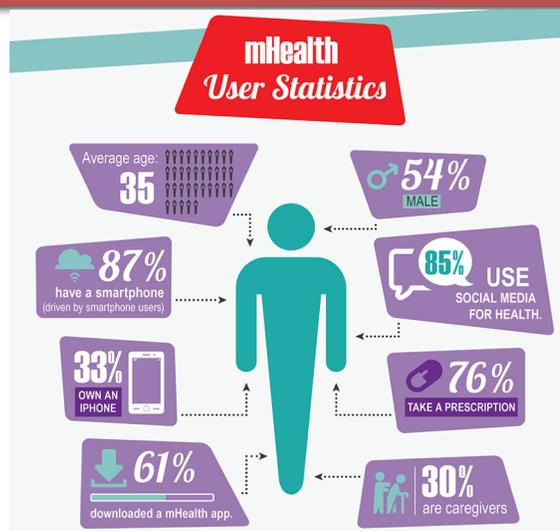
Emma's Journey Towards Smart Health

Emma connects with other patients suffering from heart failure on a patient network (sharing data on their health conditions, treatments, etc.)

Emma wants to support the development of research in chronic heart failure. She agrees to participate in a clinical trial for a new medical connected device. Her data is collected and analyzed to assess the accuracy and efficiency of the device.

mHealth

mHealth
User Statistics

Average age: **35**

♂ **54%** MALE

☁ **87%** have a smartphone (driven by smartphone users)

85% USE SOCIAL MEDIA FOR HEALTH.

33% OWN AN IPHONE

💊 **76%** TAKE A PRESCRIPTION

⬇ **61%** downloaded a mHealth app.

30% are caregivers

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Healthcare Professionals' Mobile Use

- >4 in 5 physicians, nurse practitioners, and physician assistants use smartphones daily
- >50% of physicians and 40% of nurse practitioners and physician assistants use tablets daily
- 47% of US clinicians use smartphones and tablets during the day
- Tablet and smartphone usage accounts for 40% of clinicians' screen time
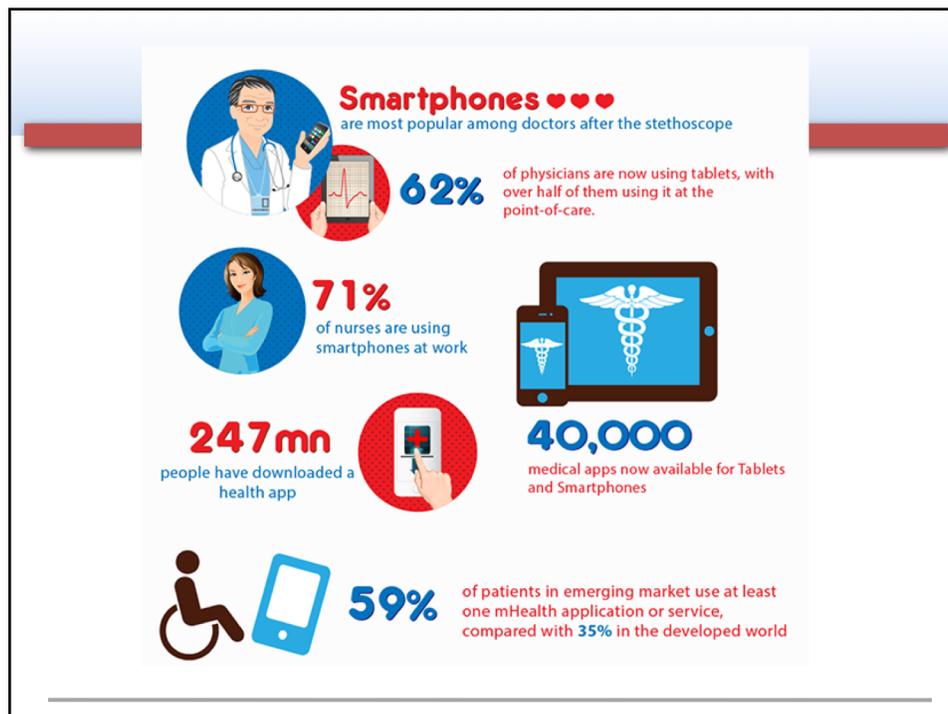
Text Messages

- Text messaging can be an effective tool to improve patient outcomes along the HIV care continuum.

Cell phones have become indispensable tools

>100
TEXT MESSAGES A DAY

1 in 3 adolescents sends more than

73% Teens own a smart phone

85% African American teens own a smart phone
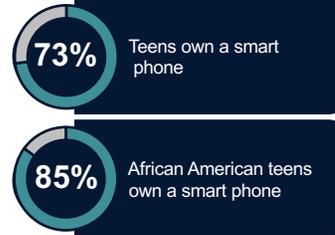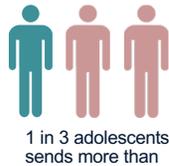
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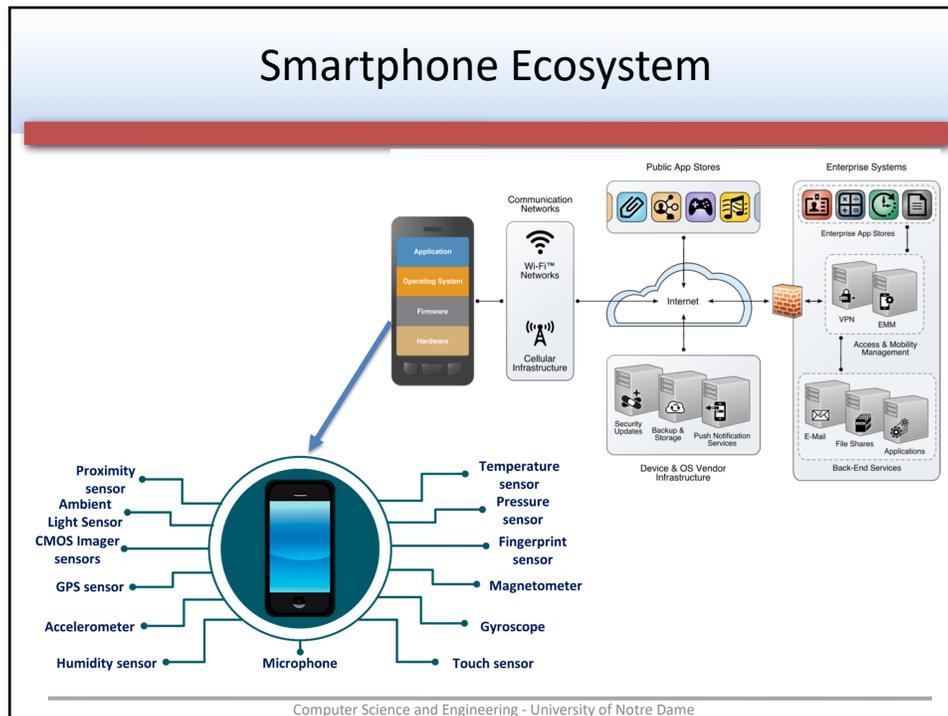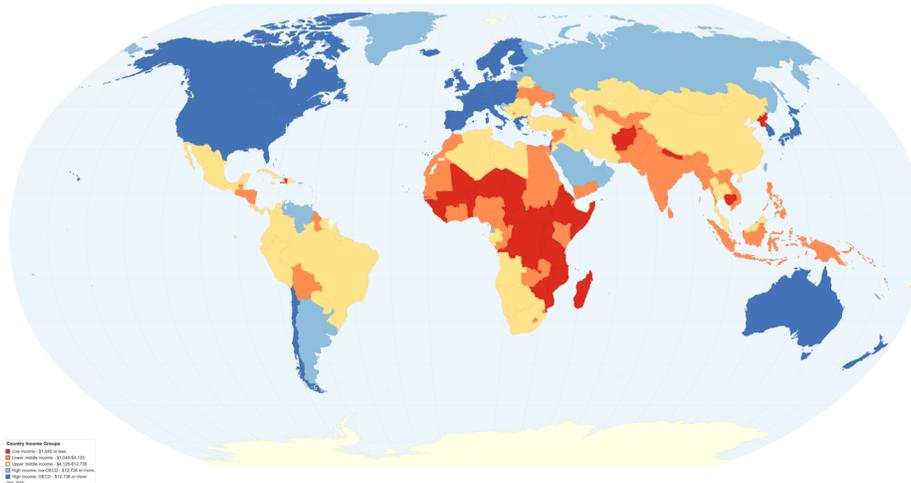
Text Messages

Automated Text Messaging
- Medication Reminders
  - *"Did you take your medication at 9:00am? Please reply yes or no."*
- Appointment Reminders
  - *"Your appointment with The SPOT is in 2 days, on 12/28. If you cannot make the appointment for any reason, reply 1."*
- Mood Check-Ins
  - *"We are always here to help. How are you doing today? Reply 1 if better than usual, 2 if same, 3 if worse than usual."*
- Social Service Needs (Housing/Bills)
  - *"You once mentioned concerns about housing. Do you think you'll have trouble with any upcoming bills? Please reply yes or no."*

Smartphone Ecosystem

LMIC

- WHO Member States are grouped into 4 income groups (low, lower-middle, upper-middle, and high) based on the World Bank list of analytical income classification of economies for the fiscal year, which is based on the Atlas gross national income per capita estimates (released July annually). See the Notes sheet in each spreadsheet for more information.
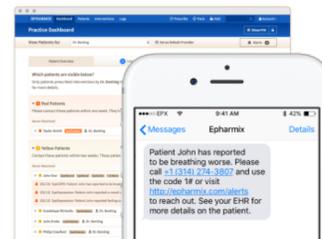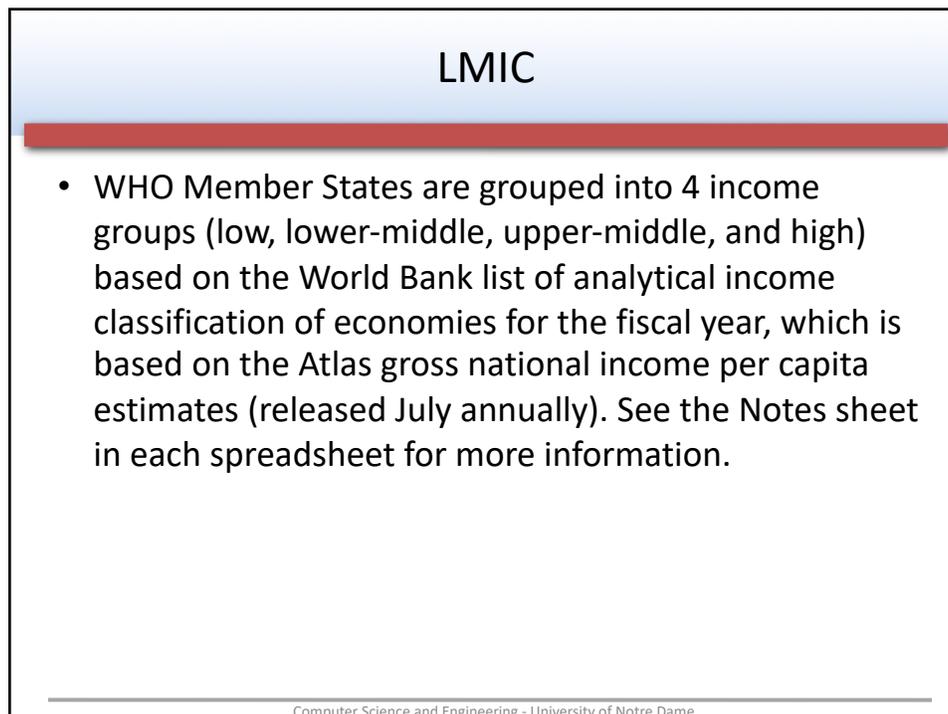
LMICs (WHO)

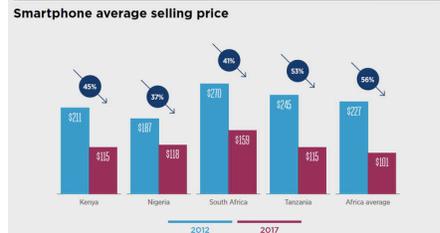Computer Science and Engineering - University of Notre Dame

mHealth in Africa

- Three-quarters of the population have a SIM connection (747 million people)
- Around a third of mobile users (250 million) have a smartphone.
- The number of mobile Internet subscribers in Sub-Saharan Africa has quadrupled since the start of the decade
- For many users it's the only way they can get online

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